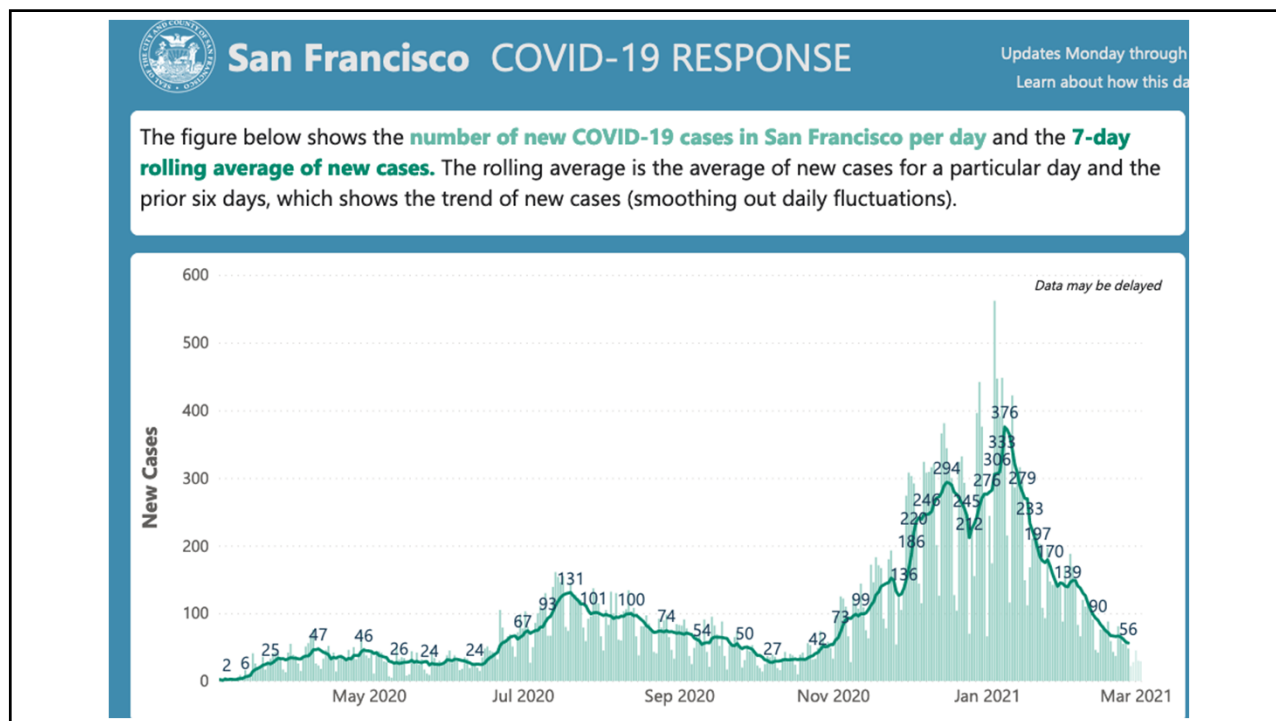
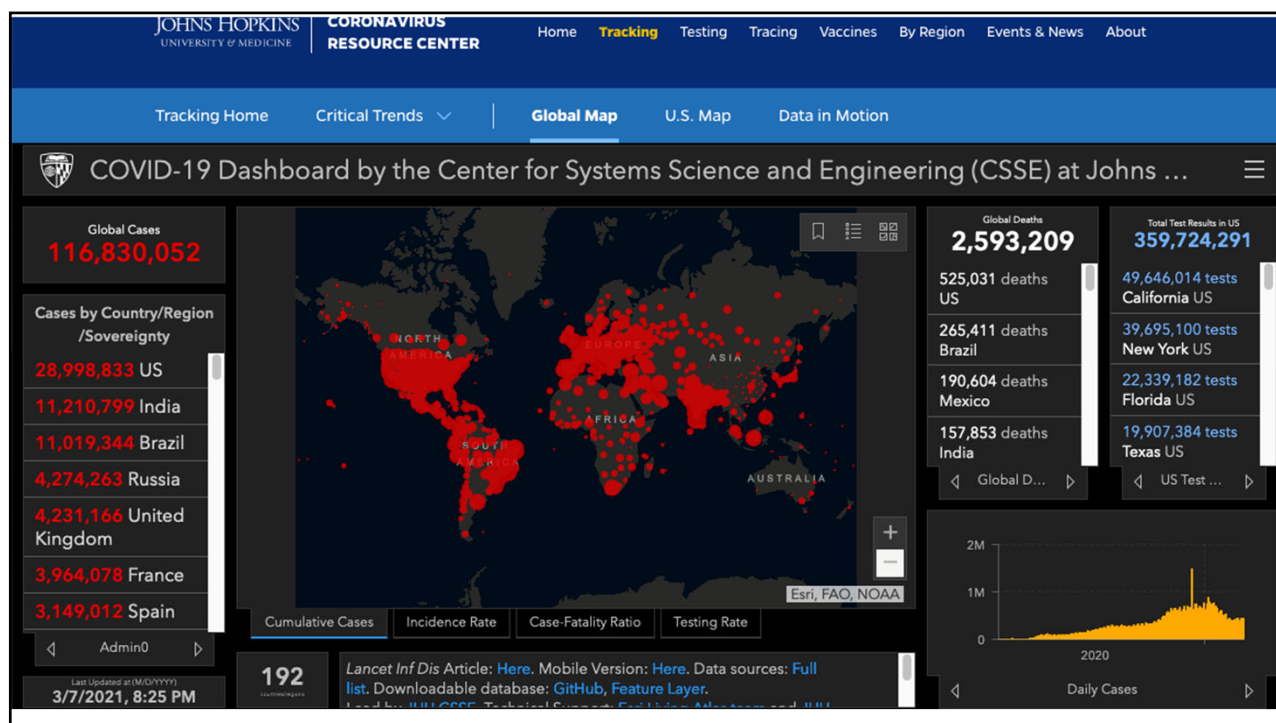


