# Building Vaccine Confidence in the Workplace

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Director of the Division of Infectious
Diseases at VUMC

VANDERBILT HEALTH

# Outline

- **Where we we are now**
- **Lessons learned**
  - The virus & the disease
  - Transmission
  - Treatment
  - Prevention
  - Vaccinations
  - Variants
- **Where we are going**
  - A return to normalcy

# Where We Are Today

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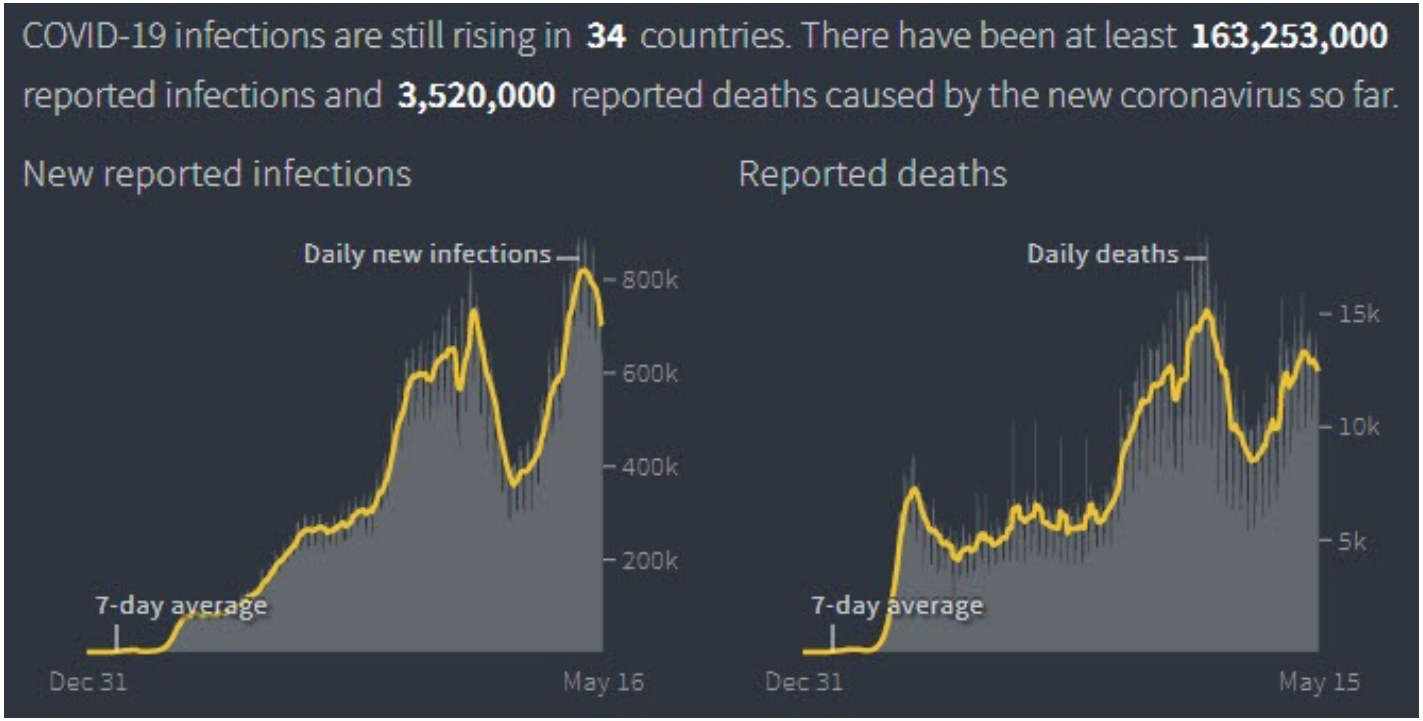
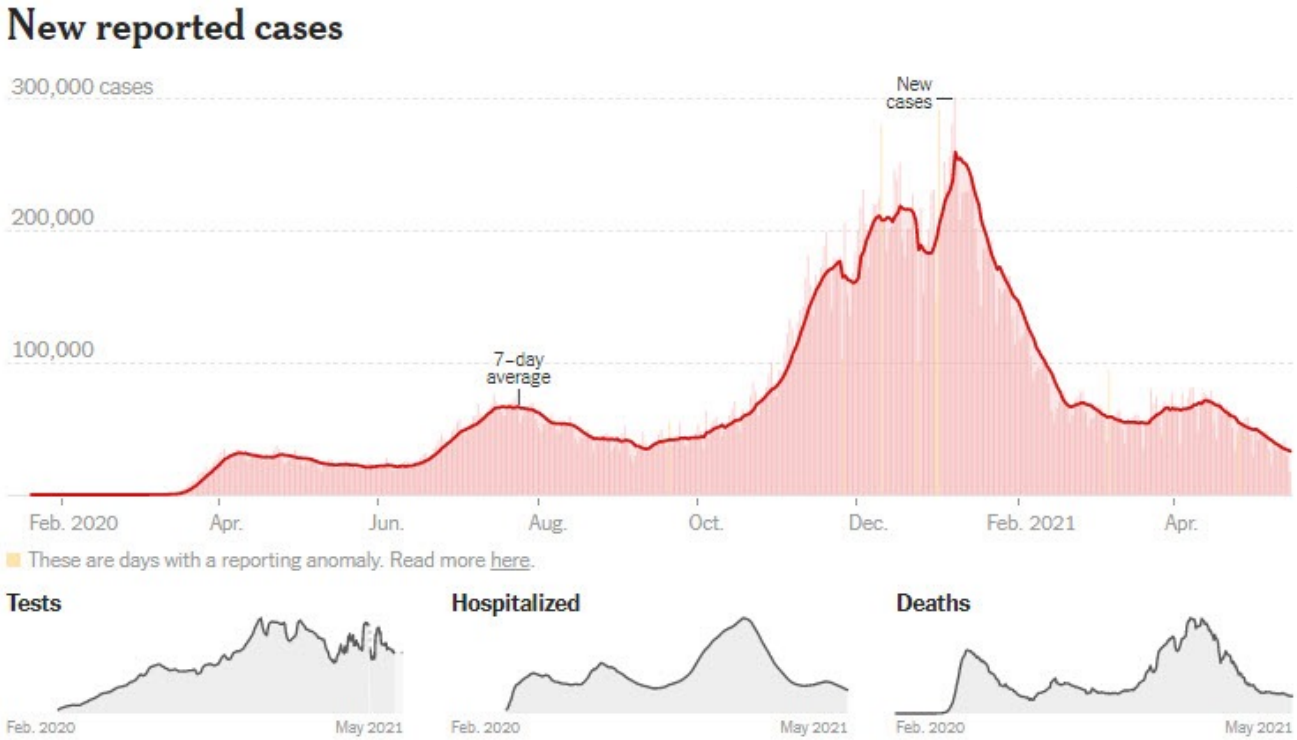
# Where We Are Today: Global




