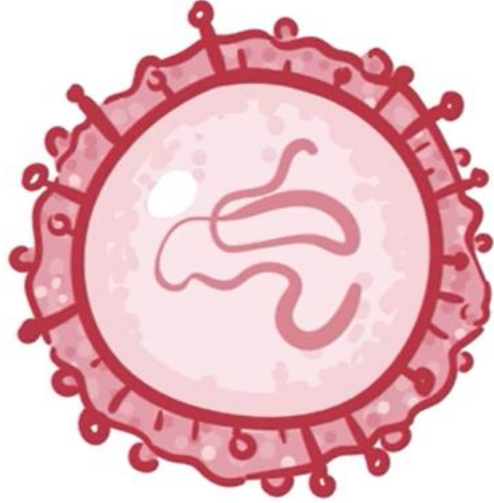




COVID-19

Lesson 1.2: COVID-19

COVID-19



GENETICALLY
SIMILAR

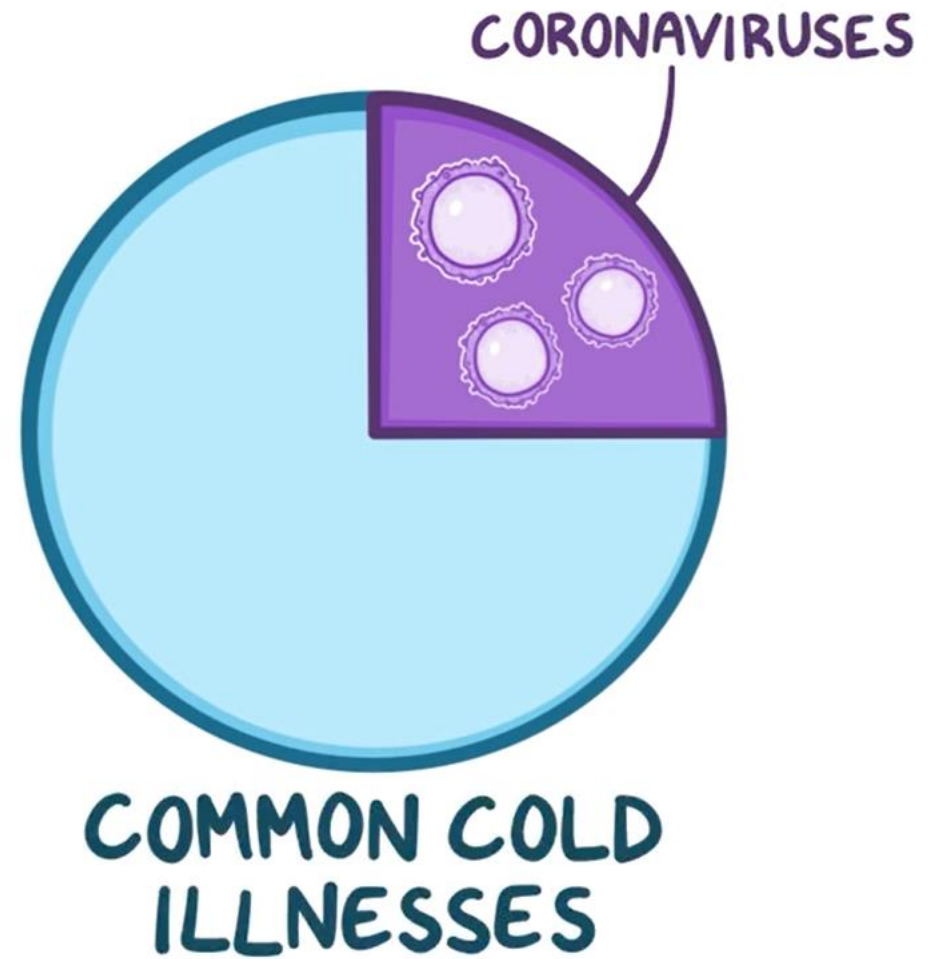
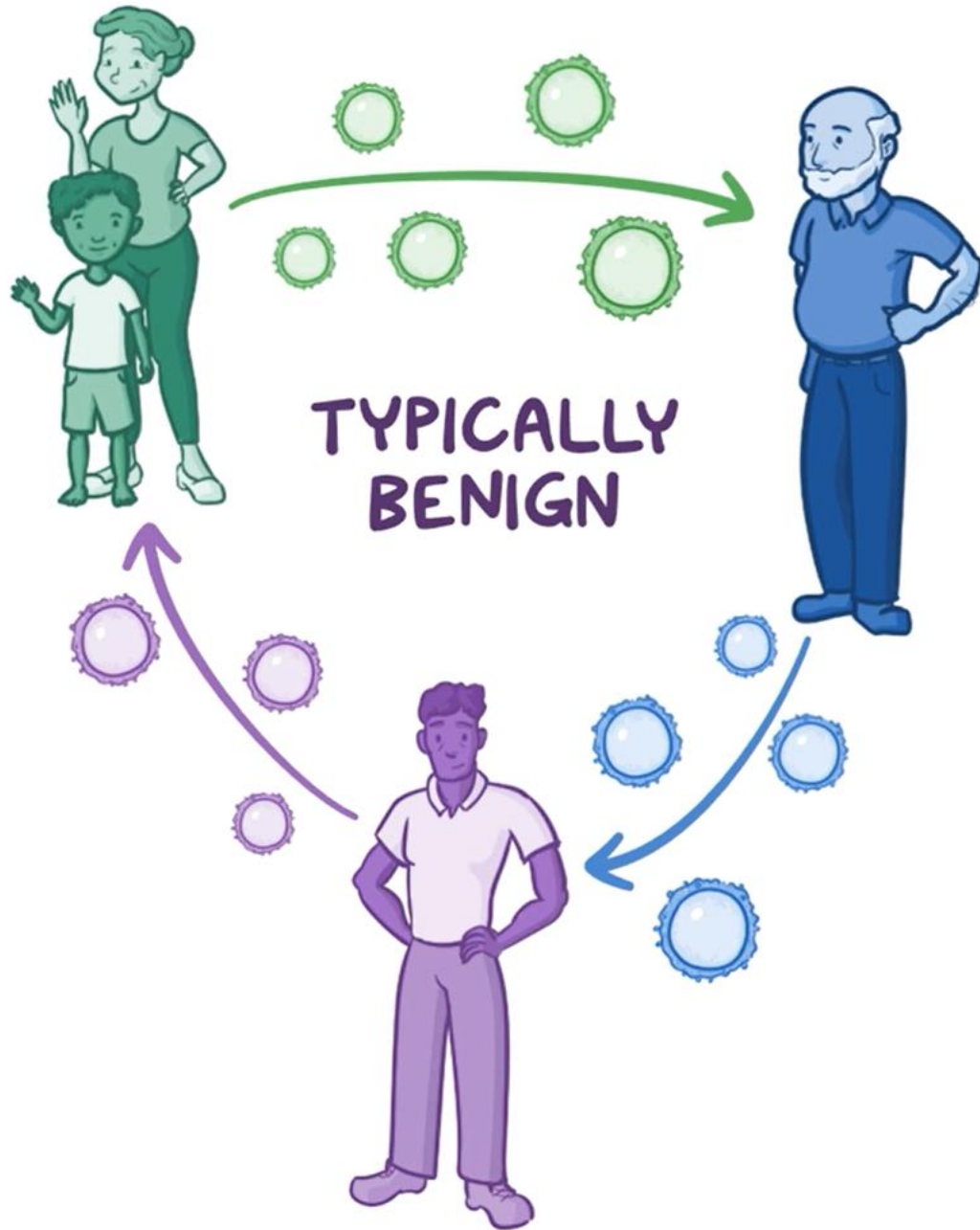


SARS-CoV-2

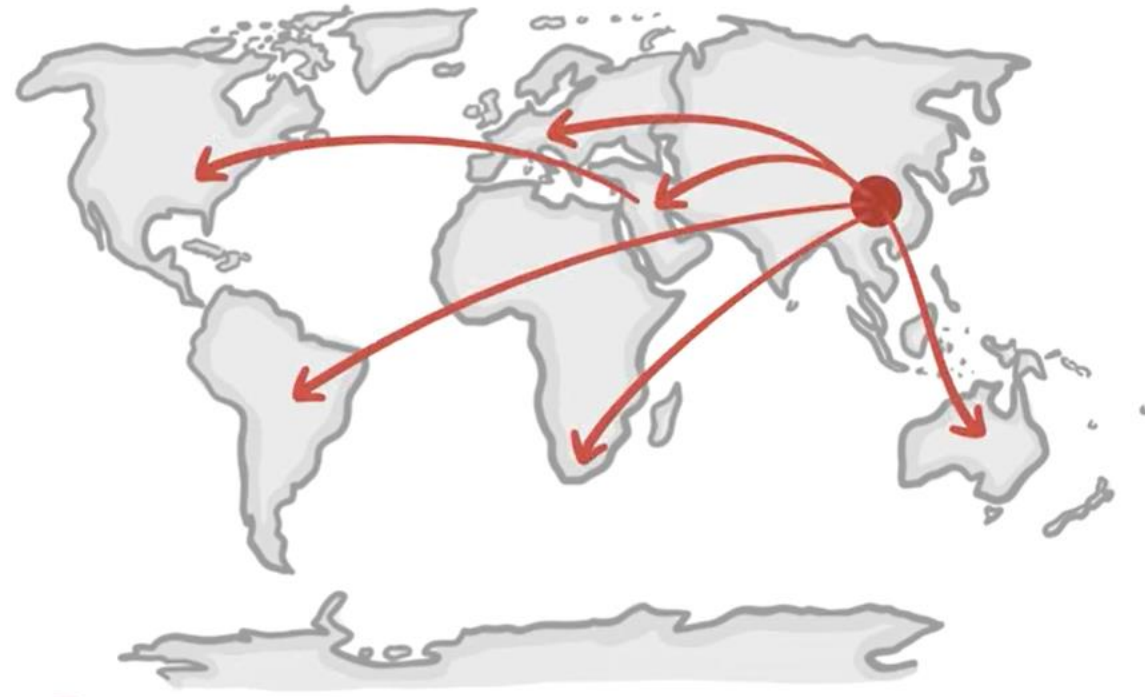
"SEVERE ACUTE RESPIRATORY
SYNDROME CORONAVIRUS 2"

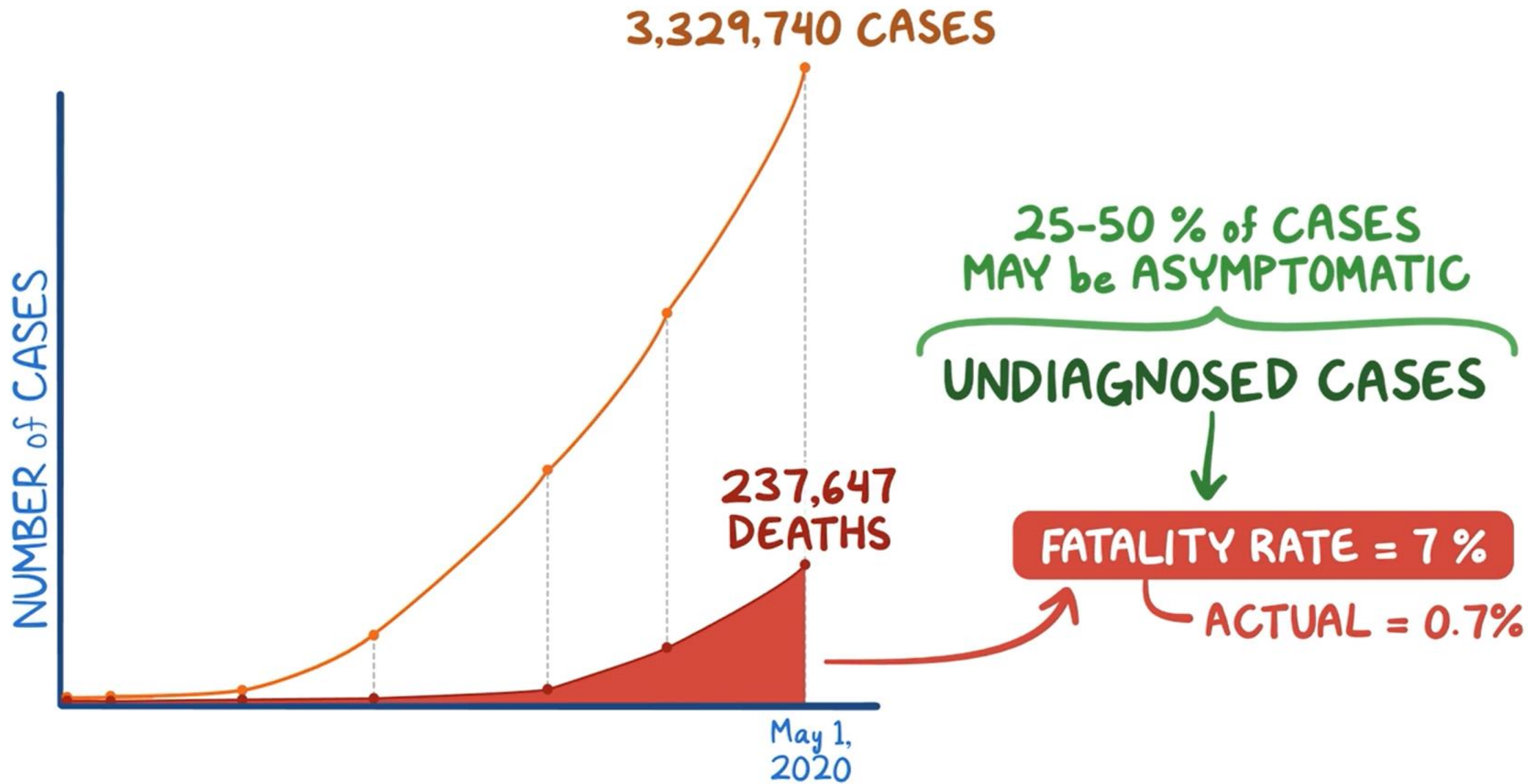
SARS CORONAVIRUS
↳ SARS OUTBREAK in 2002

