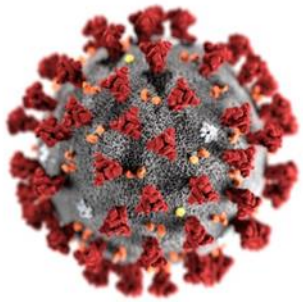
Wake Forest®
Baptist Health



COVID-19: The Virus, the Vaccine, & Lessons Learned & Yet to be Learned

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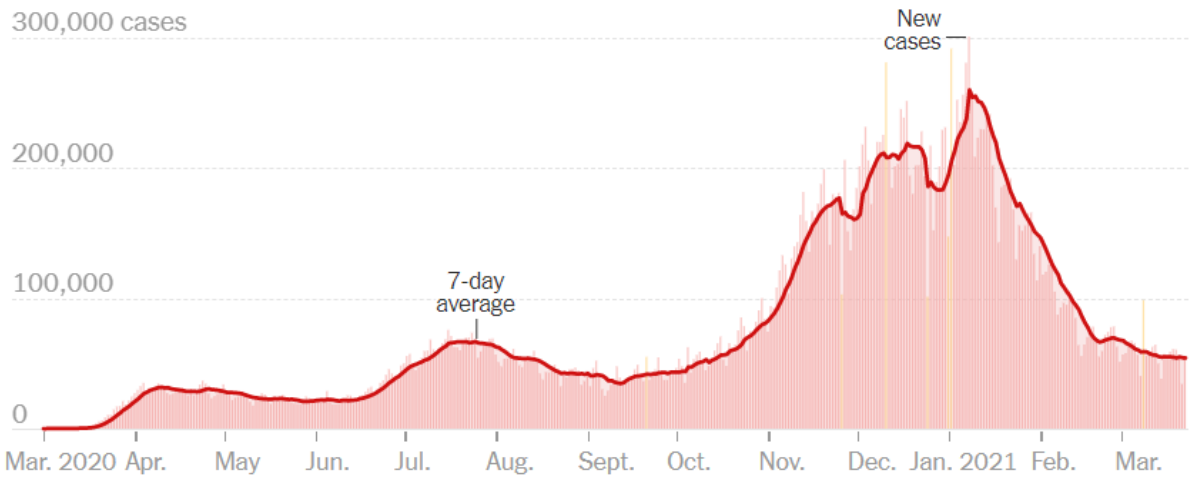
Medical Director Infection Prevention and Health System Epidemiology

Wake Forest Baptist Health

Update – Global and U.S.

- As of 03/23/2021 (5:58 am)
  - 123,719,955 confirmed cases
  - 2,724,465 deaths
  - Countries affected: 192
  - Second wave in Europe
  - US: 29,869,517 confirmed cases
  - US: 542,949 deaths
  - Spring break impact?

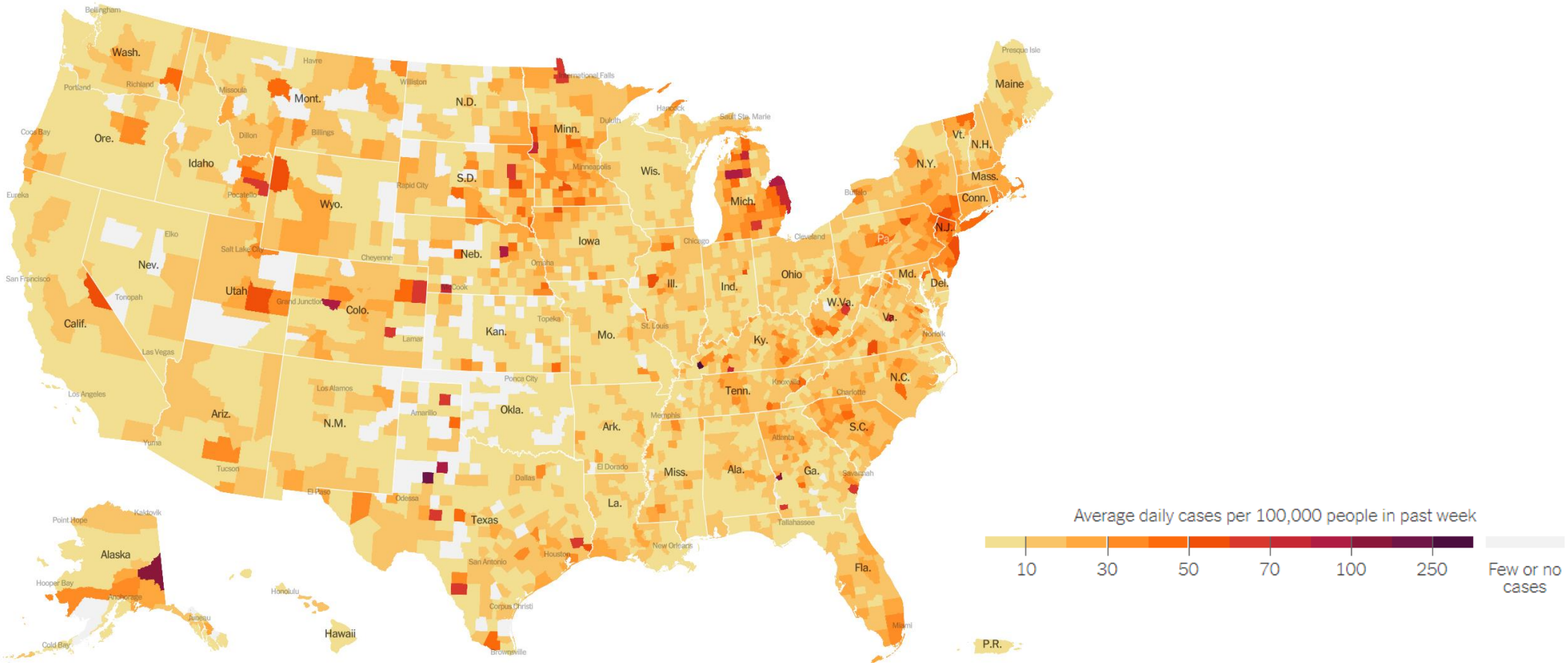
New Cases United States



	TOTAL REPORTED	ON MARCH 22	14-DAY CHANGE
Cases	29.8 million+	55,621	−8%
Deaths	542,587	650	−35%
Hospitalized		38,969	−16%

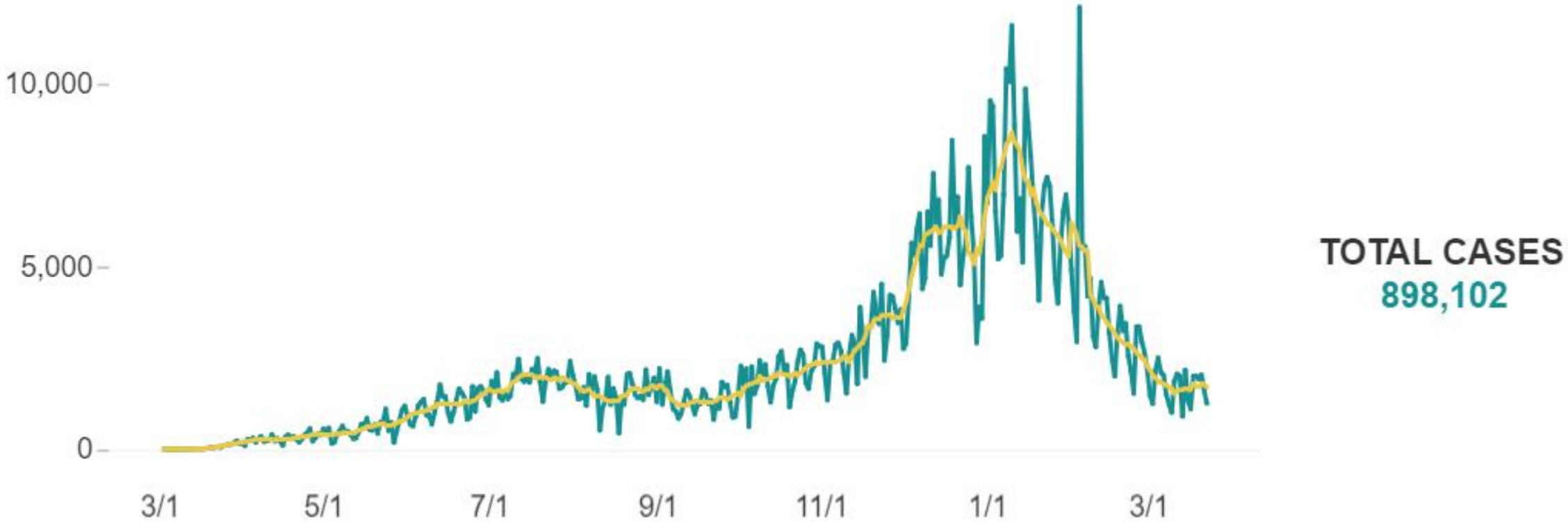
- https://gisanddata.maps.arcgis.com/apps/opsdashboard/index.html#/bda7594740fd40299423467b48e9ecf6
- https://www.bbc.com/news/world-51235105