*(These data accessed on 05/17/2021)* https://graphics.reuters.com/world-coronavirus-tracker-and-maps/

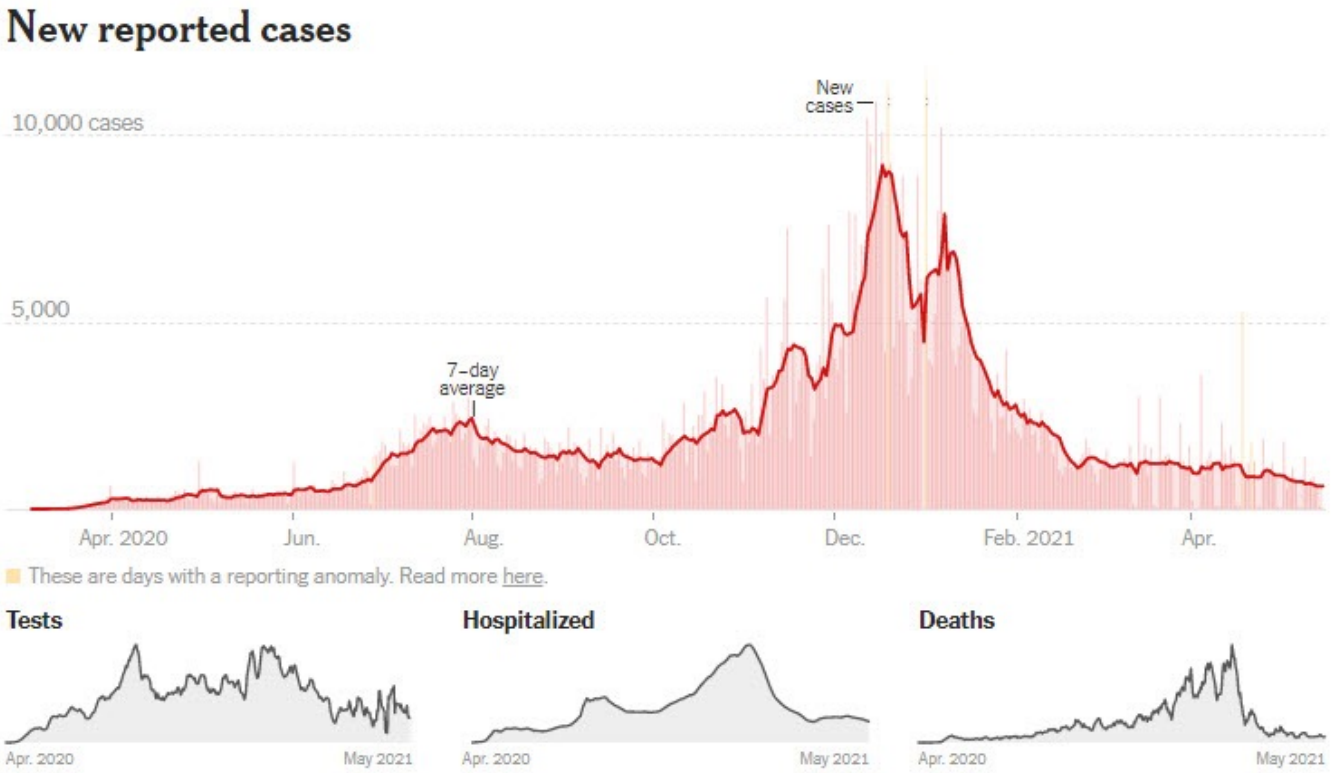
# Where We Are Today: USA




**33.7M cases**
**600K deaths**

*(These data accessed on 05/17/2021)* https://www.nytimes.com/interactive/2021/us/covid-cases.html

# Where We Are Today: Tennessee




**858,000 cases**
**12,300 deaths**

*(These data accessed on 05/17/2021)*

https://www.nytimes.com/interactive/2021/us/covid-cases-deaths-tracker.html

# Lessons Learned

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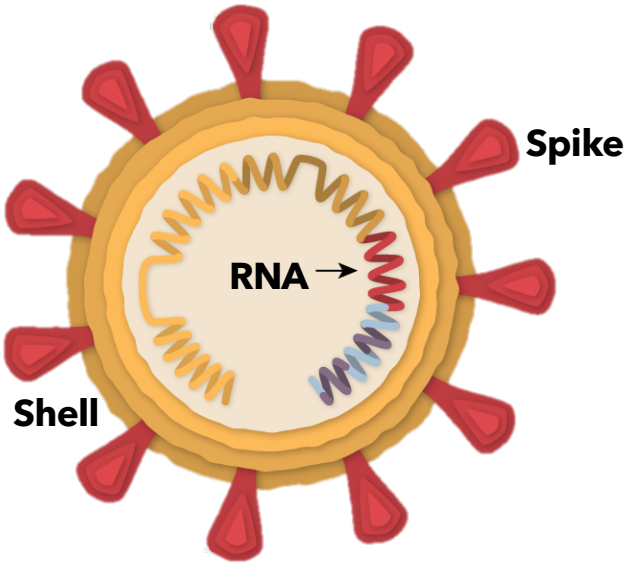
# The Virus




- Relatively simple
- New to humans
- Highly contagious
- Spike protein is “Velcro” for causing infections
- Antibodies targeting the **spike** are protective

https://www.nytimes.com/interactive/2020/health/pfizer-biontech-covid-19-vaccine.html

# Outcomes of SARS-CoV-2 Infection

| | | Hospitalized | | |
|---|---|---|---|---|
| **Asymptomatic** | **Mild / moderate** | **Severe** | **Critical** | **Death** |
| 20-40% | 80% | 15% | <5% | 1-3% |

**Risk factors for doing poorly:**

- Age > 65
- High blood pressure, diabetes, obesity, cancer, chronic lung or kidney disease, etc
- Long-standing systemic health & social inequities

https://www.cdc.gov/coronavirus/2019-ncov/hcp/clinical-guidance-management-patients.html