COVID19 Vaccination & HIV

John Szumowski MD, MPH
Ward 86, San Francisco General Hospital / UCSF
3-8-21

Topics to discuss

- What we know about COVID-19 in PLWHA
- COVID-19 vaccinations
- Q+A



Age is a major risk factor for poor outcomes in COVID-19

	Hospitalization ¹	Death ²
18-29 years	Comparison Group	Comparison Group
30-39 years	2x higher	4x higher
40-49 years	3x higher	10x higher
50-64 years	4x higher	30x higher
65-74 years	5x higher	90x higher
75-84 years	8x higher	220x higher
85+ years	13x higher	630x higher

<https://www.cdc.gov/coronavirus/2019-ncov/need-extra-precautions/older-adults.html>

Medical conditions associated with severe COVID-19

- Cancer
- Organ transplant recipients
- Chronic kidney disease
- COPD (Emphysema)
- Chronic heart disease such as congestive heart failure
- Obesity (Body mass index of 30 or more)
- Diabetes
- Sickle cell disease
- Down syndrome
- Pregnancy
- Tobacco use

<https://www.cdc.gov/coronavirus/2019-ncov/need-extra-precautions/people-with-medical-conditions.html>

COVID-19 and HIV

- The incidence and severity of COVID-19 appears **similar** in HIV+ and HIV- persons
 - Less is known for persons with uncontrolled viral load
 - Outcomes may be worse for persons with CD4 <200
- We do not have convincing evidence that antiretrovirals targeting HIV have significant activity against SARS-CoV-2
 - Lopinavir-ritonavir (Kaletra in US)
 - Tenofovir

<https://www.idsociety.org/covid-19-real-time-learning-network/special-populations/hiv/>

COVID-19 and HIV

- Treatment recommendations are similar for HIV+ and HIV- persons
 - Drug interactions are **not** a major challenge with the most common therapies being used for COVID-19 such as dexamethasone, remdesivir, and antibody-based treatments

<https://www.idsociety.org/covid-19-real-time-learning-network/special-populations/hiv/>