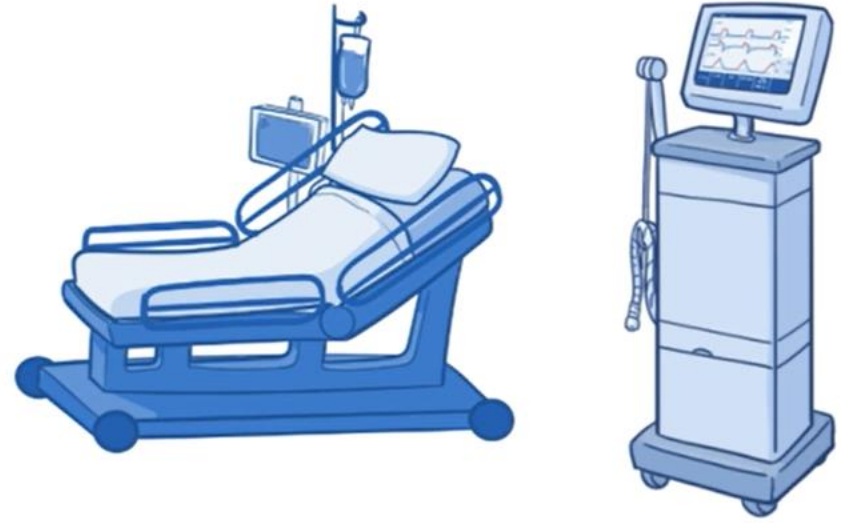
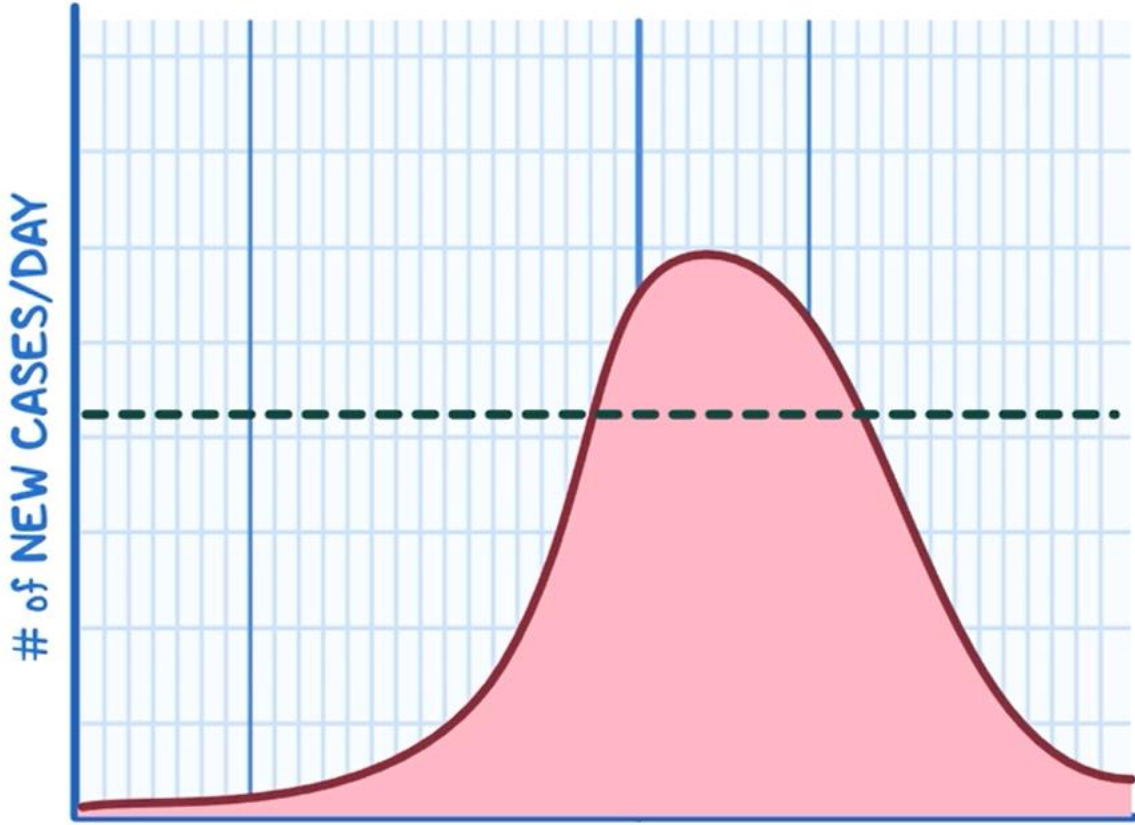




**NATURAL ANIMAL
RESERVOIR**



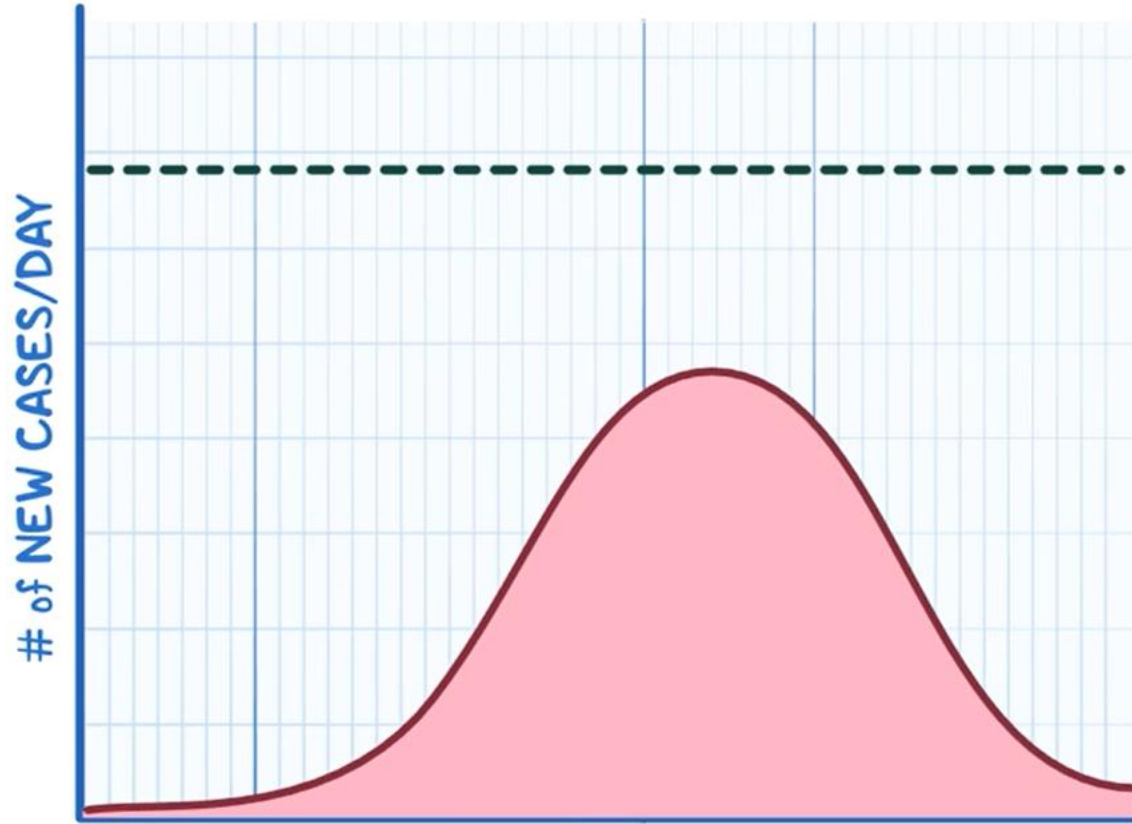




CAPACITY of HEALTHCARE SYSTEM

↳ USUALLY working near FULL CAPACITY





RAISE the LINE

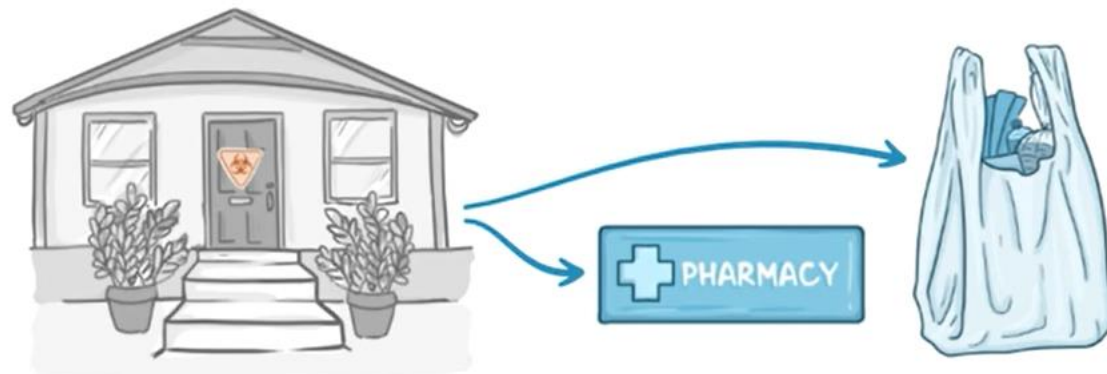
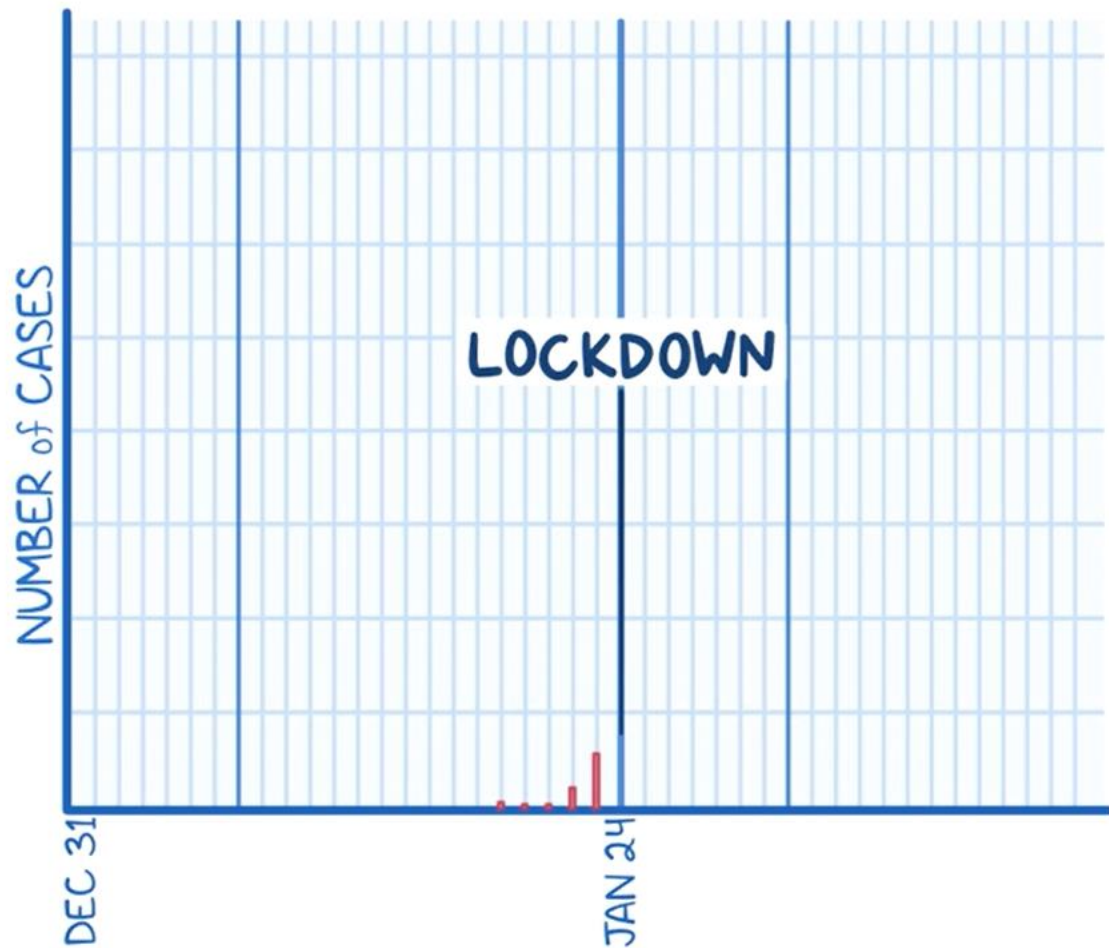
↳ ↑ HEALTHCARE CAPACITY