# Transmission

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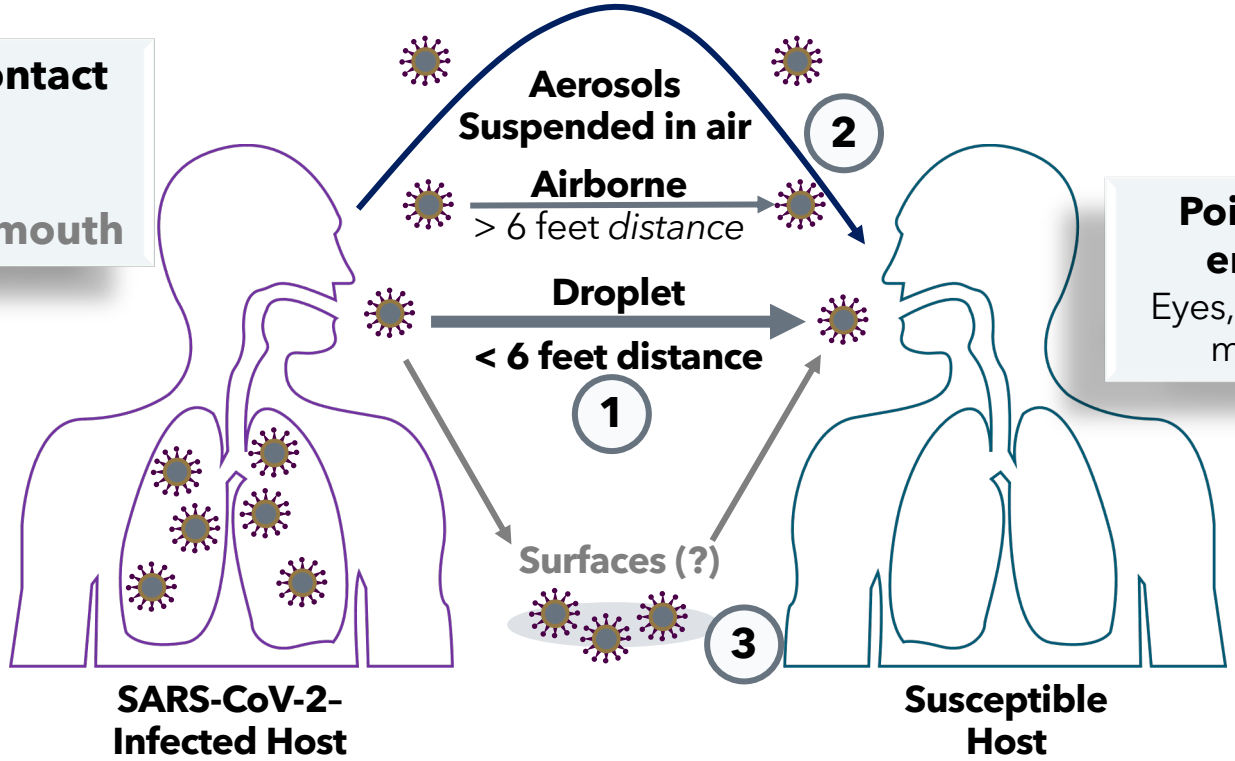
# Routes of SARS-CoV-2 Transmission

1. **Droplets/contact**
2. **Aerosols**
3. **Surfaces to eyes/nose/mouth**




**Points of entry:**
Eyes, nose, or mouth

Figure adopted from clinicaloptions.com

# Importance of Silent Transmission

**"Silent transmission events are fueling this pandemic."**

-David Aronoff, *LA Times*, July 25, 2020

**Approximately one half of new infections are transmitted by persons who have no symptoms**

CDC 12/04/2020

(https://www.cdc.gov/mmwr/volumes/69/wr/mm6949e2.htm)

BRIEF REPORT

## The implications of silent transmission for the control of COVID-19 outbreaks

Seyed M. Moghadas[a,1], Meagan C. Fitzpatrick[b,c,1], Pratha Sah[b], Abhishek Pandey[b], Affan Shoukat[b], Burton H. Singer[d,2], and Alison P. Galvani[b,2]

[a]Agent-Based Modelling Laboratory, York University, Toronto, ON M3J 1P3, Canada; [b]Center for Infectious Disease Modeling and Analysis, Yale School of Public Health, New Haven, CT 06510; [c]Center for Vaccine Development and Global Health, University of Maryland School of Medicine, Baltimore, MD 21201; and [d]Emerging Pathogens Institute, University of Florida, Gainesville, FL 32610

Edited by Mary E. Power, University of California, Berkeley, CA, and approved June 23, 2020 (received for review April 30, 2020)

Since the emergence of coronavirus disease 2019 (COVID-19), unprecedented movement restrictions and social distancing measures have been implemented worldwide. The socioeconomic repercussions have fueled calls to lift these measures. In the absence of population-wide restrictions, isolation of infected individuals is key to curtailing trans-

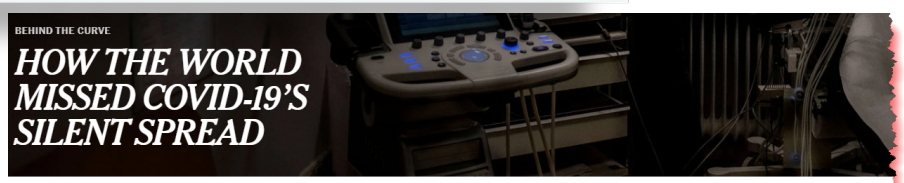
**Results**

Translating clinical data on infectiousness and symptoms (1) to population-level epidemiological impact, our results indicate that the majority of transmission is attributable to people who are not exhibiting symptoms, either because they are still in the

*Proceedings of the National Academy of Sciences* (July 28, 2020)

BEHIND THE CURVE

## HOW THE WORLD MISSED COVID-19'S SILENT SPREAD



Dr. Camilla Rothe's team was among the first to warn about asymptomatic transmission. Laetitia Vancon for The New York Times

Symptomless transmission makes the coronavirus far harder to fight. But health officials dismissed the risk for months, pushing misleading and contradictory claims in the face of mounting evidence.

By Matt Apuzzo, Selam Gebrekidan and David D. Kirkpatrick

June 27, 2020

MUNICH — Dr. Camilla Rothe was about to leave for dinner when the government laboratory called with the surprising test result.

*New York Times* (June 27, 2020)

# Treatment

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# An Ever-Evolving Standard of Care

- **Antiviral therapy**
  - Remdesivir & monoclonal antibody cocktails
- **Anti-inflammatory therapy**
  - Corticosteroids (dexamethasone, etc), tocilizumab, baricitinib
- **On the horizon**
  - Oral antiviral agents