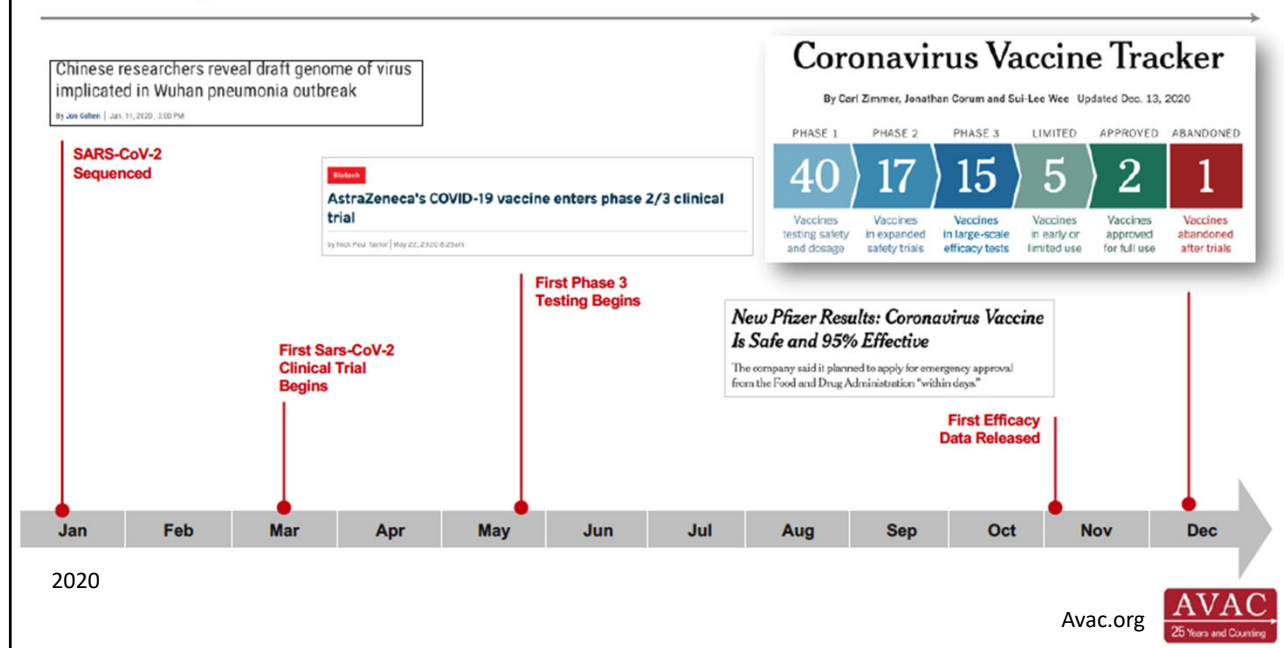
COVID-19 and HIV

- Important to continue HIV therapy without interruptions
- General health measures are still important
 - If smoking, discuss quitting options with your medical team
 - Weight control
 - Blood sugar control if diabetic
 - Make sure you are up to date with other vaccinations (influenza, pneumococcal pneumonia)

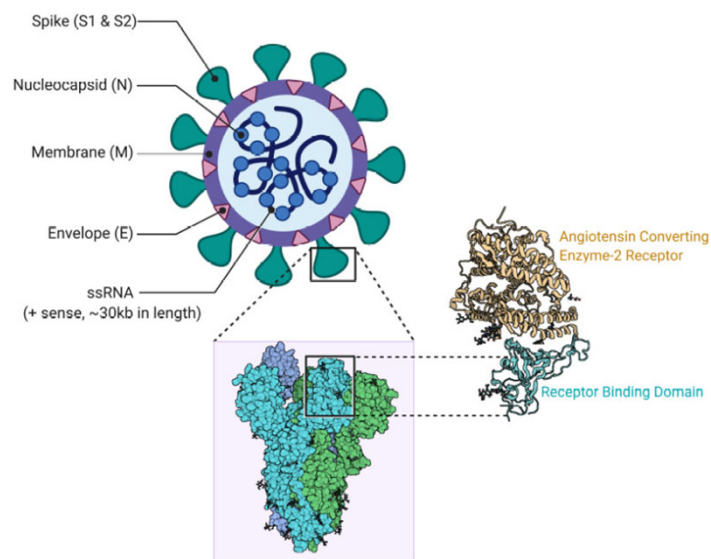
<https://www.idsociety.org/covid-19-real-time-learning-network/special-populations/hiv/>

COVID-19 Vaccines

An Unprecedented Timeline



SARS-CoV 2 Structure



Singh BR StatPearls 2020

Vaccine Platform Refresher

DNA-based vaccines work by inserting synthetic DNA of viral gene(s) into small DNA molecules (called plasmids). Cells take in the DNA plasmids and follow their instructions to build viral proteins, which are recognized by the immune system, and prepare it to respond to disease exposure

SANOFI INOVIO

Viral vector vaccines insert a gene for a viral protein into another, harmless virus (replicating or non-replicating), which delivers the viral protein to the vaccine recipient, triggering an immune response.