Average Daily Cases per 100,000 People in Past Week



- https://www.nytimes.com/

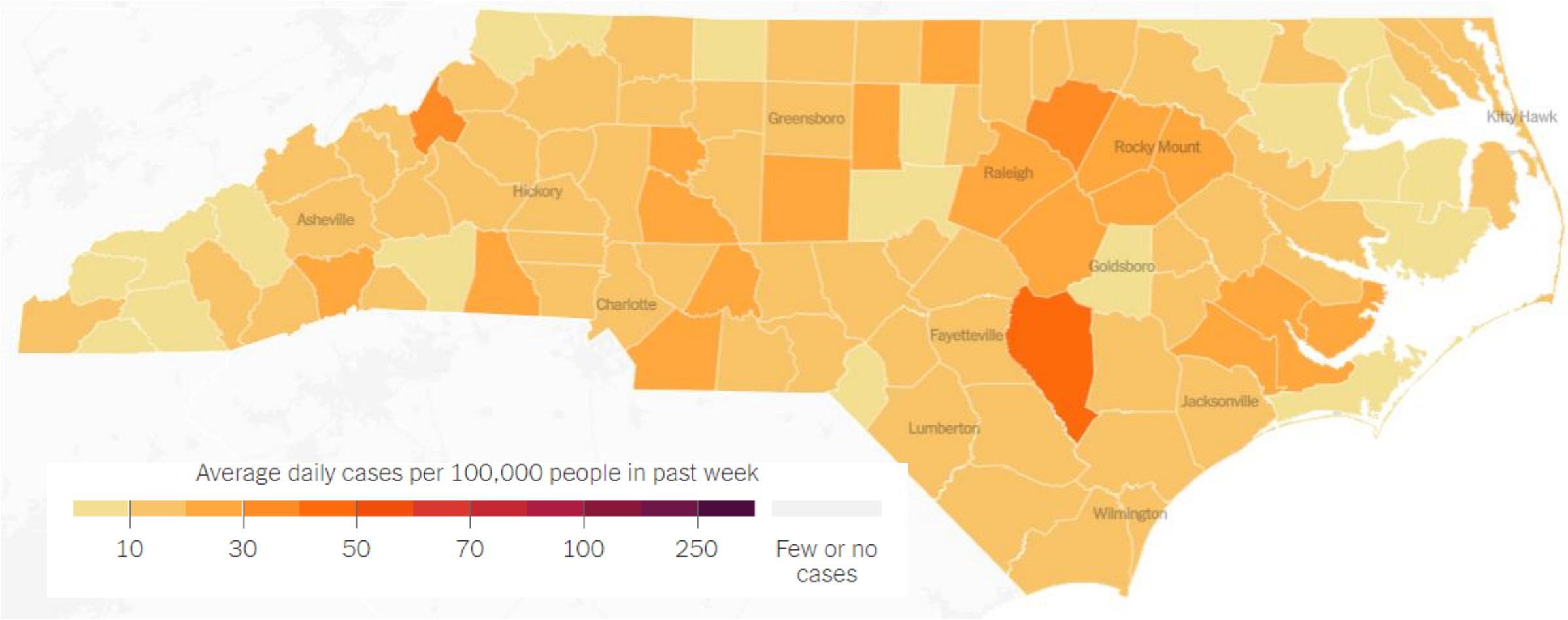
Outbreak Status – North Carolina



As of 03/22/2021, 12:00 pm: Hospitalized: 924; Deaths: 11,836

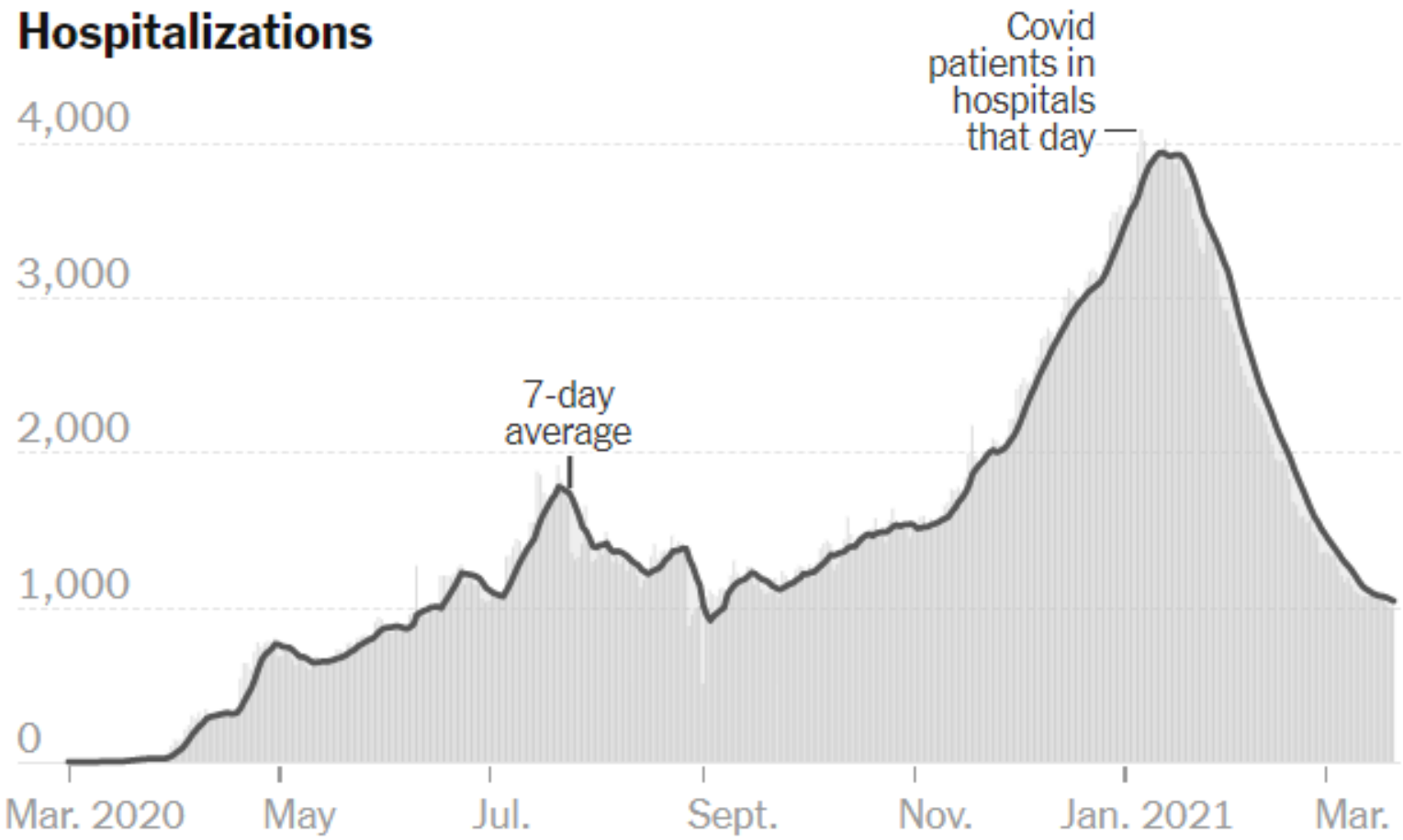
https://covid19.ncdhhs.gov/dashboard/cases