# Prevention

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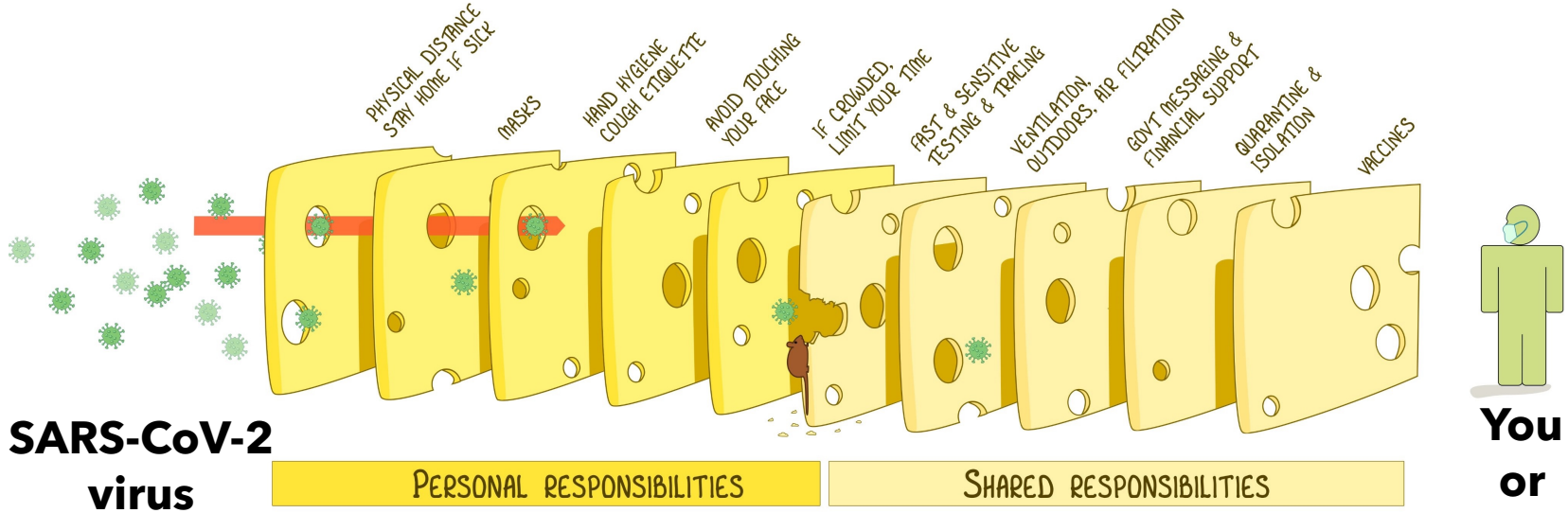
# Prevention: Bottom Line

**Multiple public health measures layered together are needed to slow this virus down**

# Prevention

**The Swiss Cheese Respiratory Virus Defense**

Recognizing that No Single Intervention is Perfect

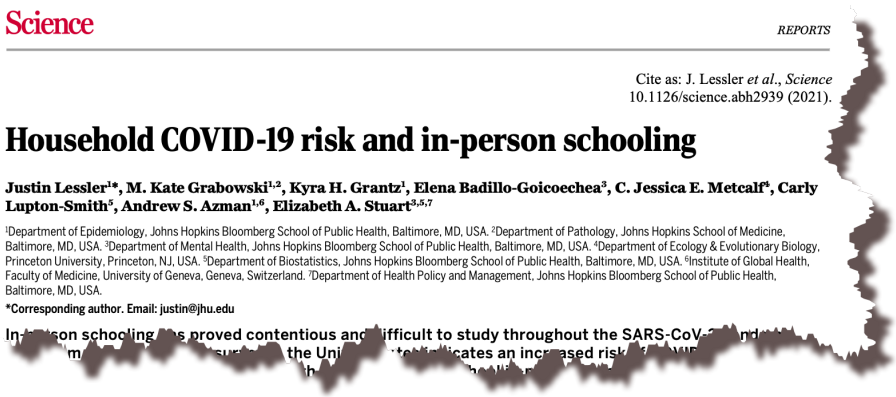



Each intervention (layer) has failings (holes)

Multiple layers reduce their impact

Figure drawn by Dr. Ian M. Mackay (2020)

# Evidence to Support the Swiss Cheese Model



Science REPORTS

Cite as: J. Lessler *et al.*, *Science* 10.1126/science.abh2939 (2021).

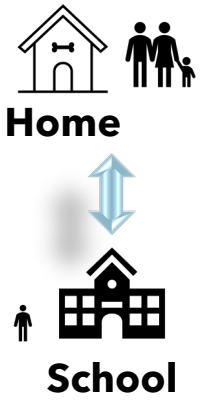
**Household COVID-19 risk and in-person schooling**

**Justin Lessler[1]*, M. Kate Grabowski[1,2], Kyra H. Grantz[1], Elena Badillo-Goicoechea[3], C. Jessica E. Metcalf[4], Carly Lupton-Smith[5], Andrew S. Azman[1,6], Elizabeth A. Stuart[3,5,7]**

[1]Department of Epidemiology, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD, USA. [2]Department of Pathology, Johns Hopkins School of Medicine, Baltimore, MD, USA. [3]Department of Mental Health, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD, USA. [4]Department of Ecology & Evolutionary Biology, Princeton University, Princeton, NJ, USA. [5]Department of Biostatistics, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD, USA. [6]Institute of Global Health, Faculty of Medicine, University of Geneva, Geneva, Switzerland. [7]Department of Health Policy and Management, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD, USA.

*Corresponding author. Email: justin@jhu.edu

In-person schooling has proved contentious and difficult to study throughout the SARS-CoV-2 and




**Large study of >500,000 households examining relationships among in-person schooling, mitigation efforts & COVID-19 infections of adults at home**

## Do mitigation factors* reduce the risk of an adult at home getting COVID-19 if their kids attend in-person school?

*Things like mask wearing, spacing of desks, symptom screening, same/many teachers, outdoor instruction, reduced class size, closing cafeterias, etc.

# Evidence to Support the Swiss Cheese Model

- **Results**
  - Living with a child doing in-person schooling increased the risk for an adult at home getting COVID-19 by about 30-40%
  - Each separate mitigation factor reduced this risk by 5-10%
  - Daily symptom screening, teacher mask mandate & cancelling extra-curricular activities assoc. with greatest risk reduction
  - **When 7 or more mitigation measures were in place the association between in-person schooling & COVID-19 disappeared**

Lessler J, *et al. Science* 10.1126/science.abh2939 (2021).

# Mask Guidance

- Once you are fully vaccinated (2 weeks after 2nd dose of mRNA vaccine or after single-dose adenovirus vaccine)
  - You can resume activities that you did prior to the pandemic
  - You can resume activities without wearing a mask or staying 6 feet apart
  - If you've been around someone who has COVID-19, you do not need to stay away from others or get tested unless you have symptoms, unless you work or live in a correctional or detention facility or a homeless shelter
- You will still need to follow guidance at your workplace and local businesses.

Important Update for Schools

CDC recommends schools continue to use the current COVID-19 prevention strategies for the 2020-2021 school year.+

https://www.cdc.gov/coronavirus/2019-ncov/vaccines/fully-vaccinated.html

| | Unvaccinated People | Examples of Activities | Fully Vaccinated People |
|---|---|---|---|
| | | **Outdoor** | |
| Safest | | Walk, run, wheelchair roll, or bike outdoors with members of your household | |
| Safest | | Attend a small, outdoor gathering with fully vaccinated family and friends | |
| Safest | | Attend a small, outdoor gathering with fully vaccinated and unvaccinated people | |
| Less Safe | | Dine at an outdoor restaurant with friends from multiple households | |
| Least Safe | | Attend a crowded, outdoor event, like a live performance, parade, or sports event | |
| | | **Indoor** | |
| Less Safe | | Visit a barber or hair salon | |
| Less Safe | | Go to an uncrowded, indoor shopping center or museum | |
| Less Safe | | Attend a small, indoor gathering of fully vaccinated and unvaccinated people from multiple households | |
| Least Safe | | Go to an indoor movie theater | |
| Least Safe | | Attend a full-capacity worship service | |
| Least Safe | | Sing in an indoor chorus | |
| Least Safe | | Eat at an indoor restaurant or bar | |
| Least Safe | | Participate in an indoor, high intensity exercise class | |