AstraZeneca
Johnson & Johnson

MERCK

CanSinoBIO

МИНИСТЕРСТВО
ЗДРАВООХРАНЕНИЯ
РОССИЙСКОЙ ФЕДЕРАЦИИ

RNA vaccines introduce an mRNA sequence coded for a disease-specific antigen. Once this antigen is reproduced within the body, it is recognized and triggers an immune response

Pfizer Moderna CureVac

Subunit vaccines introduce a fragment of the virus into the body. This fragment is enough to be recognized by the immune response and stimulate immunity.

NOVAVAX Clover

Inactivated vaccines consist of the whole virus, which has been killed with heat or chemicals so it can't cause illness.

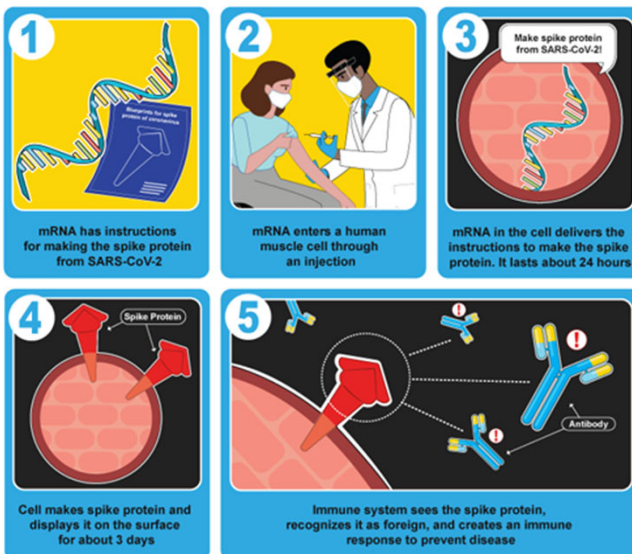
sinovac

Live attenuated vaccines are made up of whole viruses that have weakened in a lab. They tend to elicit a stronger immune response than inactivated vaccines.

Avac.org

? How do mRNA vaccines work?

mRNA vaccines give your body the information needed to defend against a virus.