FLATTEN the CURVE

↳ ↓ TOTAL # of SICK

↳ SLOWS RATE at which NEW PEOPLE get SICK

CHINA



STAY at HOME

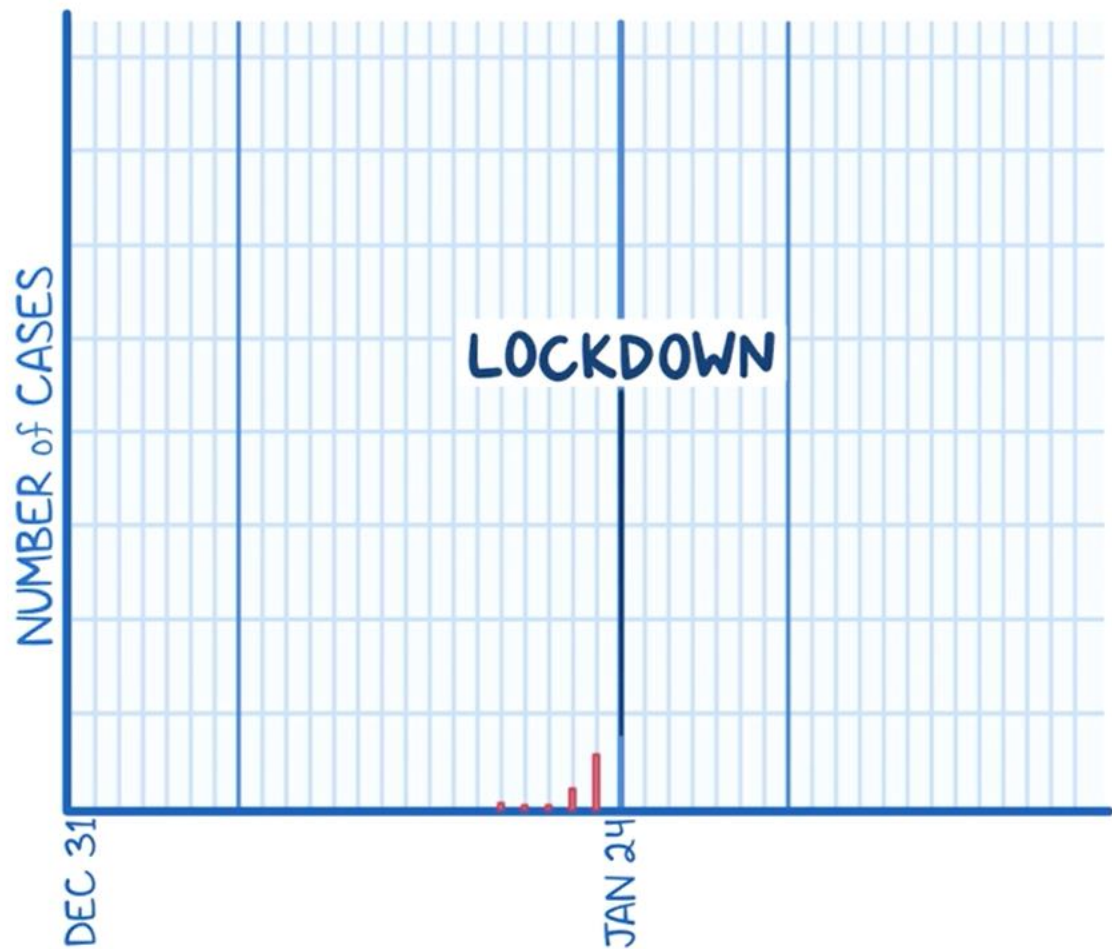


NON-ESSENTIAL BUSINESSES, SCHOOLS,
PUBLIC TRANSPORT SHUT DOWN



ROADS BLOCKED OFF

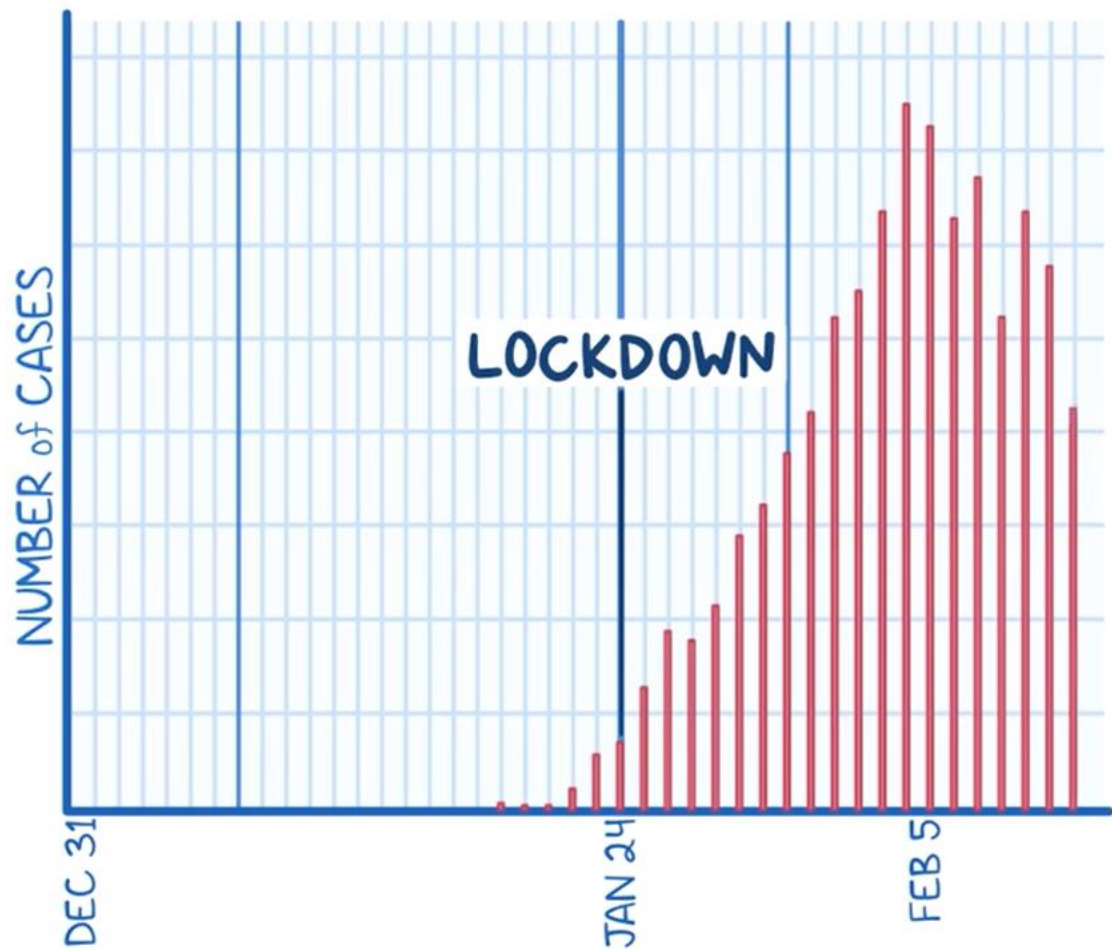
CHINA



EVERYONE SCREENED for SYMPTOMS

* AFFECTED 15 CITIES & 57 MILLION PEOPLE *

CHINA

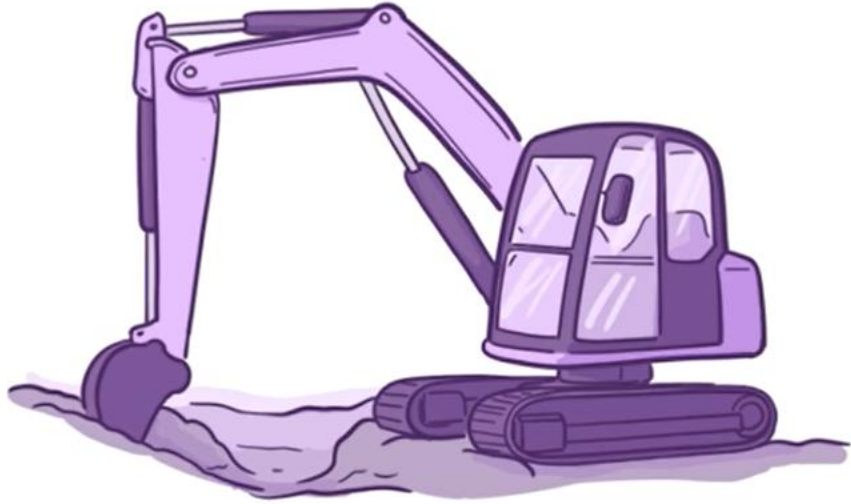


EVERYONE SCREENED for SYMPTOMS

*** AFFECTED 15 CITIES & 57 MILLION PEOPLE ***

CHINA

BUILT MULTIPLE
HOSPITALS



FLEW IN DOCTORS
& NURSES

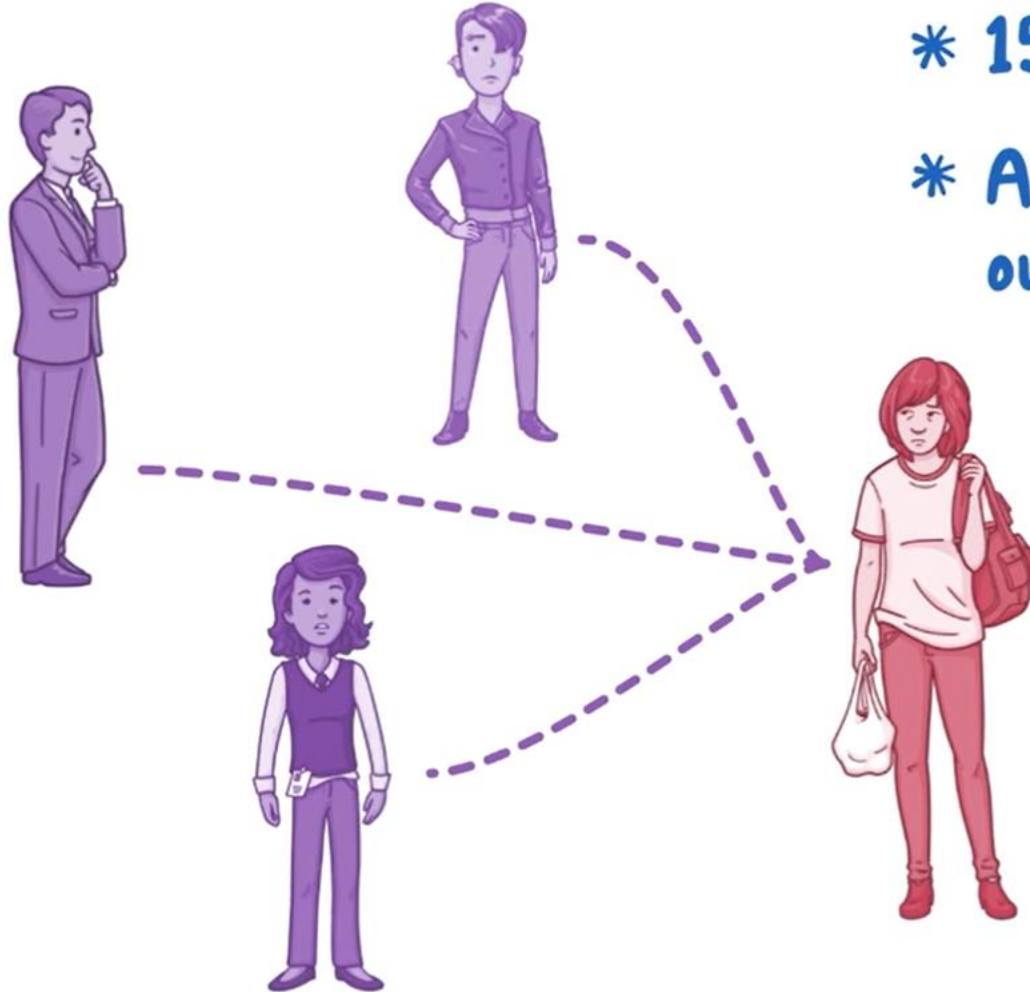
WELL DESIGNED
PPE



- * MARCH → ECONOMY began to RETURN to NORMAL
- * MORE COVID-19 from TRAVELERS

SOUTH KOREA

CONTACT TRACING



MASS TESTING

* 15,000 TESTS/DAY

* APRIL 29th: 601,000 PEOPLE
out of 51,000,000 (1/85)