Safest

https://www.cdc.gov/coronavirus/2019-ncov/vaccines/pdfs/choosingSaferAct.pdf

# Vaccination

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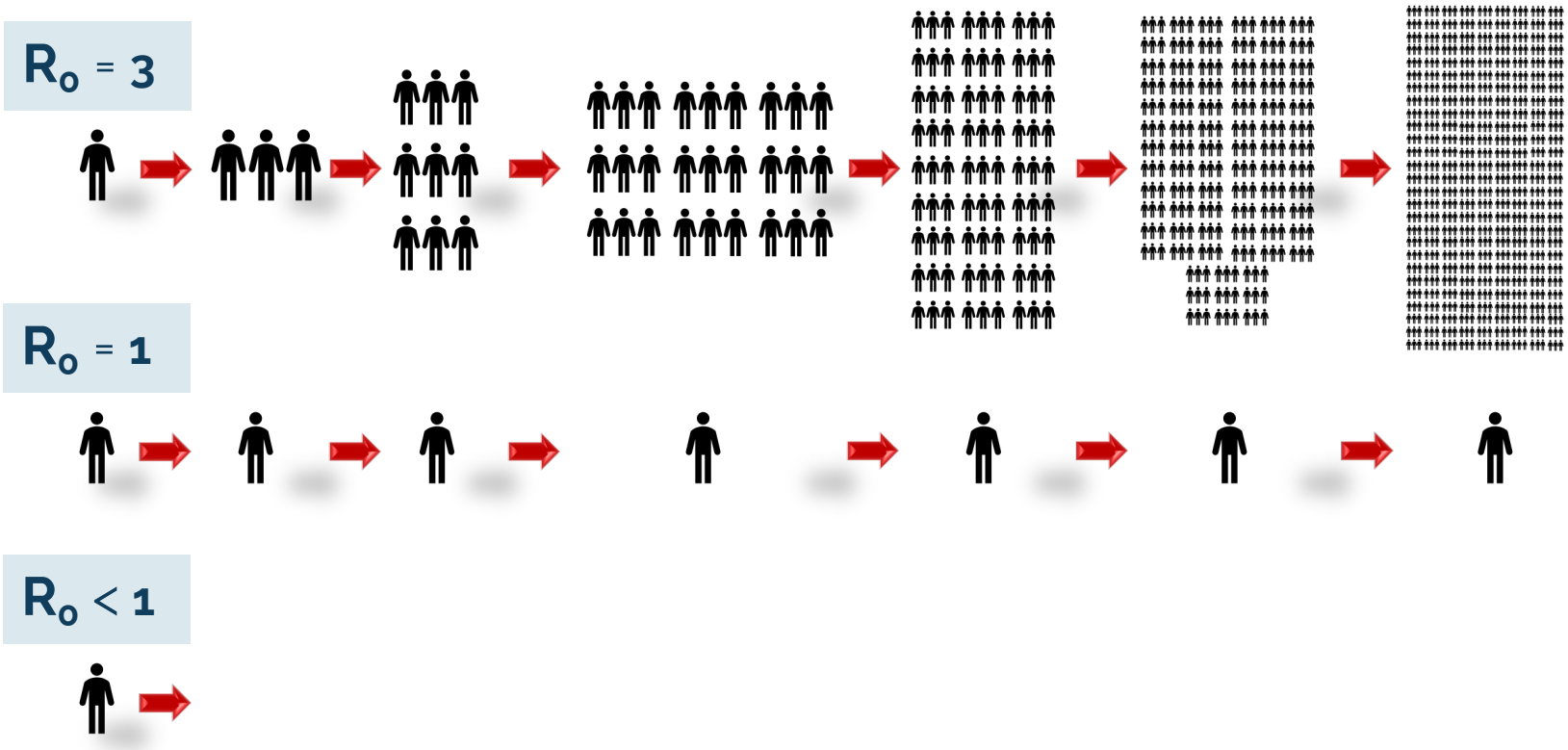
# Herd Immunity

- Herd Immunity = % of the population that needs to have immune protection against the virus to end the pandemic
- >70% is best estimate needed to end the pandemic
- Vaccines will help us get there
  - Two mRNA vaccines
  - One adenovirus vector vaccine

*These data accessed May 4, 2021*

Source: https://covid.cdc.gov/covid-data-tracker/#vaccinations; https://data.news-leader.com/covid-19-vaccine-tracker/tennessee/47/

# Herd Immunity

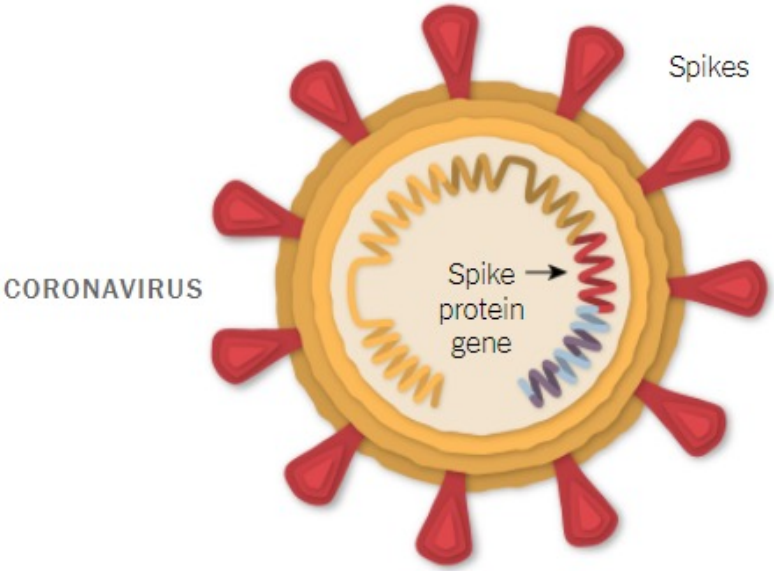



Initial $R_0$ estimate of 2-3: https://moffitt.org/endeavor/archive/the-science-behind-covid-19/