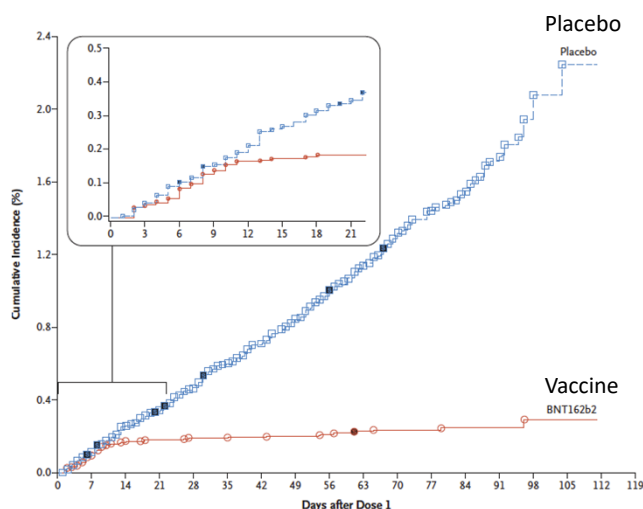


coronaviruspreventionnetwork.org

Pfizer vaccine

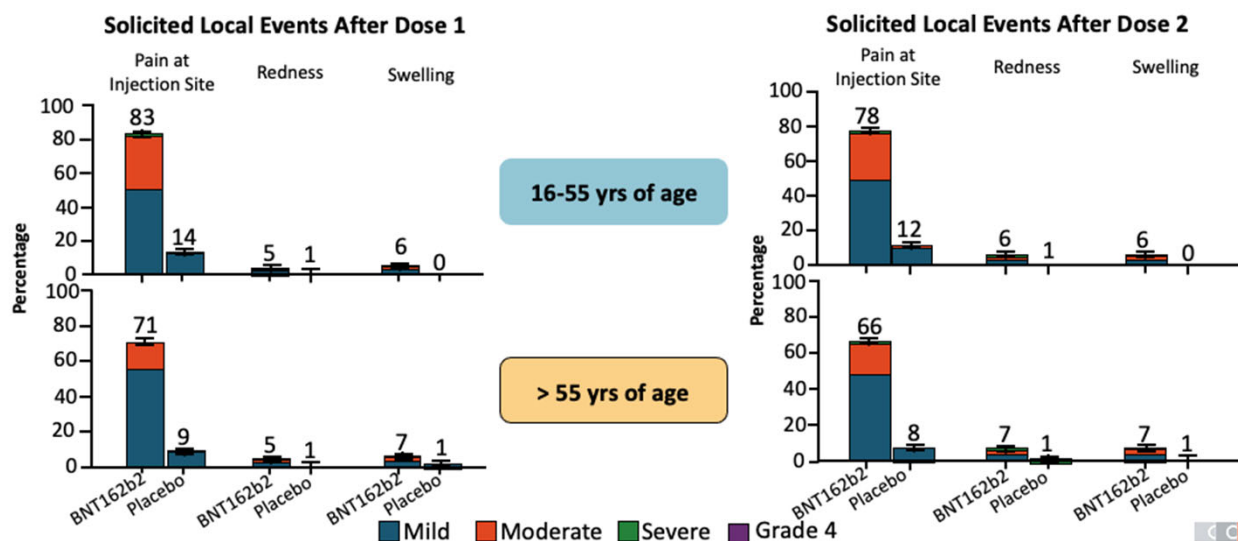
- mRNA vaccine (Spike)
- Two doses, 21 days apart
- 43548 randomized at 150 sites
- 95% efficacy
 - Count symptomatic cases at least 7 days after 2nd dose
- Cold storage requirements complicate use (-70C)

Incidence of **symptomatic** COVID19



Polack et al NEJM 2020

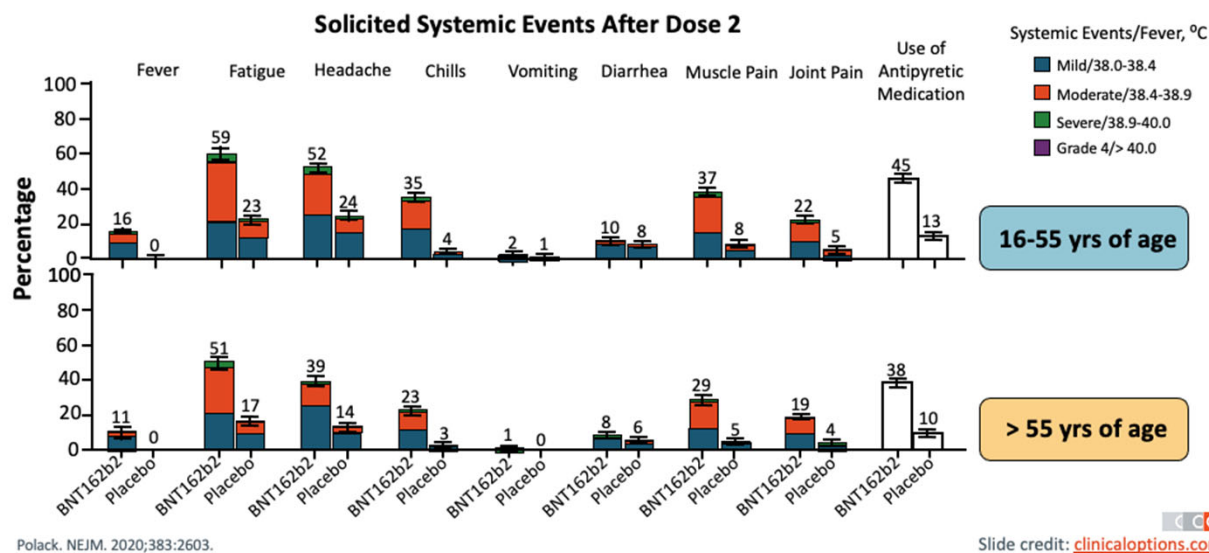
Pfizer vaccine safety



Polack. NEJM. 2020;383:2603.