Outbreak Status – North Carolina



- https://www.nytimes.com/

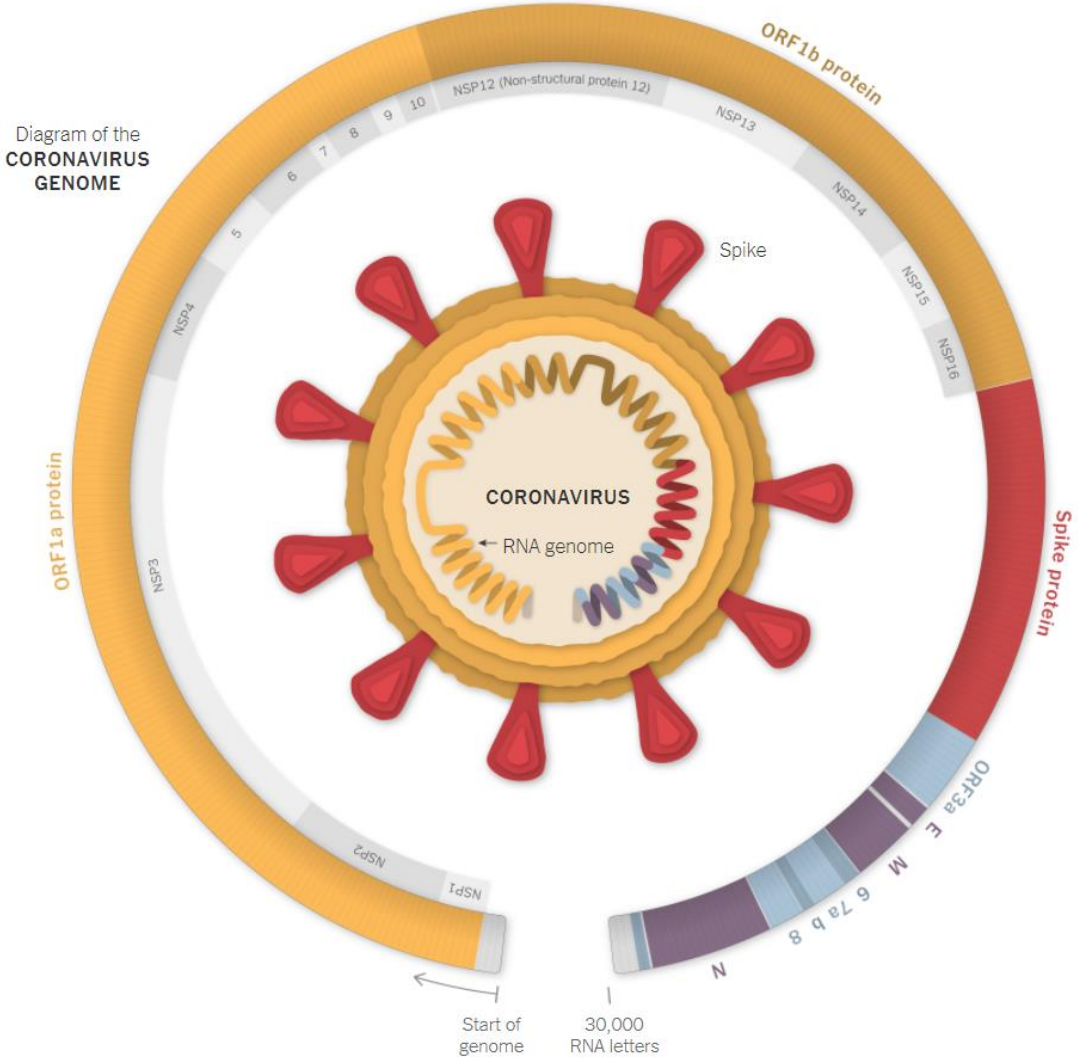
Hospitalizations in NC



https://www.nytimes.com/interactive/2020/us/covid-hospitals-near-you.html

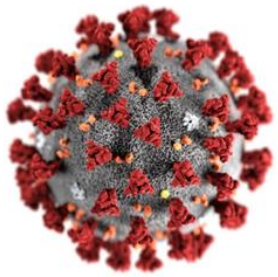
The Virus - Mutations

- All viruses mutate (tiny copying errors)
- Mutations that are passed through branches of the viral family tree are called lineage
- A group of coronaviruses that share the same inherited set of distinctive mutations is called a variant
- If enough mutations accumulate in a lineage the lineage becomes a strain (such as SARS-CoV-2)

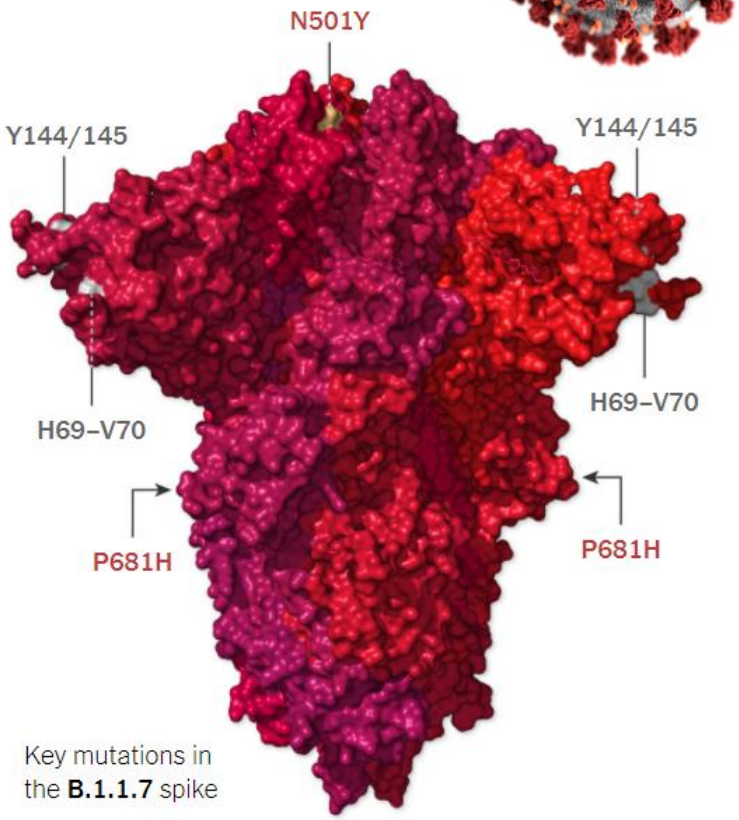


https://www.nytimes.com/interactive/2021/health/coronavirus-variant-tracker.html?searchResultPosition=1