SEVERE



HOSPITAL

MILD



QUARANTINE FACILITY



SOUTH KOREA



LOCKDOWN of
SICK INDIVIDUAL

vs.

SOCIETAL
LEVEL



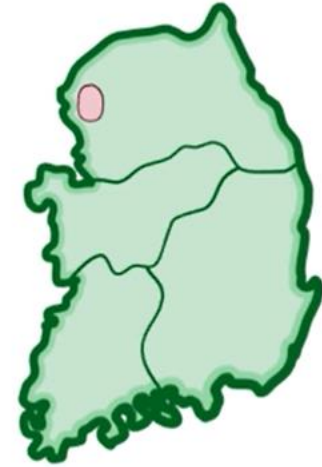
HEALTHCARE SYSTEM
was WELL PREPARED

UNITED STATES

* MOST CASES in the WORLD *



1st CONFIRMED CASE on JAN 19th



APRIL 29th: 520,000 TESTED

DOESN'T INCLUDE TESTING by PRIVATE COMPANIES



UNITED STATES



ONLY SOME STATES have LOCKDOWN
↳ MINIMAL ENFORCEMENT

UNITED STATES

HUNDREDS ILL or
QUARANTINED



INADEQUATE PPE



ICU BEDS have
started to RUN OUT

VENTILATORS in
SHORT SUPPLY

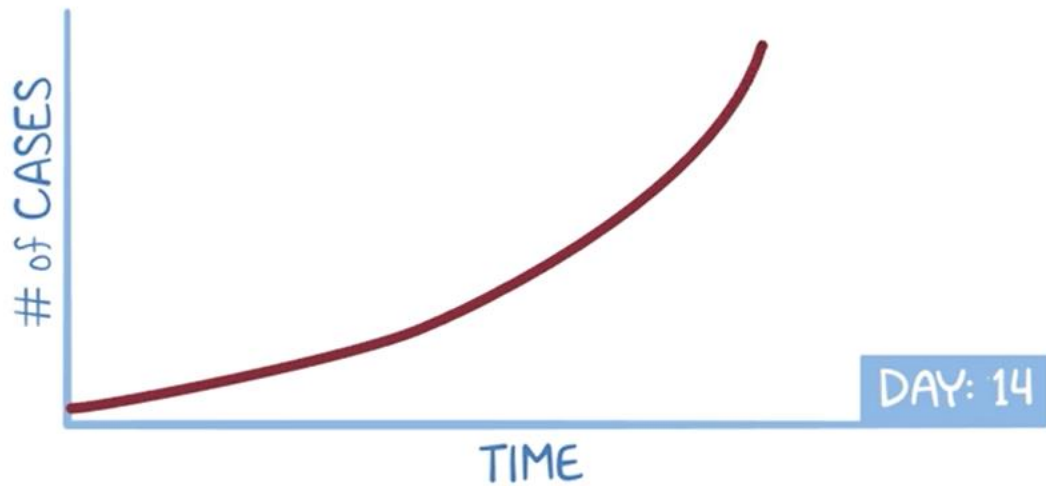


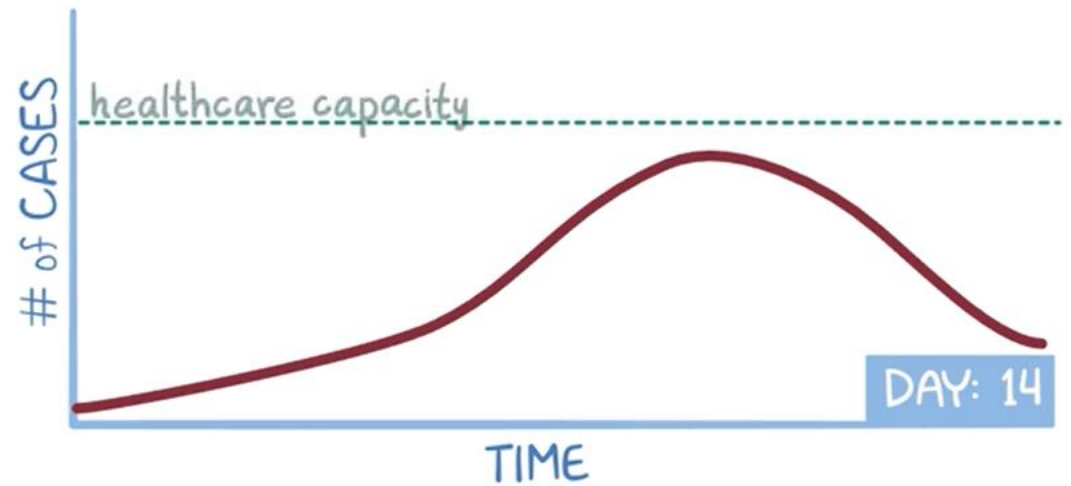
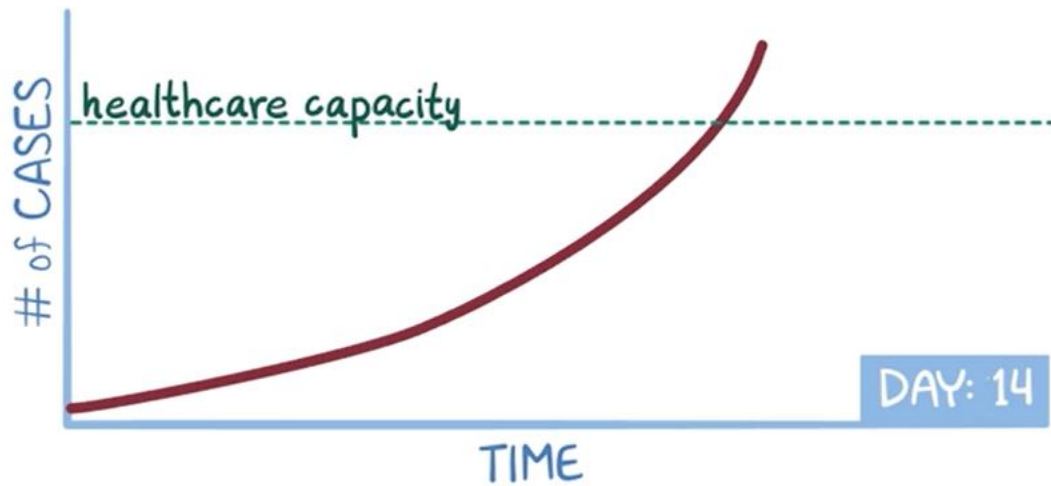
RUNS on
MEDICATIONS

MORTALITY RATES can be HIGH



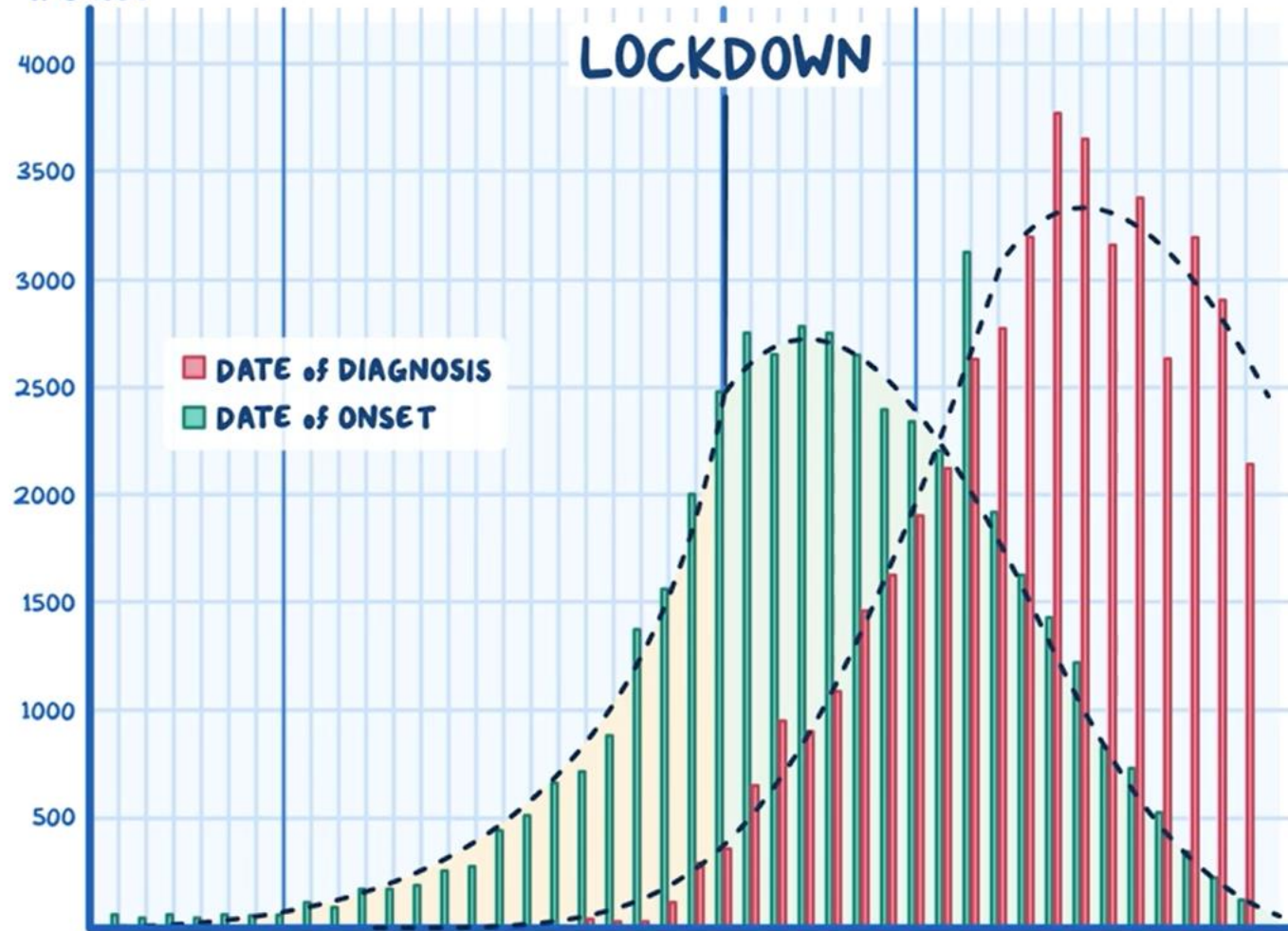
COMPLETE LOCKDOWN can
STOP SPREAD in DAYS