# How Vaccines Work

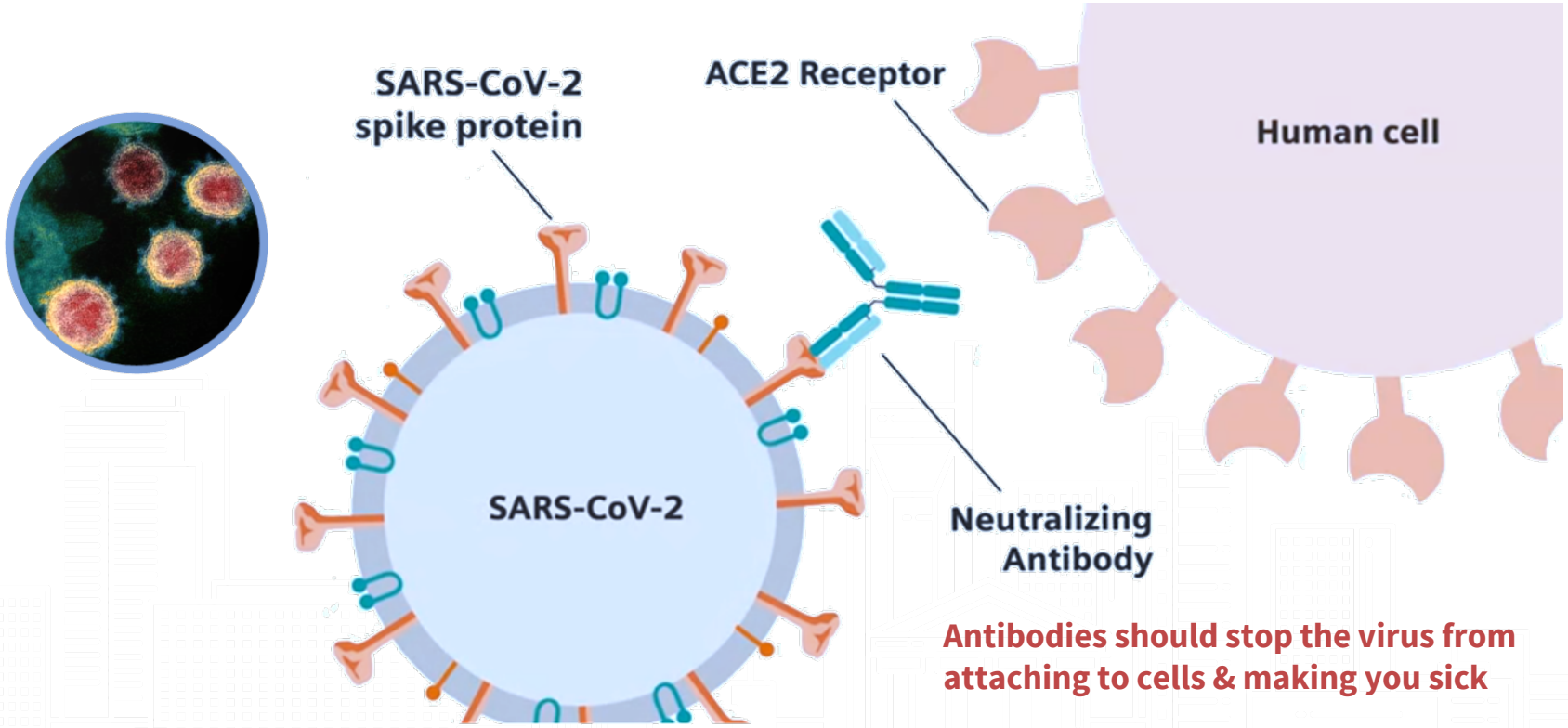
The COVID-19 virus is covered in spikes that allow the virus to attach to a cell. Once attached, the virus can damage the cell and begin to make the body sick.

**Antibodies should stop the virus from attaching to cells and making you sick**.




https://www.nytimes.com/interactive/2020/health/pfizer-biontech-covid-19-vaccine.html

# How Vaccines Work




**Antibodies should stop the virus from attaching to cells & making you sick**

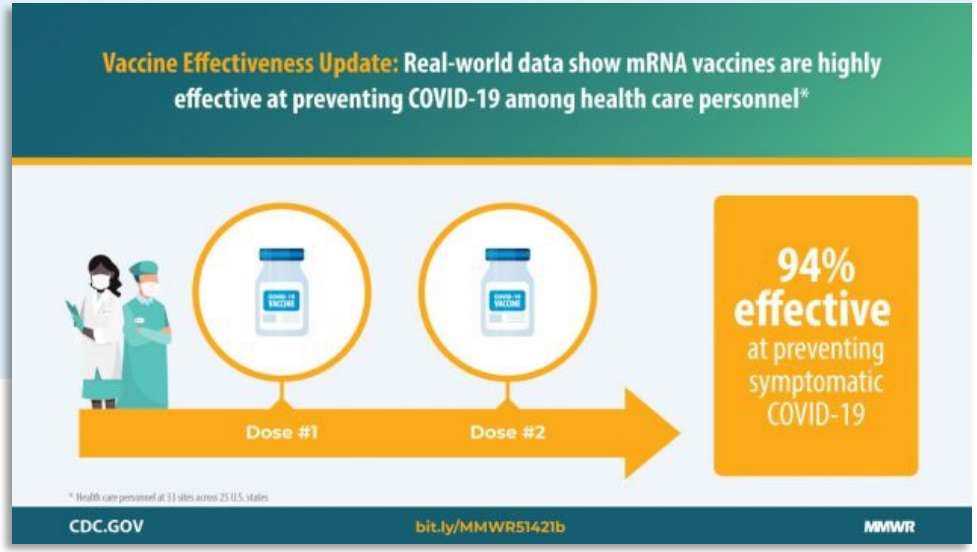
Figures from https://www.nih.gov/news-events/nih-research-matters/novel-coronavirus-structure-reveals-targets-vaccines-treatments
& https://www.siemens-healthineers.com/press-room/press-releases/covid-19-antibody-phe.html

# Vaccines Work!

Study of COVID-19 cases in healthcare workers from 33 sites in the US from January-March, 2021