The Virus - Mutations



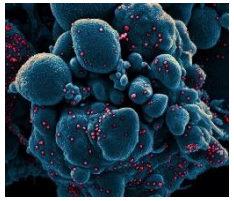
- Lineages can
  - alter transmission dynamic (higher transmission rates)
  - increase severity of illness
  - make vaccines less effective
- Changes to the spike protein
- Several new lineages detected:
  - B.1.1.7 (Britain)
  - B.1.351 (South Africa – first sample identified on 02/11 in NC)
  - P1 (Brazil)
  - CAL.20C (California)
  - B.1.526 (NYC)
  - E484K mutation in Portland, Oregon
- Current vaccines create a polyclonal response, generating numerous antibodies that hone in on different parts of the virus



Key mutations in the **B.1.1.7** spike

https://www.nytimes.com/interactive/2021/health/coronavirus-variant-tracker.html?searchResultPosition=1

The Virus - Mutations



- March 5 Scientists find the E484K mutation in a sample from Portland, Oregon.
- Feb. 23 Added the B.1.526 variant, which is spreading in New York City.
- Feb. 23 Studies suggest that a variant discovered in California is more contagious.
- Feb. 17 Maryland confirms its first case of the P.1 variant.
- Feb. 16 Massachusetts confirms its first case of the B.1.351 variant.
- Feb. 15 Added the Q677 spike mutation, which was found in several lineages in the U.S.
- Feb. 15 B.1.351 is confirmed in a Connecticut resident hospitalized in New York City.
- Feb. 13 Studies suggest B.1.1.7 is likely more deadly than other circulating variants.
- Feb. 11 Illinois and North Carolina confirm their first cases of the B.1.351 variant.
- Feb. 7 South Africa stops using AstraZeneca’s vaccine against the B.1.351 variant.
- Feb. 7 The B.1.1.7 variant is doubling every 10 days in the United States.

Vaccines

Phases of Vaccine Development

Pre-clinical

Vaccine tested on animals to assess safety and see if it triggers an immune response.

Phase 1

It's given to a small group of people, usually between 10-50.

Phase 2

It's tested on several hundred people to further check safety, side effects, immune response and dosage.

Phase 3

In this stage, it's given to thousands to determine whether it's effective and to monitor safety.

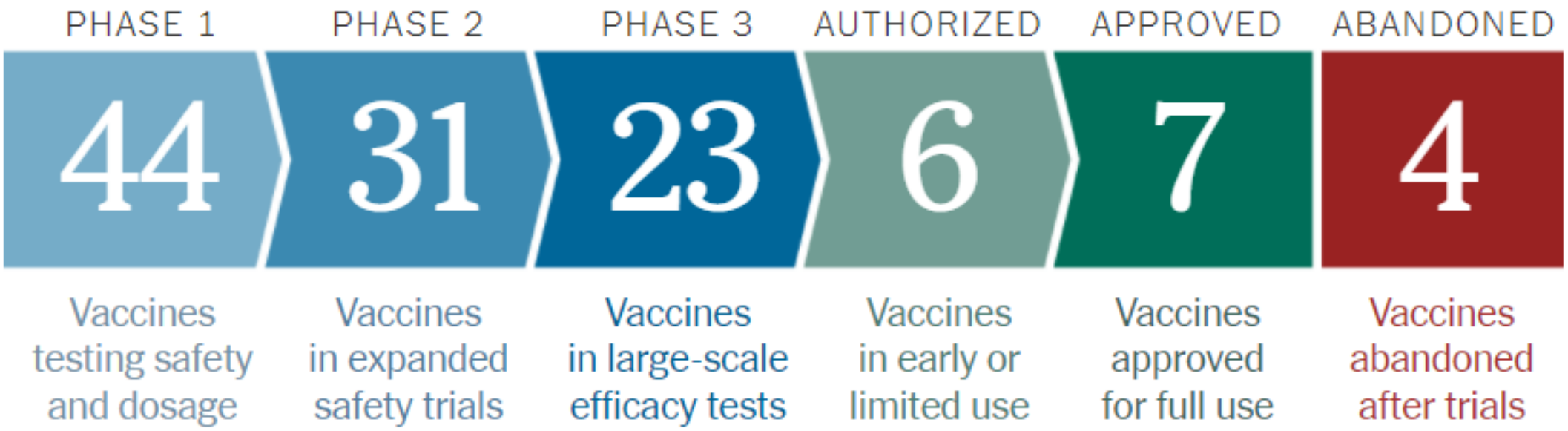
Implementation

Regulators review the results to decide whether to approve the vaccine for use, licensing and manufacturing.

Source: US Centers for Disease Control and Prevention, CNN reporting
Graphic: Eliza Mackintosh and Henrik Pettersson, CNN

Coronavirus Vaccine Tracker – 03/22

- 78 vaccines in clinical trial on humans
- At least 77 preclinical vaccines under investigation in animals



https://www.nytimes.com/interactive/2020/science/coronavirus-vaccine-tracker.html

Vaccine Types

Pfizer-BioNTech

- mRNA
- Imbedded in lipid nanoparticles
- mRNA does not create infection or is integrated into human cells
- Needs transportation at -94°F (-70°C)
- Requires two doses
- Efficacy rate of 95%

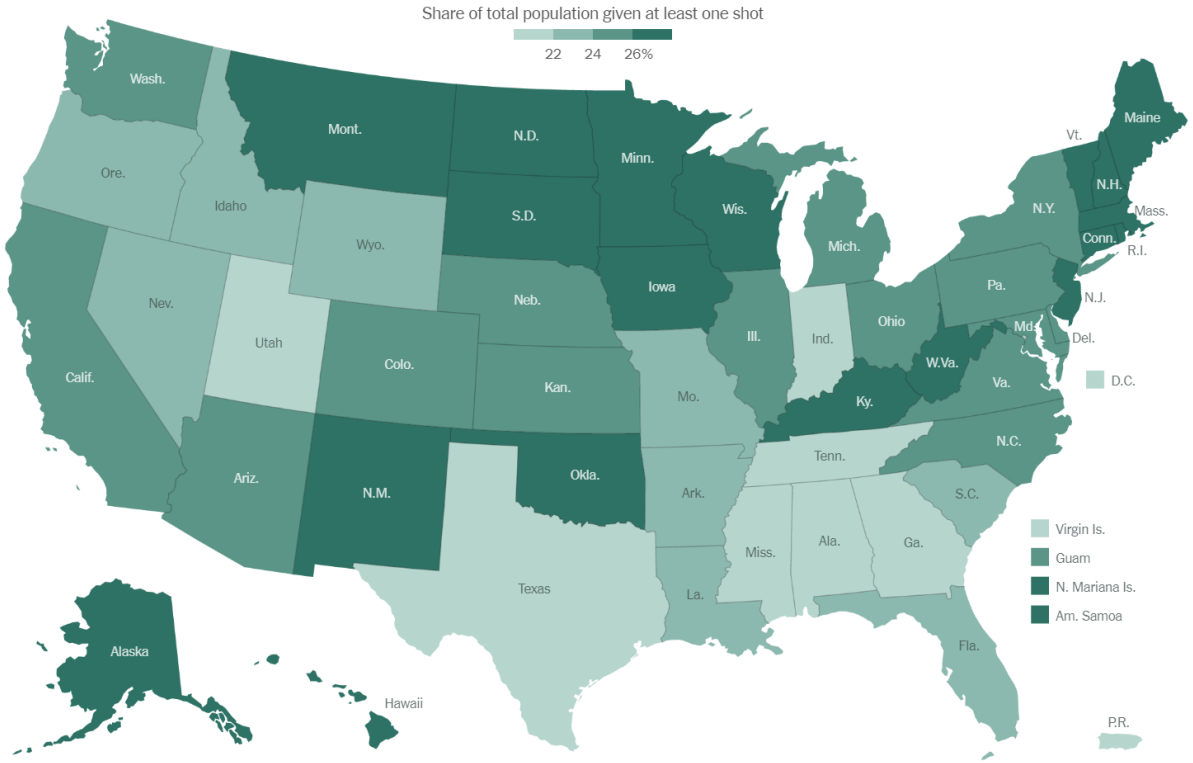
Moderna

- mRNA
- Imbedded in lipid nanoparticles
- mRNA does not create infection or is integrated into human cells
- Stable for up to six months when shipped and stored at –4°F (–20°C)
- Requires two doses
- Efficacy rate of 94.1%