Slide credit: clinicaloptions.com

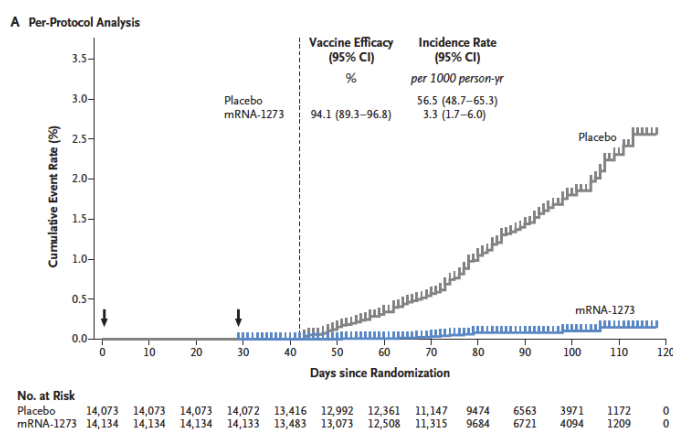
Pfizer vaccine safety



Moderna vaccine

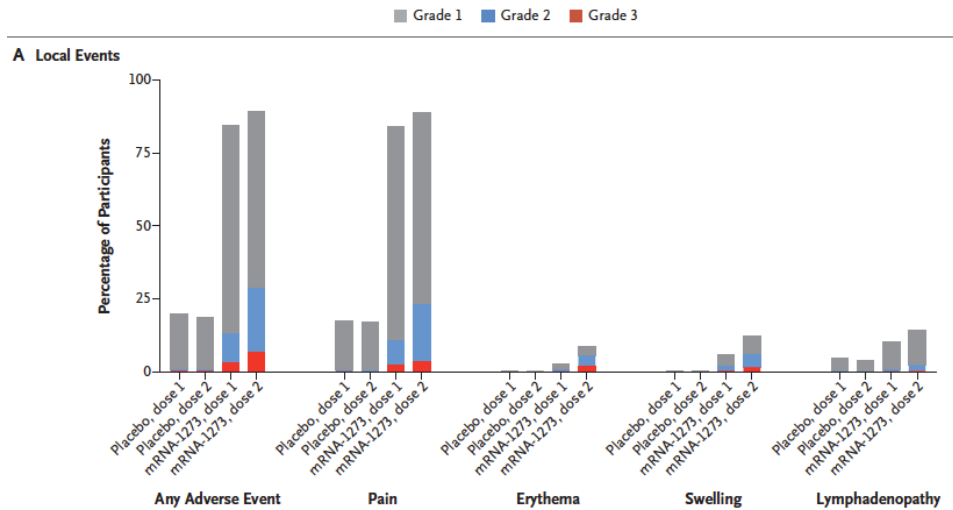
- mRNA vaccine (Spike)
- Two doses, 28 days apart
- 30,420 participants randomized at 99 sites
- 94% efficacy.
 - Count symptomatic cases at least 14 days after 2nd dose

Incidence of symptomatic COVID19



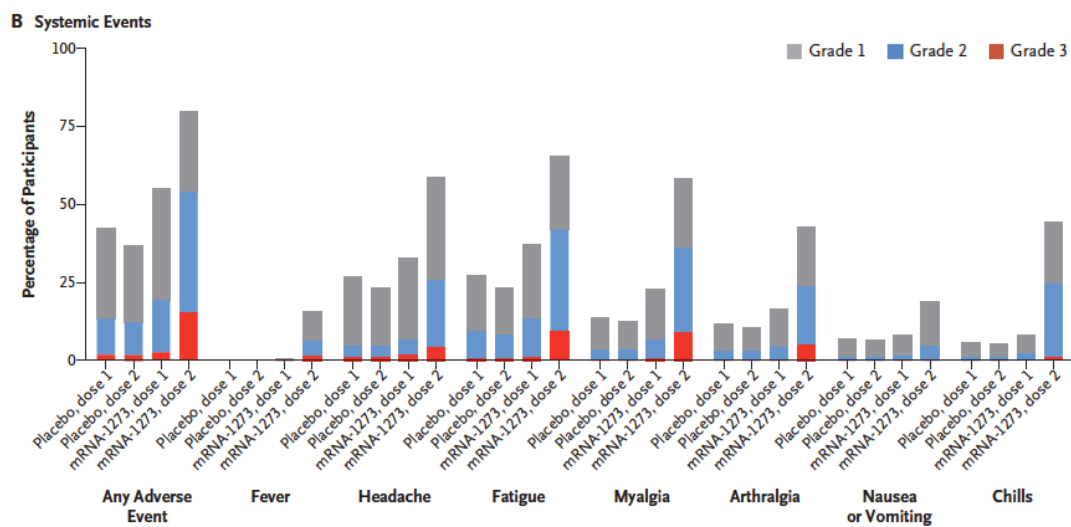
Baden et al NEJM 2020

Moderna safety



Baden et al NEJM 2020

Moderna safety



Baden et al NEJM 2020

J&J vaccine

- Attenuated adenovirus vector
- Single dose (2 dose series being studied)
- 43,783 participants
- Vaccine stable for 3 months in refrigerator
- Efficacy against symptomatic COVID-19 66.3%
 - By 28d post vaccination, 83.5% protection from severe disease, 100% from hospitalization
- Well-tolerated
 - Local reactions at injection site in 50%, most often pain
 - Systemic reactions in 55% such as headache, fatigue, and muscle aches
 - Symptoms generally short-lived, 1-2d