82% effective after 1 shot

94% effective after 2 shots

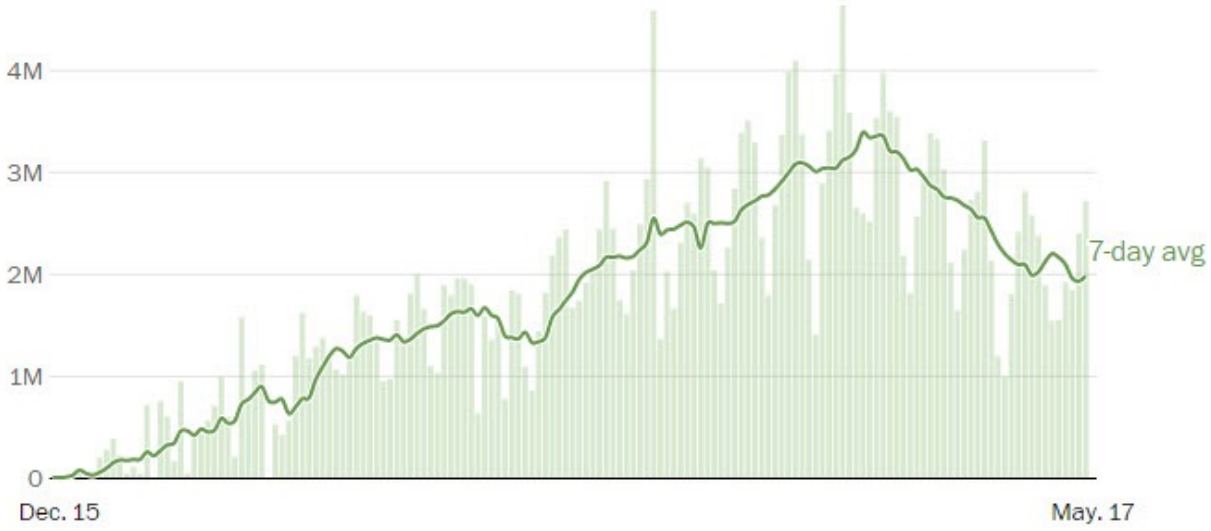



https://www.cdc.gov/mmwr/volumes/70/wr/mm7020e2.htm?s_cid=mm7020e2_x

# Getting People Immunized

**Vaccinations are slowing, impeding our quick arrival at herd immunity**

In the last week, an average of **1.98 million** doses per day were administered, a **2%** decrease ↓ over the week before.

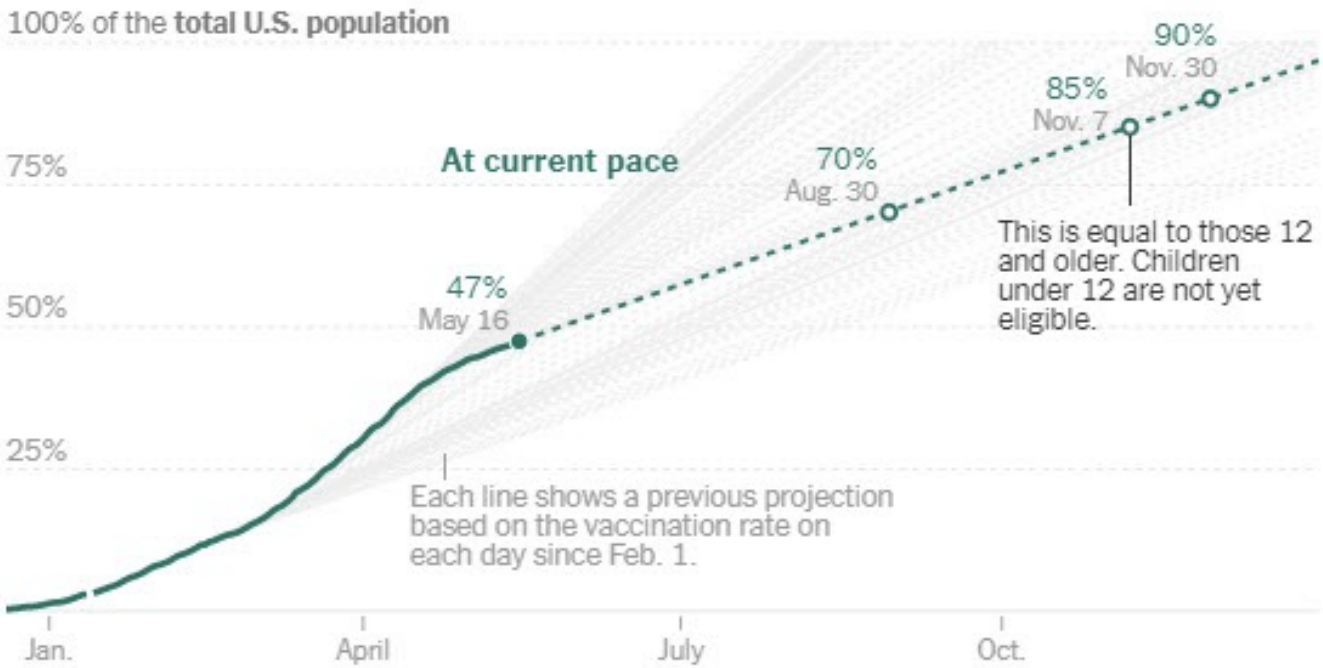



**47% of the US population has started immunization**
**37% have completed vaccination**

*These data accessed May 17, 2021*

https://www.washingtonpost.com/graphics/2020/health/covid-vaccine-states-distribution-doses/?itid=sf_coronavirus_sn_covid-vaccine-states-distribution-doses_3

# Getting People Immunized




*These data accessed May 17, 2021*

https://www.nytimes.com/interactive/2020/us/covid-19-vaccine-doses.html?action=click&module=Top%20Stories&pgtype=Homepage

# Why Get Vaccinated?

## Protect yourself:

- ✓ Vaccines **reduce the risk of infection** (asymptomatic & symptomatic)
- ✓ Vaccines **prevent hospitalization & death** from COVID-19

## Protect others:

- ✓ Vaccines likely **reduce transmission**
- ✓ Vaccinated people **clear infection** more quickly & **shed less virus** than unvaccinated people

*Tande AJ., et al. Clinical Infectious Diseases (2021); Thompson MG, et al. MMWR Morb Mortal Wkly Rep (2021); McEllistrem MC, et al. Clinical Infectious Diseases (2021); Levine-Tiefenbrun M, et al. Nature Medicine (2021); Emary KRW, et al. Lancet preprint (2021); Petter E, et al. medRxiv (2021)*

# Vaccine Safety

- COVID-19 vaccines are safe & effective
- Vaccines do not cause infertility & appear quite safe in pregnancy & breastfeeding
- Risk of immediate anaphylaxis from mRNA vaccine: ~2-5 events per million doses
- Risk of severe blood clot & low platelets from J&J vaccine: ~9 events per million doses in women 18-49 years of age
- Long-term side effects are highly unlikely
- Hundreds of millions of people have received COVID-19 vaccines

# Vaccine Safety

## Common Side Effects

### On the arm where you got the shot:

- Pain
- Redness
- Swelling

### Throughout the rest of your body:

- Tiredness
- Headache
- Muscle pain
- Chills
- Fever
- Nausea

CDC source link

# Variants

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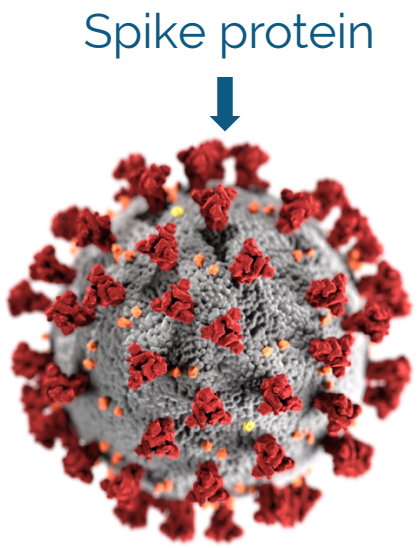
# Virus Variants