HUBEI

NUMBER
of CASES





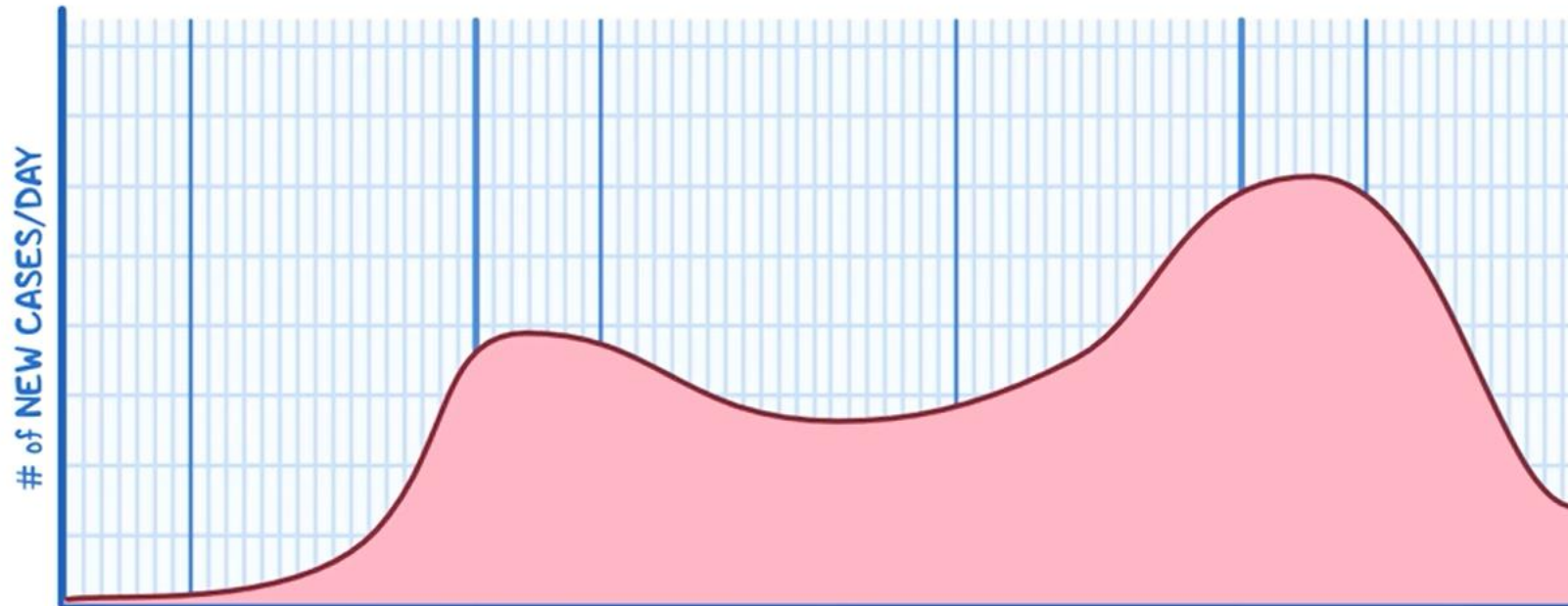
VOLUNTARY SOCIAL DISTANCING is **ONLY** as **EFFECTIVE** as the # of **PEOPLE PRACTICING IT**