Johnson & Johnson

- Double stranded DNA
- Modified adenovirus as transfer vehicle
- Adenovirus cannot replicate and cause illness
- Can be refrigerated for up to three months at 36–46°F (2–8°C)
- Only one dose
- Efficacy rate of up to 72%

Vaccine Distribution



Source: Centers for Disease Control and Prevention

Name	Percent of people: Given at least one shot	Percent of people: Fully vaccinated	Doses delivered	Shots given	Doses used
U.S. total*	**25%**	13%	**156,734,555**	**124,481,412**	79%
North Carolina	25%	14%	4,932,810	4,002,867	81%

Distribution Plan – NC DHHS – Vaccination Plan

Group 4: starting 03/17 vaccination open for people with a medical condition

https://covid19.ncdhhs.gov/vaccines

Wake Forest Baptist Health – Vaccine Status

- March 18, 2021:
  - Total vaccine inventory received: 63,620
    - For first dose: 35,390
    - For second dose: 28,230
    - Shared with health departments: 7,152
  - Total vaccines administered: 44,649 (includes employees and patients)
    - Number of employees who received first dose: 13,884
    - Number of employees who received second dose: 12,520
    - Number of patients who received first dose: 11,461
    - Number of patients who received second dose: 6,784
  - Joint mass vaccine event weekend (March 12-14): 8,027

http://intranet.wakehealth.edu/Departments/Infection-Control/Coronavirus/Topics/Vaccine.htm?utm_source=homepage

Does the COVID-19 Vaccine Reduce the Spread of the Coronavirus?

- Asymptomatic patients are responsible for 24% of transmissions.
- The more virus circulates, the higher the risk of mutations.
- Vaccines can prevent illness and/or transmission.
- Measles vaccine provides sterilizing immunity, Hep B vaccine does not.
- Preliminary data indicates a reduction in transmission:
  - UK | AstraZeneca Plc.: 67% fewer positive swabs in vaccinated patients – similar results reported for the Moderna Inc vaccine
  - Israel |Pfizer Inc. BioNTech: 89.4% reduction in transmission (caveat: national testing data, vaccinated people less likely to be tested leading to potential overestimation)
- More evidence necessary to determine true impact of vaccine on virus transmission.

Vaccination Questions

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

- Why two shots for some vaccines:
  - A relatively weak immune reaction was found within a few weeks after people received the first dose of vaccine, followed by a strong reaction when a second dose was given.
  - New studies are looking into the need for the second shot.
- Side effects in patients that had COVID-19:
  - Localized injection site symptoms similar.
  - Patients with pre-existing immunity encounter higher frequency of systemic side effects (fatigue, headache, chills, fever, and muscle or joint pains)
  - Most likely only one shot needed

https://jamanetwork.com/journals/jama/fullarticle/2776229
https://www.bmj.com/content/372/bmj.n308

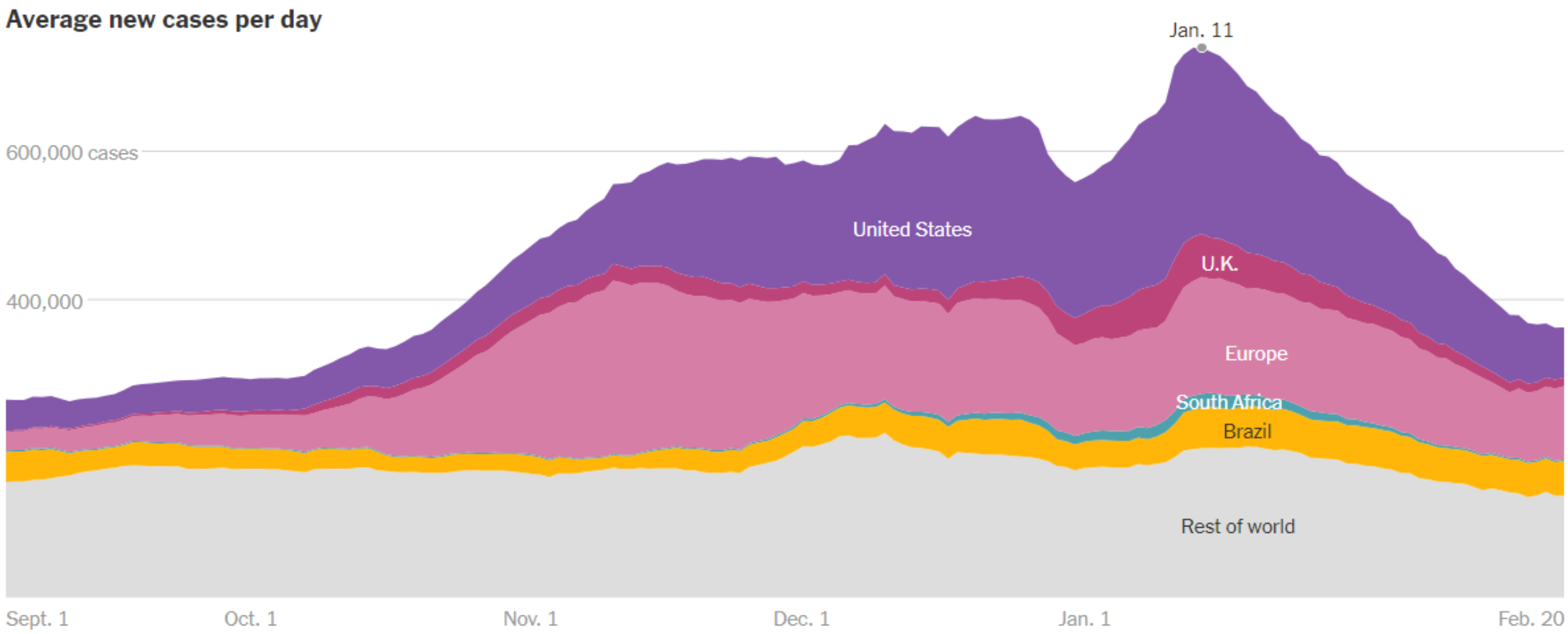
Vaccination Questions

- How effective are the current vaccines against variants:
  - Current vaccines based on the SARS-CoV-2 spike protein on the original Wuhan-hu-1 virus.
  - Novavax, J&J, AstraZeneca vaccines less effective against B.1.351 (South Africa) variant.
  - Lab studies using serum samples show lower effectiveness of the Pfizer-BioNTech and Moderna vaccines. But may still be sufficient.
  - Real world experience necessary. J&J showed significantly lower hospitalization rates than placebo group.
  - Israel very successful in vaccination and protection. The B.1.1.7 (UK) variant appears to not affect outcome (Pfizer-BioNTech).
  - Next steps:
    - Keep infection prevention measures in place (social distancing, masking, hand hygiene).
    - Vaccine manufacturers are working on modified vaccine versions to target variants.