CDC

Vaccine allergy

- Allergic reactions have been reported, rarely
 - 11.1 cases of anaphylaxis per million doses of Pfizer vaccine
 - Estimates for Moderna are under study
- The rate of anaphylaxis to penicillin has been estimated at 1:5000 doses

MAY PROCEED WITH VACCINATION
<p>Among persons without a contraindication or precaution, a history of:</p> <ul style="list-style-type: none"> • Allergy to oral medications (including the oral equivalent of an injectable medication) • History of food, pet, insect, venom, environmental, latex, etc., allergies • Family history of allergies <p>Actions:</p> <ul style="list-style-type: none"> • 30-minute observation period: persons with history of anaphylaxis (due to any cause) • 15-minute observation period: all other persons

https://emergency.cdc.gov/coca/ppt/2021/030221_slide.pdf
<https://www.nejm.org/covid-vaccine/faq>
<https://www.cdc.gov/mmwr/volumes/70/wr/mm7002e1.htm>

What about viral variants?

- Some viral strains with mutations have been identified that seem to spread more easily and/or possibly cause more severe disease
 - UK, S Africa, Brazil, among others
- In some cases, antibodies generated in response to existing COVID-19 vaccines may not attach as well to mutant virus in the laboratory
 - Implications outside of the laboratory aren't as clear

Overcoming vaccine hesitancy

- Take an empathetic approach and try to understand the basis for the patient's concerns
- But ... Recommend vaccination
- Share your own vaccine experience, if you are comfortable doing so
- Share what we know:
 - 10s of thousands of patients in trials
 - Vaccines are highly effective at preventing COVID-19 mortality and severe disease

Overcoming vaccine hesitancy

- Risk of complications (short & longer term) and death from COVID 19 >> local reactions, flu like symptoms for a limited period of time post vaccination
- Expected benefits to the community in addition to the individual (reduce disease transmission)
- Tread carefully: discuss reliability of source of information

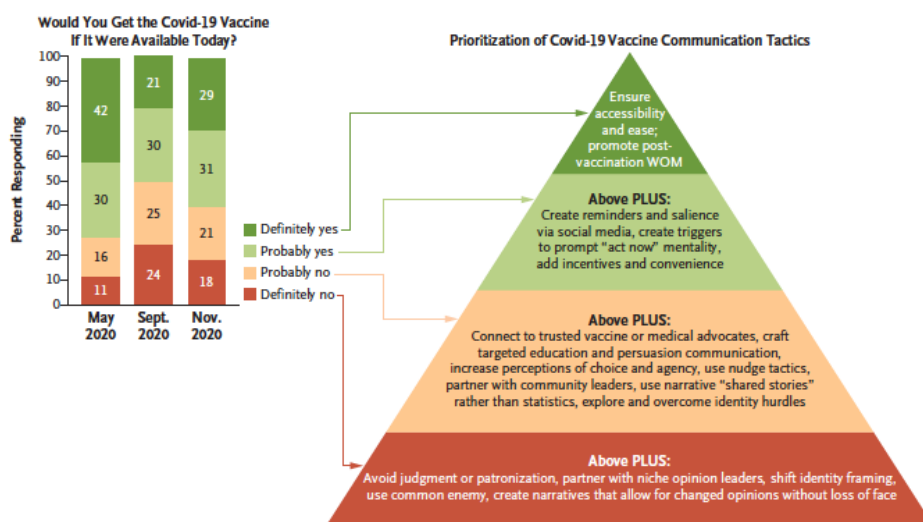









Figure 1. Prioritization of Communication Tactics Based on Vaccine-Hesitancy Level.