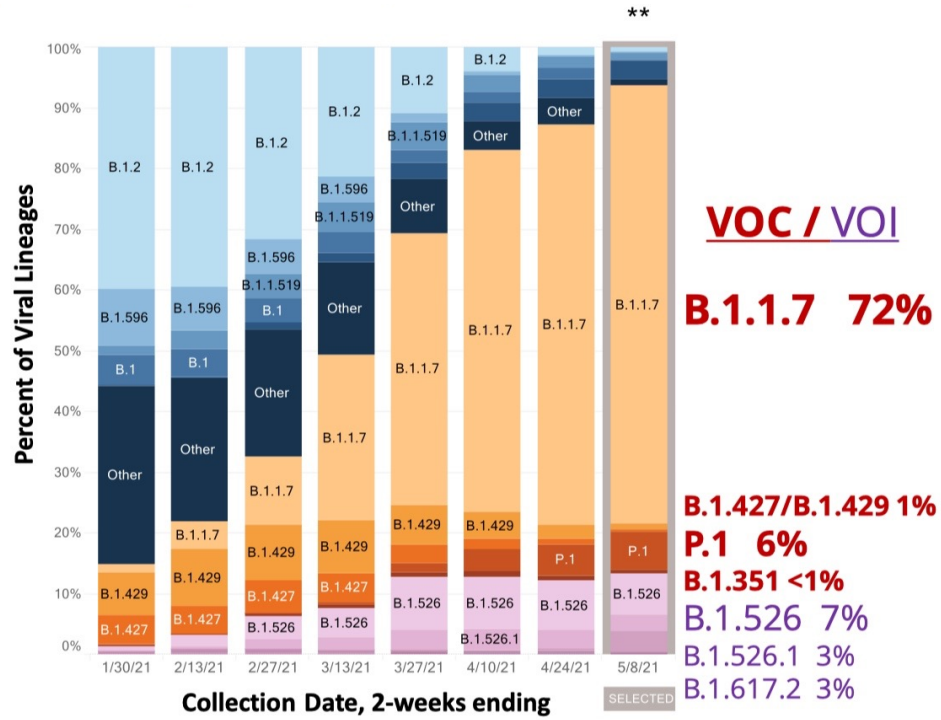
- Viruses like SARS-CoV-2 constantly change through mutation
- Some variants ("mutants") emerge & disappear, others persist
- Changes to the spike protein can help the virus cause infections more easily & evade our immune system
- Multiple variants are circulating globally including strains form UK, South Africa, Brazil, India, California, & New York




SARS-CoV-2 virus

# SARS-CoV-2 Variants

**The "UK" B.1.1.7 variant is now dominant in the USA**




CDC COVID Data Tracker As of 5/11/21; VOC=Variant of Concern; VOI=Variant of Interest

https://covid.cdc.gov/covid-data-tracker/#variant-proportions

# What We Need to Do

Continue non-pharmacological interventions to slow the spread of the virus!

- Distance
- Masks
- Ventilation
- Hygiene

**Get people immunized!**

# What We Need to Do

Centers for Disease Control and Prevention
MMWR
Morbidity and Mortality Weekly Report
Early Release / Vol. 70
May 5, 2021

**Modeling of Future COVID-19 Cases, Hospitalizations, and Deaths, by Vaccination Rates and Nonpharmaceutical Intervention Scenarios — United States, April–September 2021**

Rebecca K. Borchering, PhD[1,*]; Cécile Viboud, PhD[2,*]; Emily Howerton[1]; Claire P. Smith[3]; Shaun Truelove, PhD[3]; Michael C. Runge, PhD[4]; Nicholas G. Reich, PhD[5]; Lucie Contamin, MS[6]; John Levander[6]; Jessica Salerno, MPH[6]; Wilbert van Panhuis, PhD[6]; Matt Kinsey, PhD[7]; Kate Tallaksen, MS[7]; R. Freddy Obrecht, PhD[7]; Laura Asher, MPS[7]; Cash Costello, MS[7]; Michael Kelbaugh[7]; Shelby Wilson, PhD[7]; Lauren Shin[7]; Molly E. Gallagher, PhD[7]; Luke C. Mullany, PhD[7]; Kaitlin Rainwater-Lovett, PhD[7]; Joseph C. Lemaitre, MS[8]; Juan Dent, ScM[3]; Kyra H. Grantz[3]; Joshua Kaminsky, MS[3]; Stephen A. Lauer, PhD[3]; Elizabeth C. Lee, PhD[3]; Hannah R. Meredith, PhD[3]; Javier Perez-Saez, PhD[3]; Lindsay T. Keegan, PhD[9]; Dean Karlen, PhD[10]; Matteo Chinazzi, PhD[11]; Jessica T. Davis[11]; Kunpeng Mu[11]; Xinyue Xiong, MSc[11]; Ana Pastore y Piontti, PhD[11]; Alessandro Vespignani, PhD[11]; Ajitesh Srivastava, PhD[12]; Przemyslaw Porebski, PhD[13]; Srinivasan Venkatramanan, PhD[13]; Aniruddha Adiga, PhD[13]; Bryan Lewis, PhD[13]; Brian Klahn, MS[13]; Joseph Outten[13]; James Schlitt, PhD[13]; Patrick Corbett[13]; Pyrros Alexander Telionis, PhD[13]; Lijing Wang, MS[13]; Akhil Sai Peddireddy[13]; Benjamin Hurt, MS[13]; Jiangzhuo Chen, PhD[13]; Anil Vullikanti, PhD[13]; Madhav Marathe, PhD[13]; Jessica M. Healy, PhD[14]; Rachel B. Slayton, PhD[14]; Matthew Biggerstaff, ScD[14]; Michael A. Johansson, PhD[14]; Katriona Shea, PhD[1,†]; Justin Lessler, PhD[3,†]

**High vaccination rates & compliance with public health prevention measures are essential to control the COVID-19 pandemic & to prevent surges in hospitalizations & deaths in the coming months.**

-Borchering RK, *et al.*, *MMWR* (2021)

Published May 5, 2021

# The Future

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# The Future

- Global **control** of COVID-19
- **Surveillance**: global, sequencing, data sharing
- **Testing**: cheap, available, frequent, self-administered
- **Treatment**: possibly closer to oral antivirals
- **Vaccines**: targeting variants; children; boosters
- "**Long COVID**": better understanding/treatments/preventions
- Improve **public health** systems
- Improve **population health** to reduce inequities & disparities

# For More Information

*Curated for employers by Vanderbilt Health Employer Solutions*

Employer Insights Blog
and Newsletter

https://employersolutions.vanderbilthealth.com/

Email us at

EmployerSolutions@vumc.org

# Follow Up Webinar

*Hosted by Vanderbilt Health*

May 25th at 2:00 pm

"Building Confidence in the Vaccine and Easing Return-to-Work Anxieties"

**David Aronoff, MD**

Addison B. Scoville Chair in Medicine and Director of the Division of Infectious Diseases at VUMC

**Abhi Saxena, MD**

Medical director of hospital services for Vanderbilt Behavioral Health

Register at this QR code

# Questions & Answers