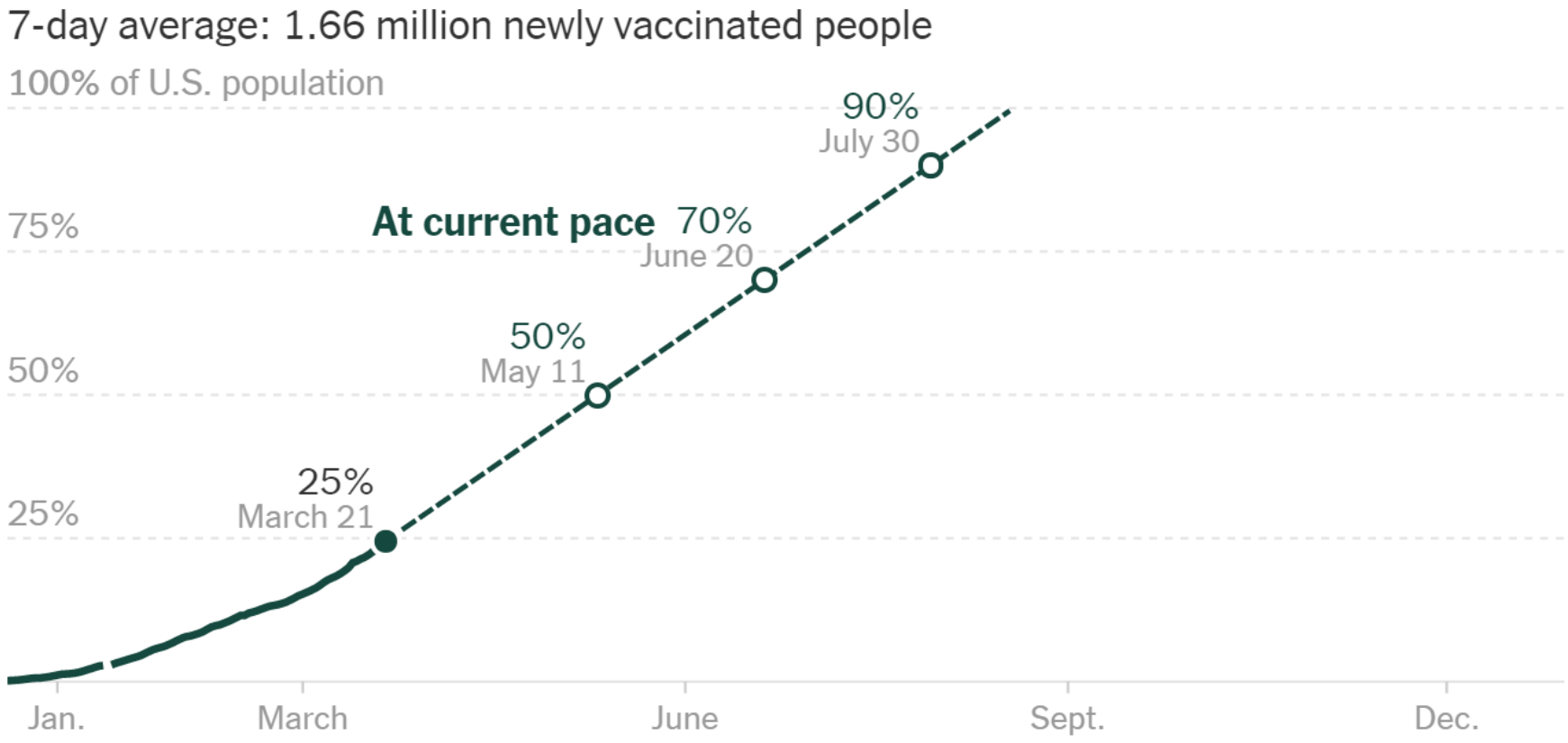
https://jamanetwork.com/journals/jama/fullarticle/2777785

What will be next?

Current Status



Projections – Vaccine Coverage

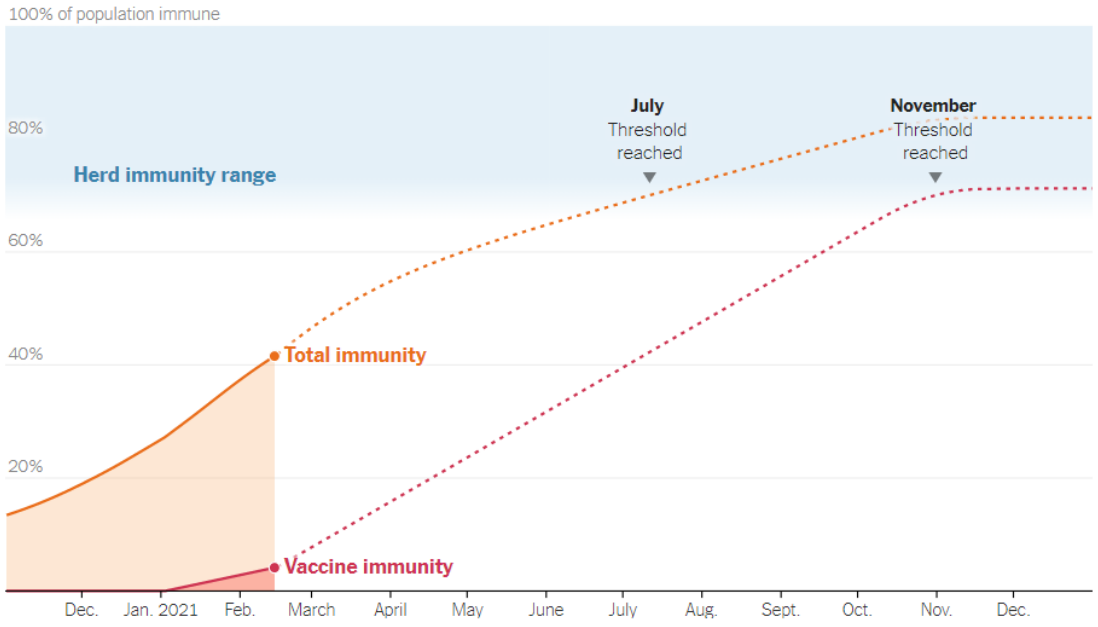


Source: Centers for Disease Control and Prevention | Note: Data from Dec. 20 to Jan. 12 are for all doses administered. Data for Jan. 13 is unavailable. Projections could change if additional vaccines are authorized.

Projections - Vaccine Supplies

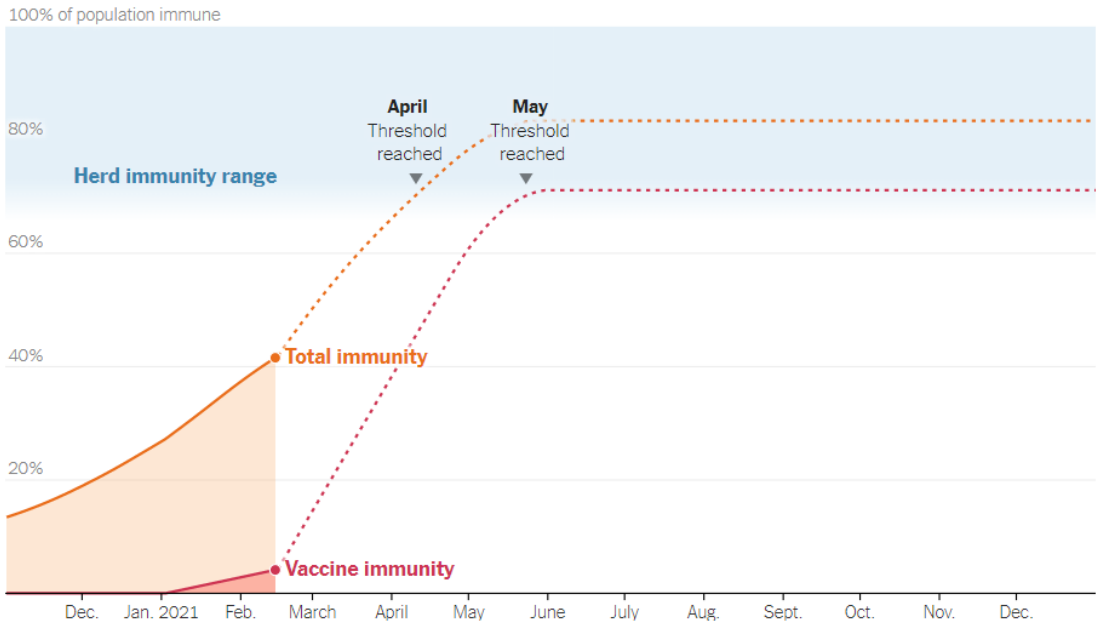
Current pace	Supply increase	Huge supply increase
About 1.7 million shots per day	3 million shots per day	5 million shots per day

If we continue at our current pace, we could reach the herd immunity threshold by **July**. In that time, **100,000** people could die from the virus.