Survey data are from the Pew Research Center's American Trends Panel (ATP).¹ To move the public from intent to action (completing

Wood and Schulman NEJM 2021

Vaccine takeaways

- COVID-19 vaccines have shown high levels of protection against severe illness & death from COVID-19
- Local symptoms (ie arm pain) and flu-like symptoms (headache, fatigue) are common but resolve after a few days typically
- Encourage patients to take the first COVID-19 vaccine they can access
- HIV-specific data are limited at present; it's possible the vaccine protection is reduced in persons with very low CD4 counts

Company	Platform	Doses	Non-clinical results	# who got vaccine	Protection from hospitalization from COVID-19	Protection from COVID severe dz (some at home)	Efficacy against milder COVID
	mRNA-1273 mRNA in lipid nanoparticle	2	Neutralizing Abs; Strong Th1 CD4+, CD8+; protection from challenge (macaques)	~15,000	97% (1 in vaccine arm after 2nd dose hospitalized)	97% (30 cases in placebo arm; 0 in vaccine reported but 1 severe per FDA)	94.1%
	BNT162b2 mRNA in lipid nanoparticle	2	Neutralizing Abs; Strong Th1 CD4+, CD8+; protection from challenge (macaques)	~18,600	100%	100% (9 cases in placebo arm; 0 in vaccine- 1 initially severe but not)	95%
	JNJ-78436725 Non-replicating human adenovirus/DNA	1	Neutralizing Abs; Strong Th1 CD4+ > Th2; CD8+; challenge protection (macaque)	~22,000 US, Latin America, S. Africa	100%	85.4% across 3 sites (7 deaths, 16 hospitalizations, all 1 placebo arm)	72% US; 68% Latin America; 64% S. Africa (96% B.1.351)
	AZD 1222 Non-replicating Chimp Adenovirus-DNA	2	Neutralizing Abs; Strong Th1 CD4+ > Th2; CD8+; protection from challenge (macaques)	~8588	100%	100% (15 in placebo – all hospitalized; 0 in vaccine)	70% overall; 76% 1 dose; S. Africa trial halted for mild
	NVX-CoV2373 Spike protein/RBD + Matrix M adjuvant	2	Neutralizing Abs; Strong Th1 CD4+ > Th2; challenge protection (macaques)	~9700 (Phase 3 UK; 2b SA)	100%	100% (but only 1 severe in placebo; 0 in vaccine)	96%; 89% B.117 UK; 60% SA (94% B.1.351)
	Ad26 and Ad5 adenovirus/DNA	2	NAbs; IFN-γ secretion PMBCs, cellular response	~14964	100%	100% (20 in placebo; 0 vaccine)	91.6%
	Inactivated virus	2	Antibodies (T cells next)	~12500	100%	83% (tx needed)	50.7% across

Courtesy of Monica Gandhi MD

Current Tiered COVID vaccination strategy in California

Who can get vaccinated now

Phase 1A

Est. 3M people

NOW VACCINATING

- Healthcare workers
- Long-term care residents

Phase 1B

Est. 12M people

NOW VACCINATING AS SUPPLIES ALLOW

- Individuals 65 and older
- Sector populations:
 - Agriculture and food
 - Education and childcare
 - Emergency services

Vaccinating those at higher risk

Beginning March 15, healthcare providers may use their clinical judgement to vaccinate individuals aged 16-64 who are deemed to be at the very highest risk to get very sick from COVID-19 because they have the following severe health conditions:

- **Cancer**, current with weakened immune system
- **Chronic kidney disease**, stage 4 or above
- **Chronic pulmonary disease**, oxygen dependent
- **Down syndrome**
- **Solid organ transplant**, leading to a weakened immune system
- **Pregnancy**
- **Sickle cell disease**
- **Heart conditions**, such as heart failure, coronary artery disease, or cardiomyopathies (but not hypertension)
- **Severe obesity** (Body Mass Index ≥ 40 kg/m²)
- **Type 2 diabetes mellitus** with hemoglobin A1c level greater than 7.5%

OR

If as a result of a developmental or other severe high-risk disability one or more of the

HIV alone is not on this list of comorbid conditions though many patients may qualify via another condition (ie diabetes or kidney disease)

<https://covid19.ca.gov/vaccines/#When-can-I-get-vaccinated>
<https://sf.gov/covid-19-vaccine-san-francisco>

Outstanding questions

- How **long** will vaccine protection last?
- How well will vaccines work against **mutant** virus?
- How well will vaccines work for persons with **weakened immune systems**?
- How will vaccination affect virus **transmission**? Effect on **asymptomatic infection**?
- What is the **best strategy for rolling out vaccination**?