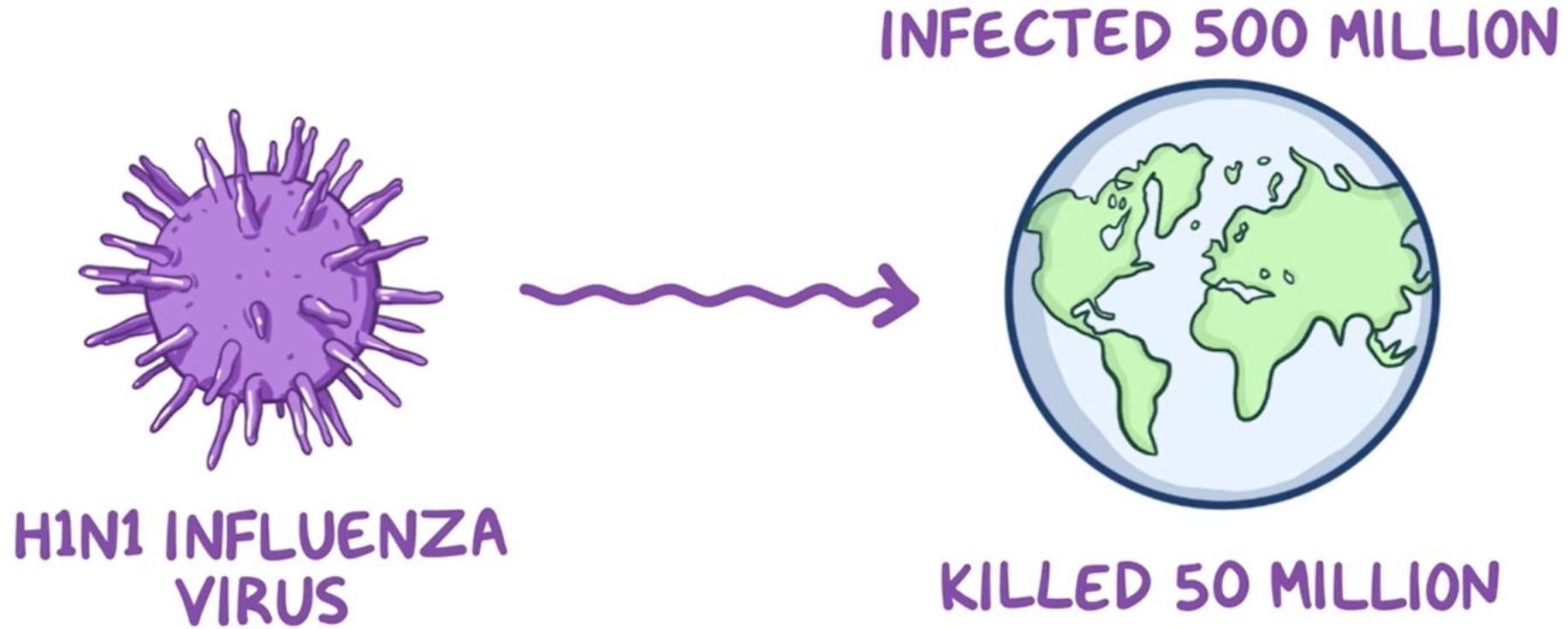
UNDER PRESSURE to EASE RESTRICTIONS



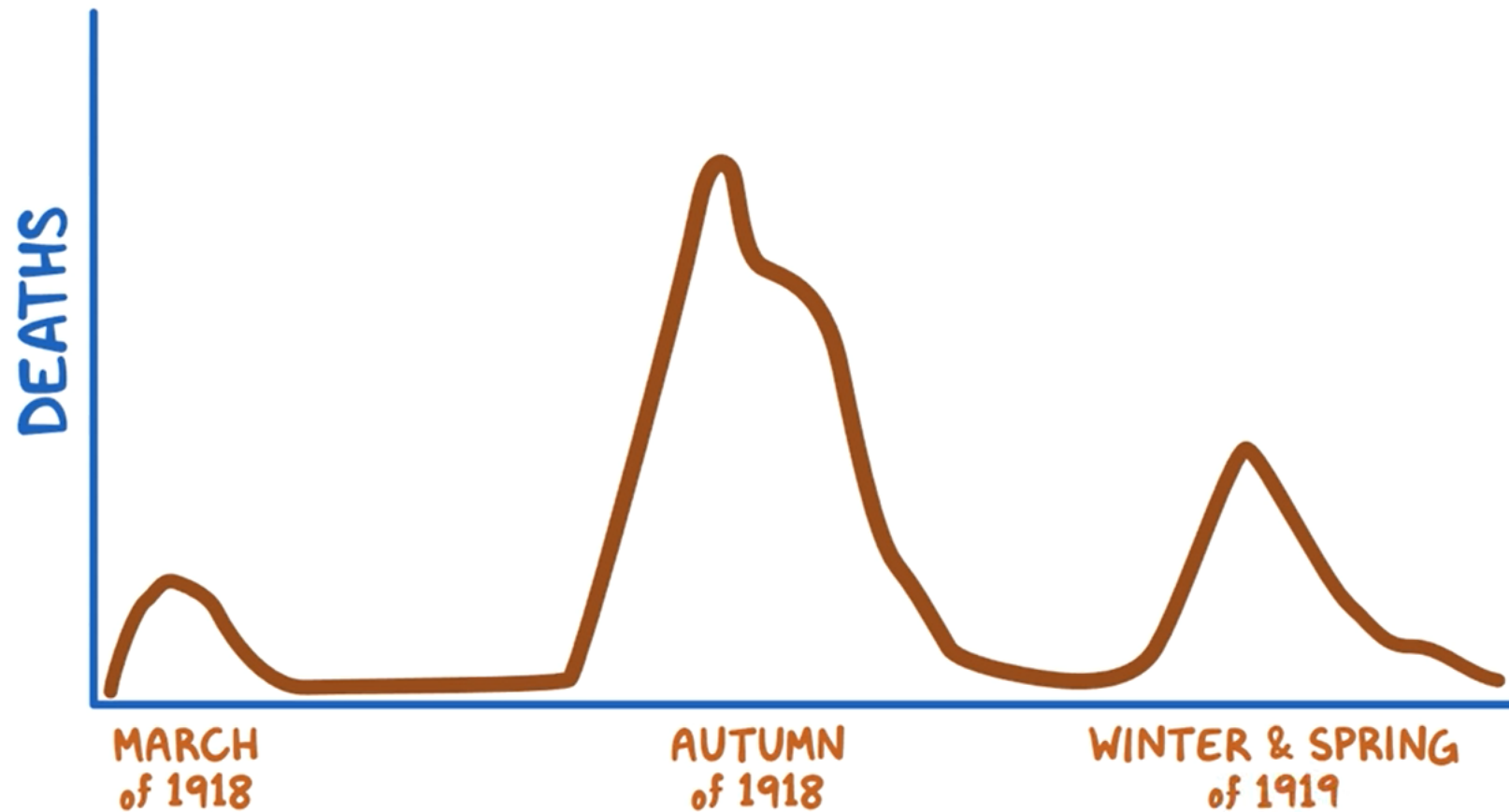
MIGHT EXPERIENCE SECOND, LARGER
WAVE of INFECTED INDIVIDUALS



1918 INFLUENZA PANDEMIC



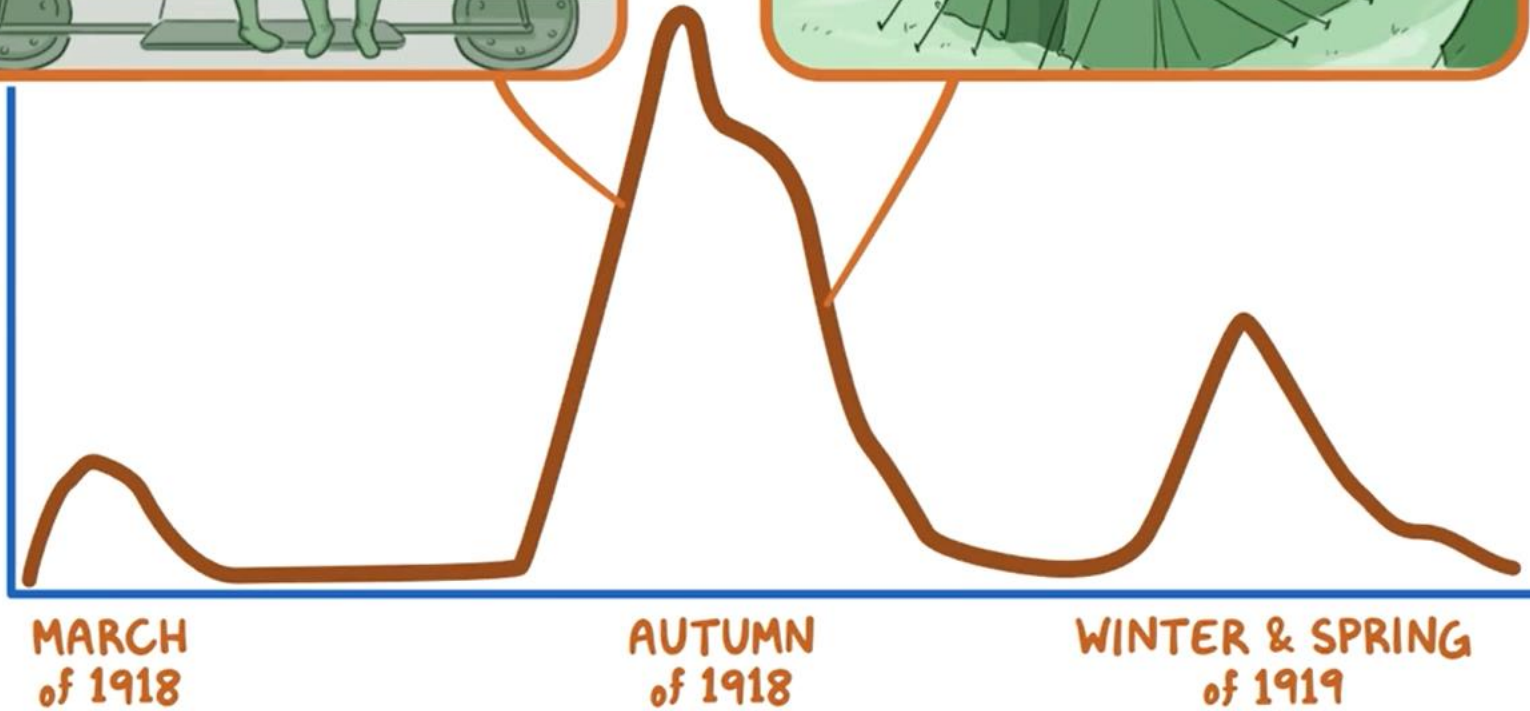
1918 INFLUENZA PANDEMIC



1918 INFLUENZA PANDEMIC



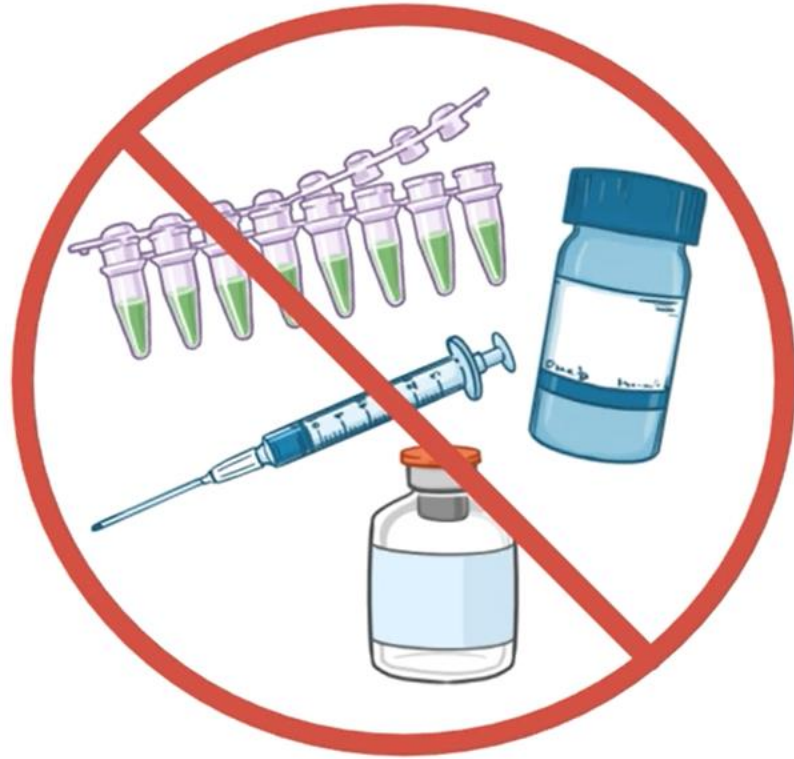
DEATHS



1918 INFLUENZA PANDEMIC



HEALTHCARE WORKERS
were LIMITED



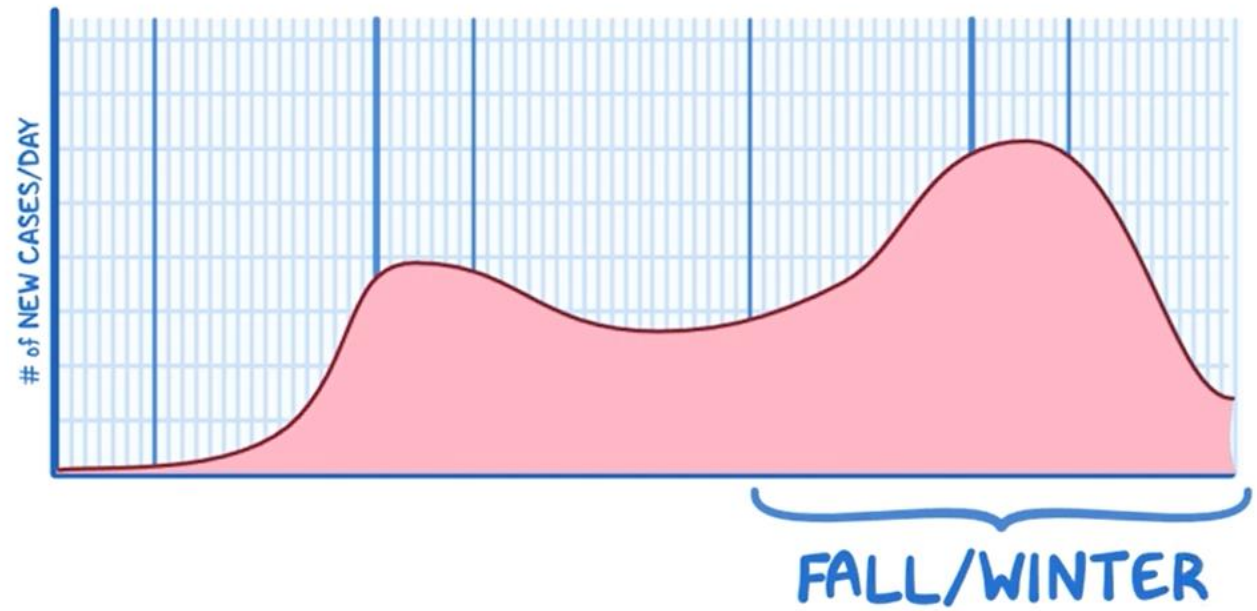
SOME CITIES ENFORCED
MEASURES



NO WIDESPREAD
NATIONAL EFFORT



CHANGE for OUTBREAKS & SURGE ↑↑



AGE, years	CASE FATALITY RATE, %
0-9	< 0.2
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	8.0
> 80	14.8

COMORBID CONDITION	CASE FATALITY RATE, %
HYPERTENSION	6.0
DIABETES	7.3
CARDIOVASCULAR DISEASE	10.5
CHRONIC RESPIRATORY DISEASE	6.3
CANCER (any)	5.6
NONE	0.9

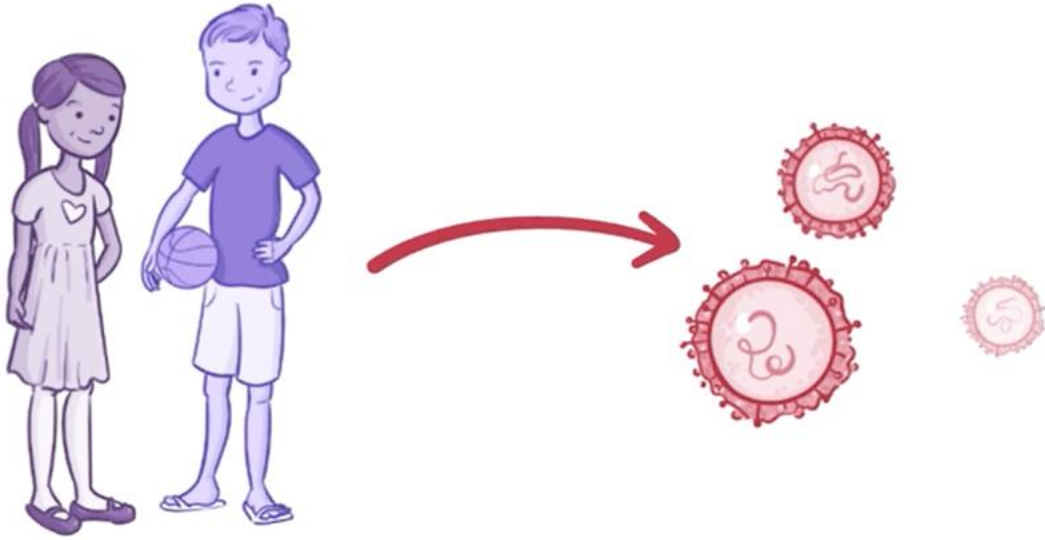


AGE, years	CASE FATALITY RATE, %
0-9	< 0.2
10-19	0.2
20-29	0.4
30-39	0.7
40-49	0.4
50-59	1.3
60-69	3.6
70-79	8.0
> 80	14.8

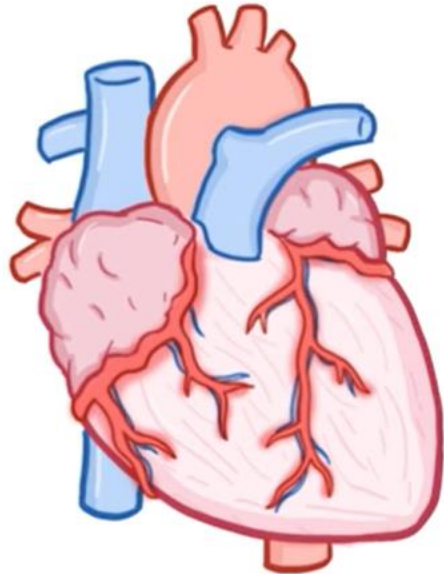
ELDERLY have A LOT of these CONDITIONS

COMORBID CONDITION	CASE FATALITY RATE, %
HYPERTENSION	6.0
DIABETES	7.3
CARDIOVASCULAR DISEASE	10.5
CHRONIC RESPIRATORY DISEASE	6.3
CANCER (any)	5.6
NONE	0.9





**PEDIATRIC INFLAMMATORY
MULTISYSTEM SYNDROME**



*** LESS LIKELY to DEVELOP a
SEVERE DISEASE**

*** CAN BE MORE CONTAGIOUS
than ADULTS**

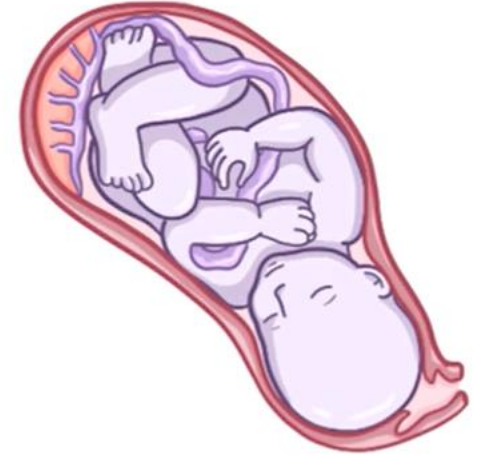
**IN YOUNG ADULTS can INCREASE
the RISK of STROKES**





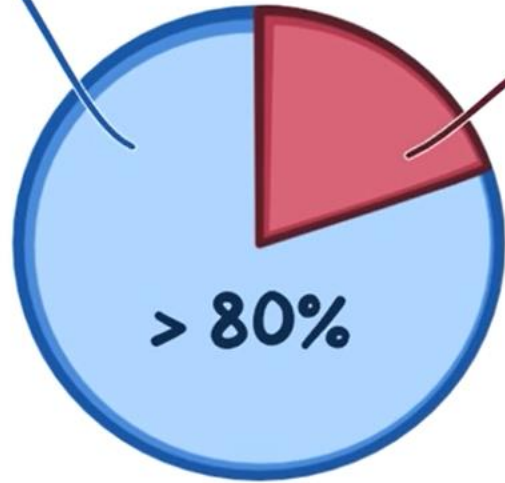
**HEALTHY PREGNANT
PEOPLE NOT at HIGH RISK**