Current pace	Supply increase	**Huge supply increase**
About 1.7 million shots per day	3 million shots per day	5 million shots per day

It's a stretch, but if the pace increases to 5 million shots per day, we could reach the herd immunity threshold by **April**. In that time, **80,000** people could die from the virus.



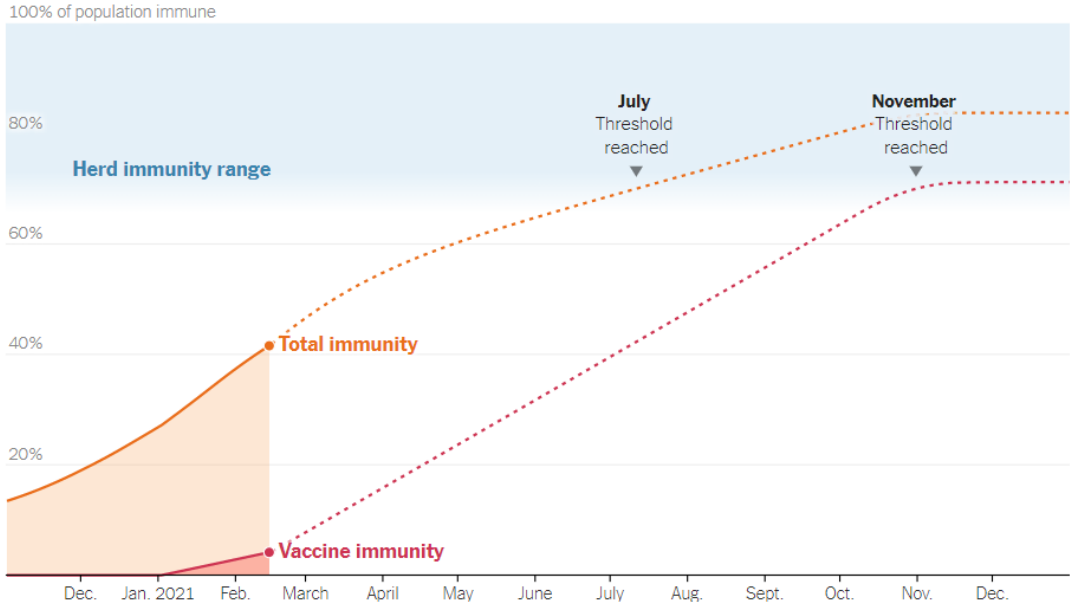
Projections – Relaxing Social Distancing

Keep measures in place
Continue social distancing until most people are vaccinated.

Ease up in the spring
Lift restrictions when 15 percent of people are vaccinated.

End precautions now
Lift restrictions when few people are vaccinated.

If we keep restrictions in place, we could reach the herd immunity threshold by **July**. In that time, **100,000** more people could die from the virus.

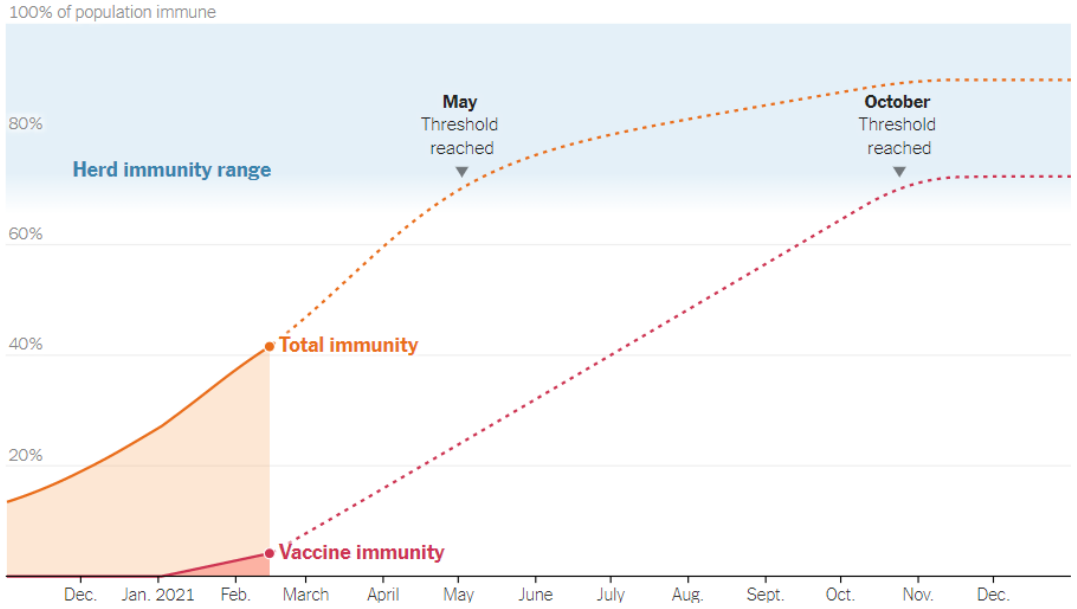


Keep measures in place
Continue social distancing until most people are vaccinated.

Ease up in the spring
Lift restrictions when 15 percent of people are vaccinated.

End precautions now
Lift restrictions when few people are vaccinated.

If we end restrictions now, we could reach the herd immunity threshold by **May**. But in that time, **320,000** more people could die from the virus.



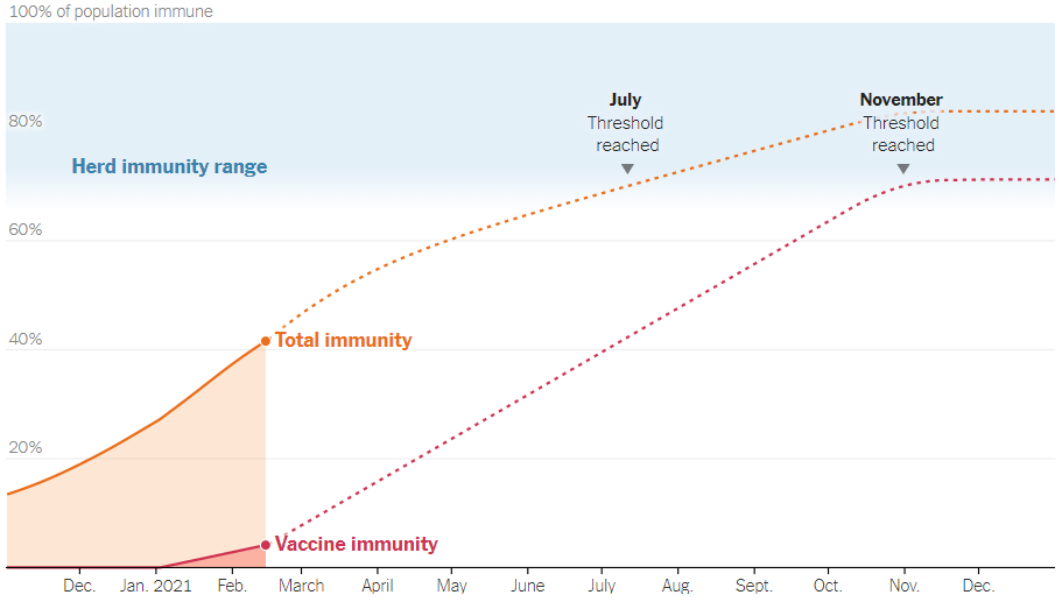
Projections – New, more contagious Variant

Current variant with precautions
Transmissibility and precautions remain the same.

More contagious variant with precautions
Transmissibility increases but preventative measures continue.

More contagious variant with no precautions
Preventative measures end in March and transmissibility increases.

Based on estimates of how fast the virus spreads, we could reach the herd immunity threshold by **July** if preventative measures stay in place. In that time, **100,000** people could die from the virus.

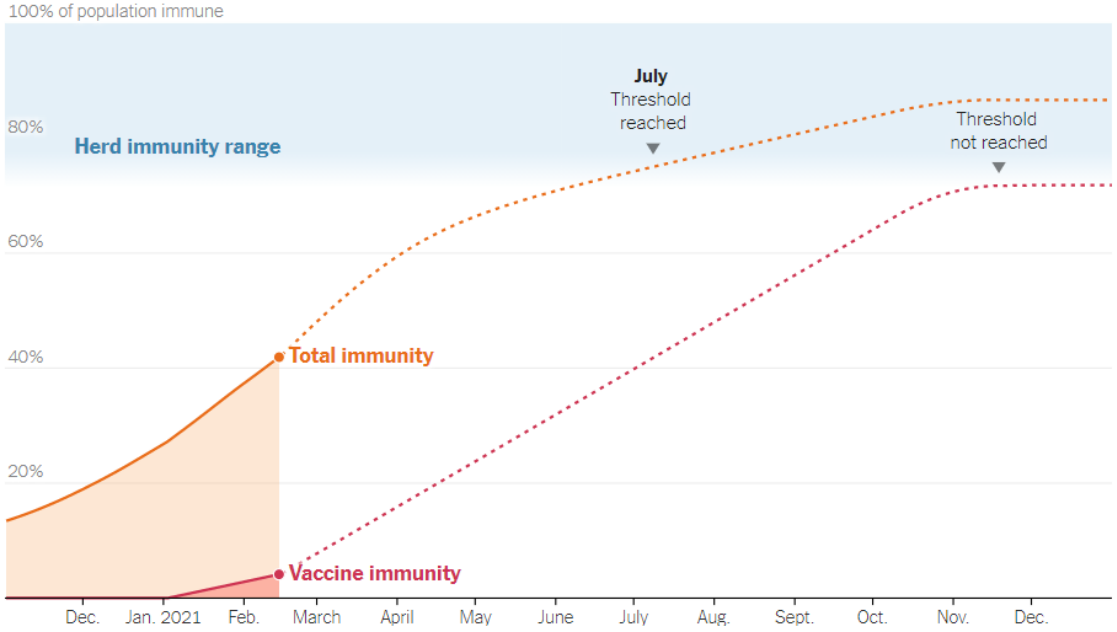


Current variant with precautions
Transmissibility and precautions remain the same.

More contagious variant with precautions
Transmissibility increases but preventative measures continue.

More contagious variant with no precautions
Preventative measures end in March and transmissibility increases.

A more contagious variant will spread faster and raise the herd immunity threshold. We could still expect to reach herd immunity in **July**, but new deaths could double, to **200,000** people.



Dealing with Misinformation

Evaluating Online Information

- Time is a scarce commodity.
- The goal of disinformation is to capture attention, and critical thinking is deep attention.
- SIFT:
    1. Stop.
    2. Investigate the source.
    3. Find better coverage.
    4. Trace claims, quotes and media to the original context.
- Stop overthinking what you see online!

Evaluating Online Information – An Example

Children's Health Defense™

JOIN THE MOVEMENT | SUPPORT OUR EFFORTS | TAKE ACTION | MEMBERS ONLY | EBOOKS

Exposing the Truth

Certain lapses in safety, such as the VAERs passive reporting system, have put our children at risk. The FDA has proved to be incapable of monitoring vaccine safety by not accurately calculating exposure levels to aluminum and mercury in vaccines, while thimerosal still remains in 12 of the current flu vaccines on the market. To compound the misinformation, the CDC vaccine safety database has failed to adequately detect injuries. As a nation we can no longer pretend our trusted agencies are protecting our children.

Evaluating Online Information

An example: Children's Health Defense

1. Stop
2. Investigate the source
   - Wikipedia result: *Children's Health Defense is an American 501c3 nonprofit advocacy organization,[1] known for its anti-vaccine activism. Much of the material put forth by the organization involves misinformation on vaccines and anti-vaccine propaganda.[2]*
3. Find better coverage
   - Google: 'vaccination information'; first four results:
     1. Vaccines and Immunizations | CDC
     2. COVID-19 Vaccine Updates & Information | Johns Hopkins University
     3. Pfizer-BioNTech – FDA
     4. Vaccines and immunization – WHO | World Health Organization
4. Trace claims, quotes and media to the original context.

https://en.wikipedia.org/wiki/Children%27s_Health_Defense

Talking to Friends and Family about COVID-19 Misinformation

Talking to Family and Friends

This advice pertains to friends or relatives with whom you are already close and who are not demonstrating unstable or violent behavior.

- Ask where the information is coming from:
  - Use SIFT.
  - Explain how Google search works (search algorithm: ranking based on hits and links).
- Create cognitive dissonance:
  - Acknowledge that some conspiracies exits (e.g., Watergate, Catholic Church's sexual abuse scandals, Jeffrey Epstein's network of underage sexual abuse)
  - How do they usually play out? Whistleblower and/or news reports, investigations by independent journalist, victims and witnesses forthcoming. Not directly addressing the conspiracy theories in questions but motivating the individual to 'do their research'.

https://www.nytimes.com/2020/10/25/opinion/qanon-conspiracy-theories-family.html?searchResultPosition=2

Talking to Family and Friends

- Create cognitive dissonance (cont.):
  - Avoid appealing to authorities such as government or mainstream media but subtly pointing out the discrepancies in the promoted conspiracy theory and its historical record.
- Debunking is difficult:
  - ‘Believers’ are vested in the conspiracy theory as part of their cultural and political identity.
  - Questioning the conspiracy theory through fact-checking can be seen as a personal attack on their integrity.
  - Asking questions is more productive.
- Don’t debate on Facebook:
  - Seek out face-to-face conversations (virtual or in-person)

https://www.nytimes.com/2020/10/25/opinion/qanon-conspiracy-theories-family.html?searchResultPosition=2

Talking to Family and Friends

- Mocking and scolding don’t work:
  - Do not dismiss them outright.
  - Do not attempt to argue with a ‘true’ believer – keep your cool.
  - Don’t be a scold. Be gentle, compassionate and patient.
- Know when to walk away:
  - Be very careful choosing when and with whom to engage.
  - If you have legitimate concerns about their health and safety, that is usually a job for professionals.
  - There comes a point where you may not be able to have that instability in your life. If you have to, be ready to walk away from them.

https://www.nytimes.com/2020/10/25/opinion/qanon-conspiracy-theories-family.html?searchResultPosition=2

A few Thoughts on Congregate Settings

In-Person Worship, Singing, Eating

- Herd immunity not reached with variants posing challenges.
- Outdoors better than indoors.
- Discourage symptomatic members from attending.
- Still keep social distancing and masking measures in place.
- Singing/choir practices:
  - Safe with masks (special singing masks) and social distancing (6ft)
  - Increase ventilation (open windows).
- If food is being served:
  - Only use prepackaged food and beverages.
  - Staff will wear masks and gloves when handling pre-packaged food and beverages.
  - Attendees will wear masks during the distribution of pre-packaged food items and prepared beverages. Items can be placed on tables for easy pick-up.
  - Utensils for beverage or food consumption (e.g., pitchers, cutlery etc.) should not be shared.
  - Use of disposable items (e.g., plates, cutlery, cups, napkins, table covers etc.) is highly recommended.
- Summer camps:
  - Next few months are decisive.