**NO CASES of
INTRAUTERINE
TRANSMISSION**



**VIRUS NOT DETECTED
in BREASTMILK**

MILD INFECTION



SOME DON'T
DEVELOP SYMPTOMS

SYMPTOMS

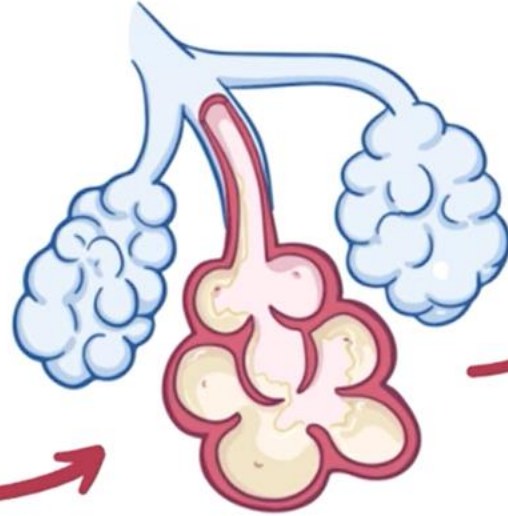
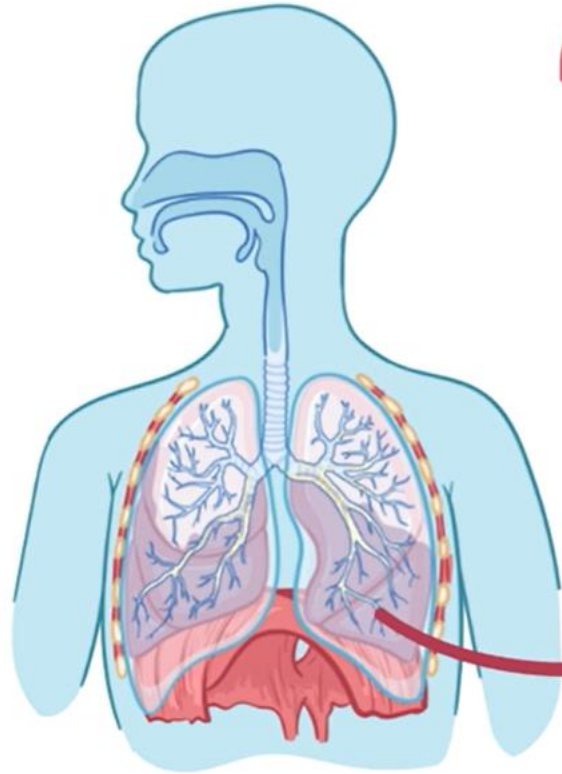
- ~ FEVER
- ~ COUGH
- ~ SHORTNESS
of BREATH
- ~ FATIGUE
- ~ LOSS of SMELL & TASTE
- ~ PNEUMONIA

SEVERE LUNG DAMAGE



ARDS

ACUTE RESPIRATORY DISTRESS SYNDROME

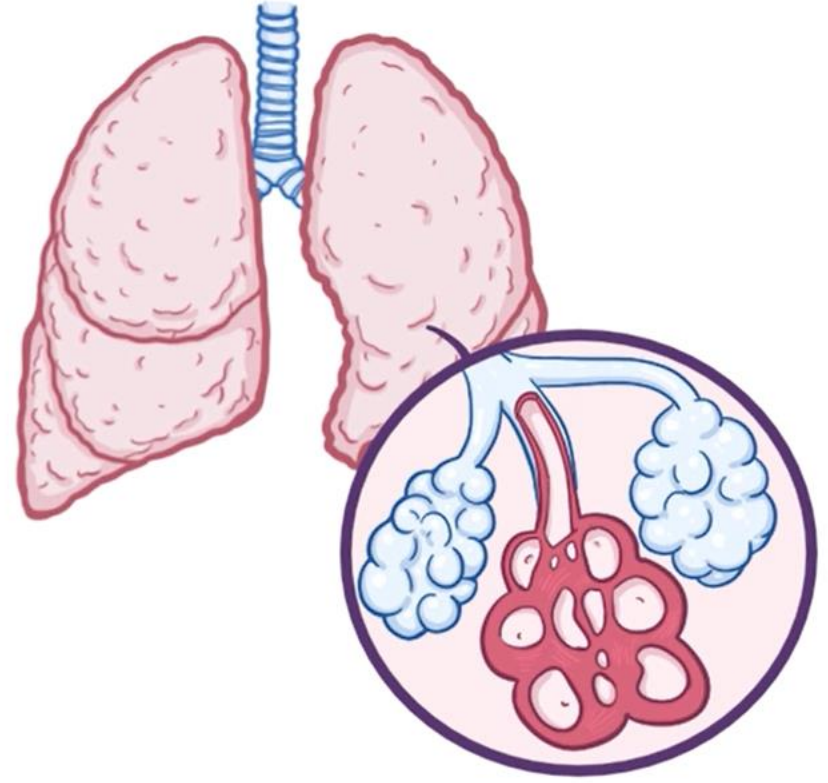


SEPTIC SHOCK






YOUNG & HEALTHY




PULMONARY FIBROSIS



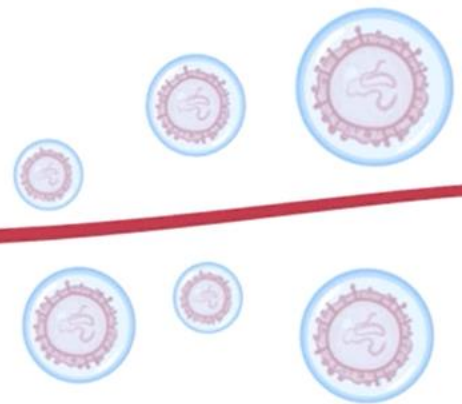
**PRESYMPTOMATIC
PEOPLE**
(in incubation period)

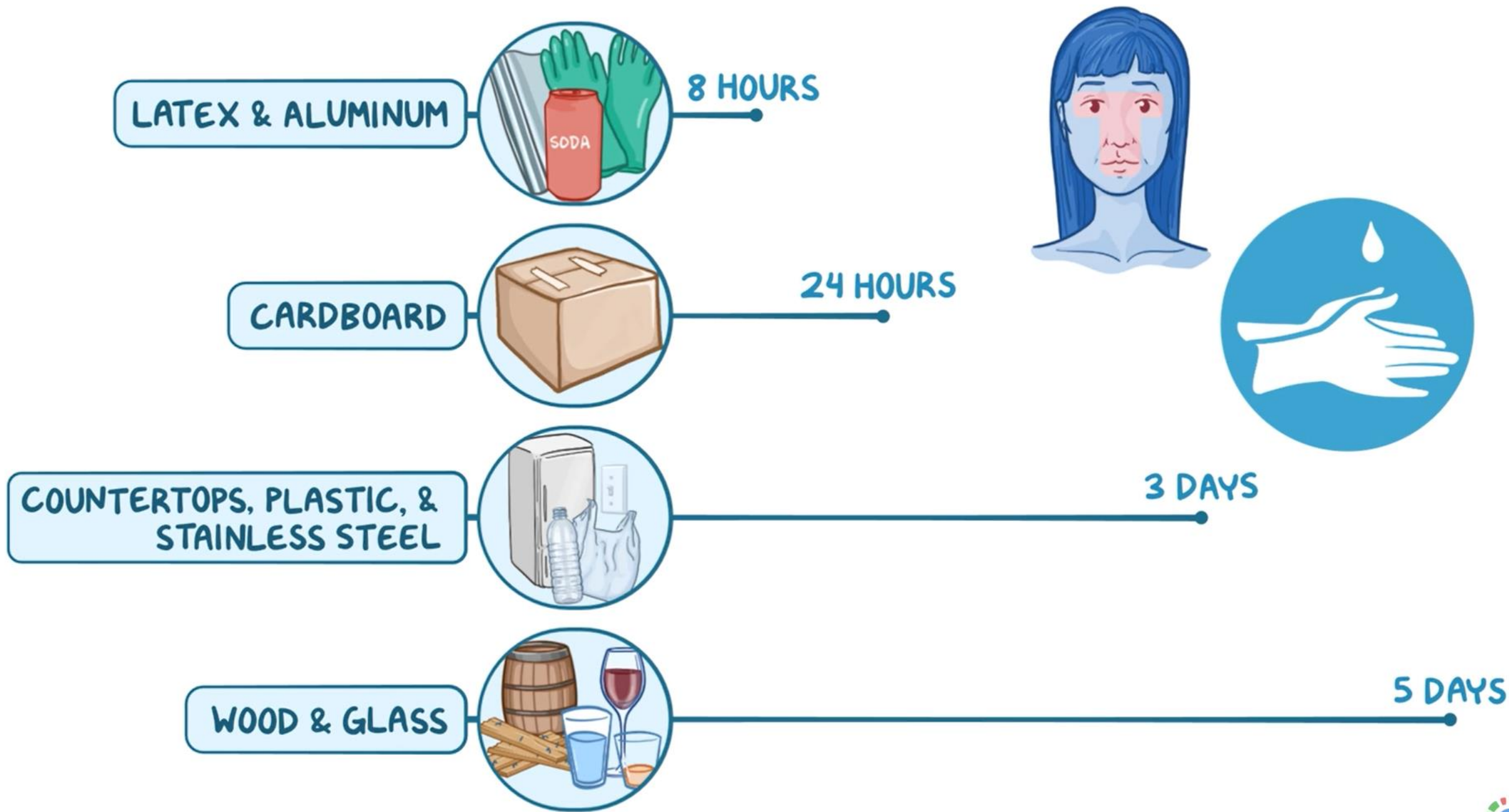


**REMAIN INFECTIOUS
UP to 3 HOURS**



**COUGH or
SNEEZE**





LATEX & ALUMINUM



8 HOURS

CARDBOARD



24 HOURS

COUNTERTOPS, PLASTIC, & STAINLESS STEEL



3 DAYS

WOOD & GLASS

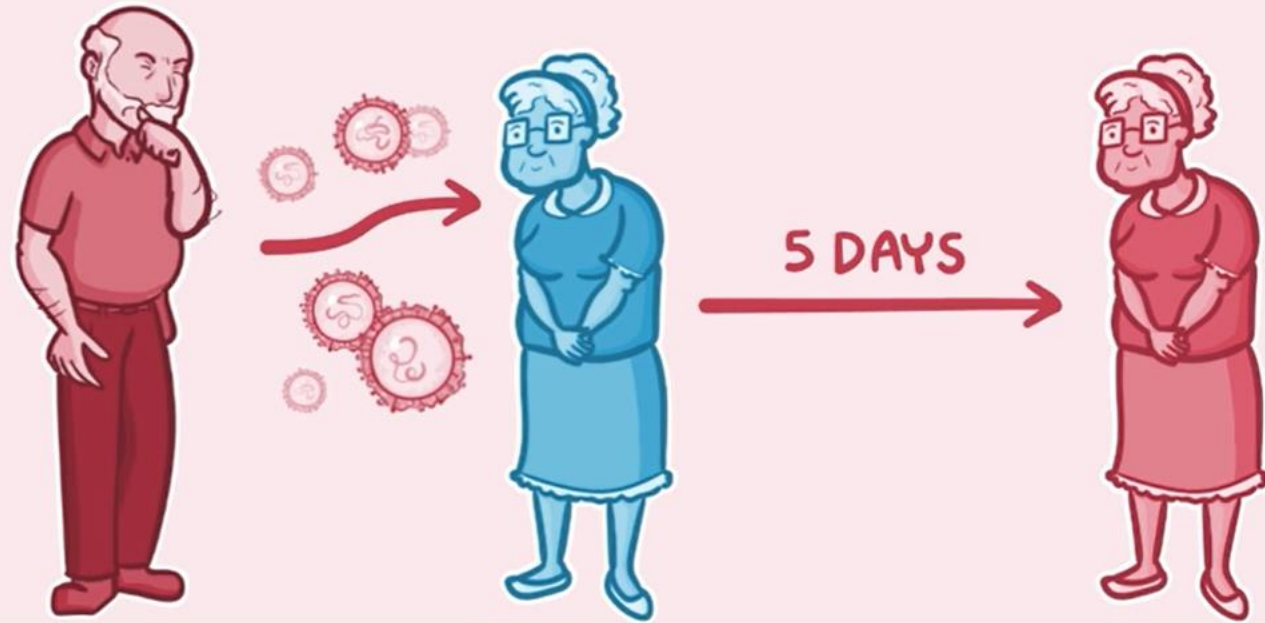


5 DAYS

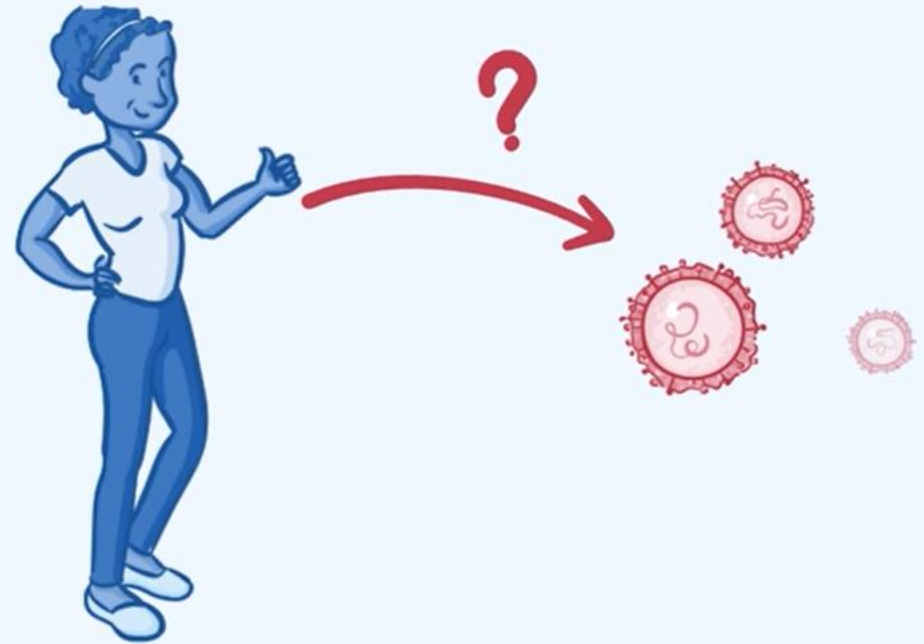
CLEAN & STERILIZE
FREQUENTLY
TOUCHED SURFACES



INCUBATION PERIOD



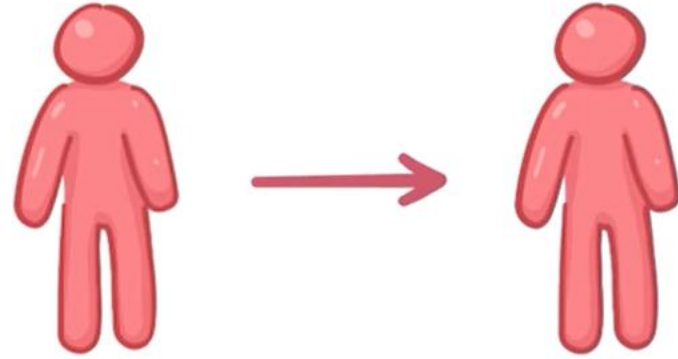
CAN ASYMPTOMATIC/PRESYMPTOMATIC PEOPLE SPREAD DISEASE?



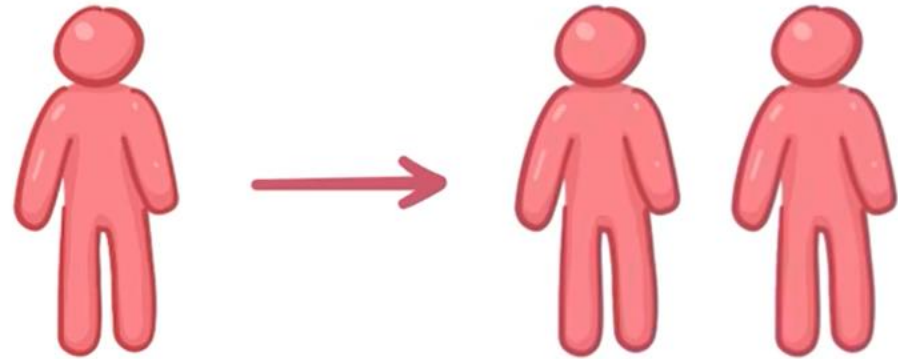


R_0 → HOW QUICKLY it SPREADS

$R_0 = 1$



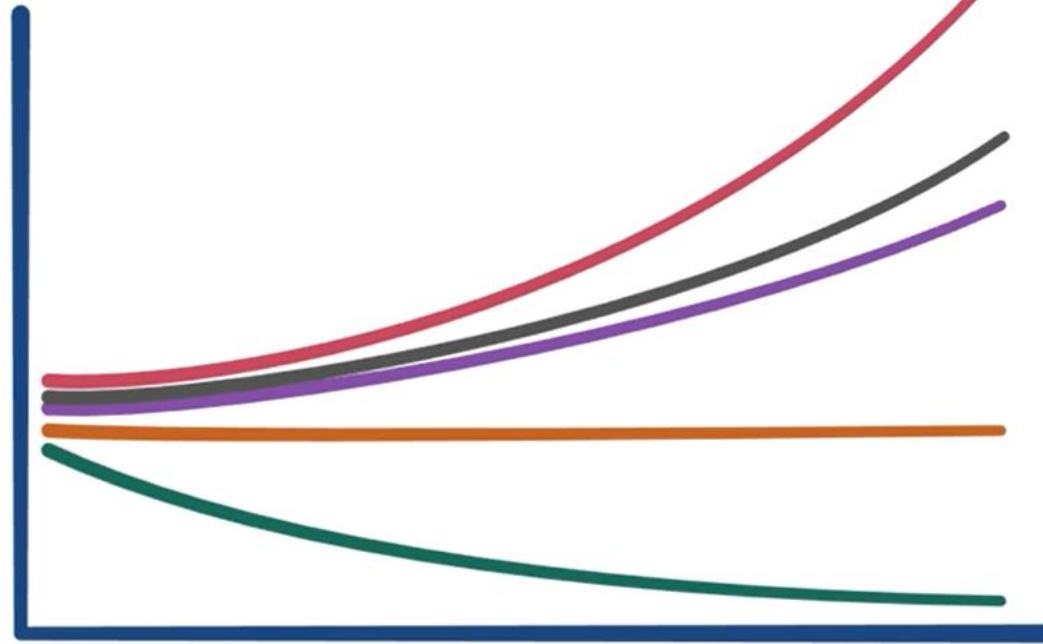
$R_0 = 2$





R_0 → HOW QUICKLY it SPREADS

NUMBER
of
INFECTED



COVID-19 $R_0 \approx 2-2.5$

FLU $R_0 \approx 1.3$

$R_0 > 1$

$R_0 = 1$

$R_0 < 1$

TIME

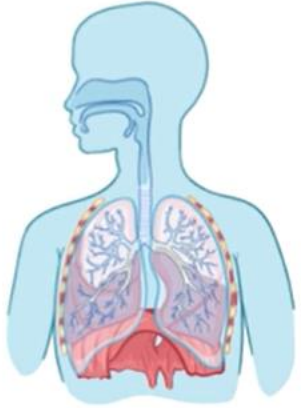




reverse transcription polymerase chain reaction

RT-PCR TEST

- * can DETECT SMALL amounts of VIRAL RNA
- * NOT VERY SENSITIVE



CHEST CT

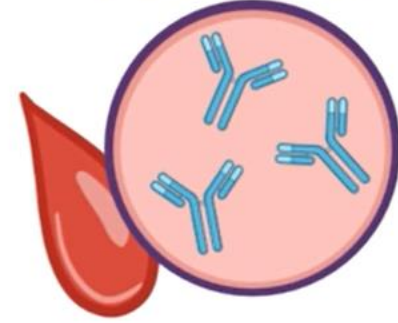
- * DETECT VIRAL PNEUMONIA



ISOTHERMAL AMPLIFICATION

- * VIRAL RNA

RAPID SEROLOGICAL TESTING



- * can DETECT PREVIOUS INFECTIONS

LOOK for OTHER CAUSES



- * QUICK FLU TEST
- * RESPIRATORY VIRAL PANEL

TREATMENT



MILD SYMPTOMS

- * ISOLATE at HOME
- * REST & FLUIDS



SEVERE SYMPTOMS

- * SUPPORTIVE CARE
 - FLUIDS
 - OXYGEN
 - VENTILATORY SUPPORT

TREATMENT

FDA APPROVED EMERGENCY
USE of REMDESIVIR

↳ NOT formal approval

1 - REMDESIVIR

↳ HELP SHORTEN DURATION of SYMPTOMS

↳ NO STATISTICALLY SIGNIFICANT BENEFITS
vs. PLACEBO

2 - LOPINAVIR + RITONAVIR

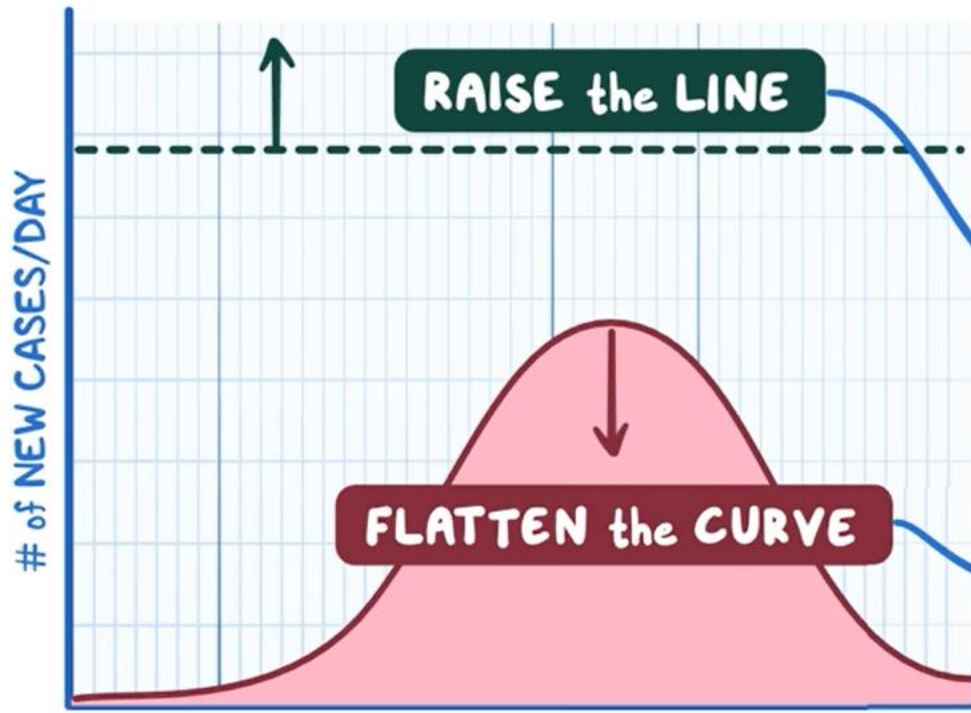
3 - CHLOROQUINE OR HYDROXYCHLOROQUINE

4 - HYDROXYCHLOROQUINE + AZITHROMYCIN



VACCINES are BEING DEVELOPED (estimated 2021)





- * CHINA & SOUTH KOREA have ↓ NEW CASES
- * in the US CASES ↑

- ~ TRAINING FRONTLINE HEALTHCARE WORKERS
- ~ BUILDING MORE HOSPITALS
- ~ PROVIDING ADEQUATE PPE

- ~ MANDATED LOCKDOWN ~ CONTACT TRACING
- ~ MASS TESTING

TREATMENT

- ~ SUPPORTIVE CARE
- ~ MEDICATIONS are in CLINICAL TRIALS
- ↳ may be VACCINE in 2021

PREVENTION

- ~ STAY ISOLATED
- ~ HAND WASHING
- ~ AVOID TOUCHING T-ZONE
- ~ if HEALTHCARE WORKER use PERSONAL PROTECTIVE EQUIPMENT





OCT 12, 1986 - FEB 7, 2020

DR. LI WENLIANG

WHO COURAGEOUSLY RAISED THE ALARM
ABOUT COVID-19 IN THE EARLY DAYS OF THE OUTBREAK.

