

Update on Vaccines for COVID-19. Help is on the Way!

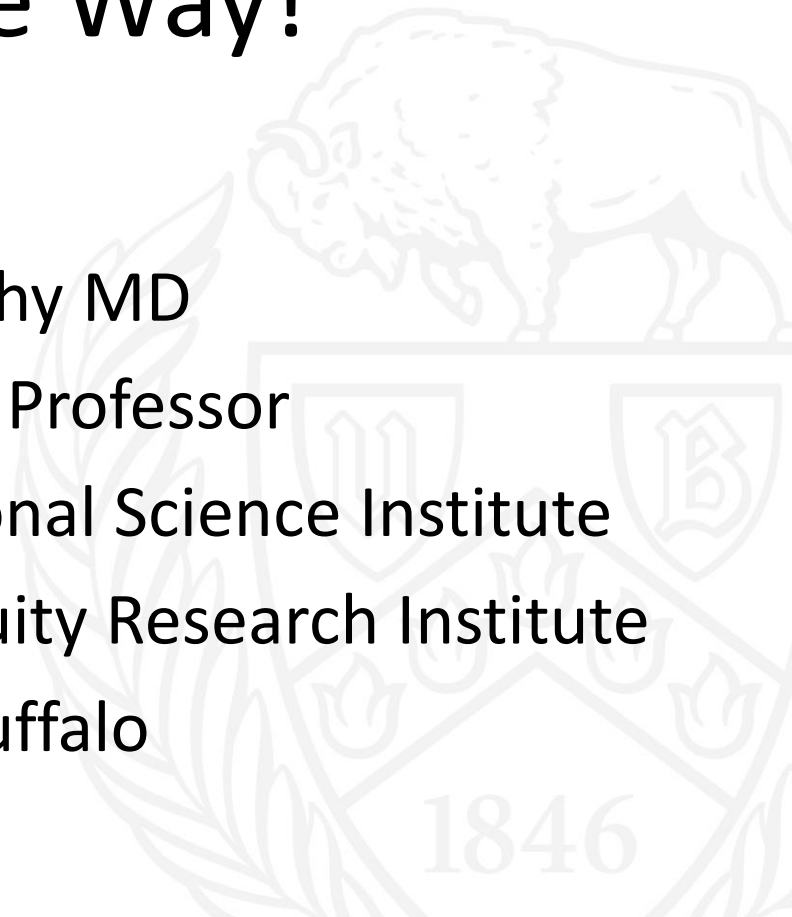
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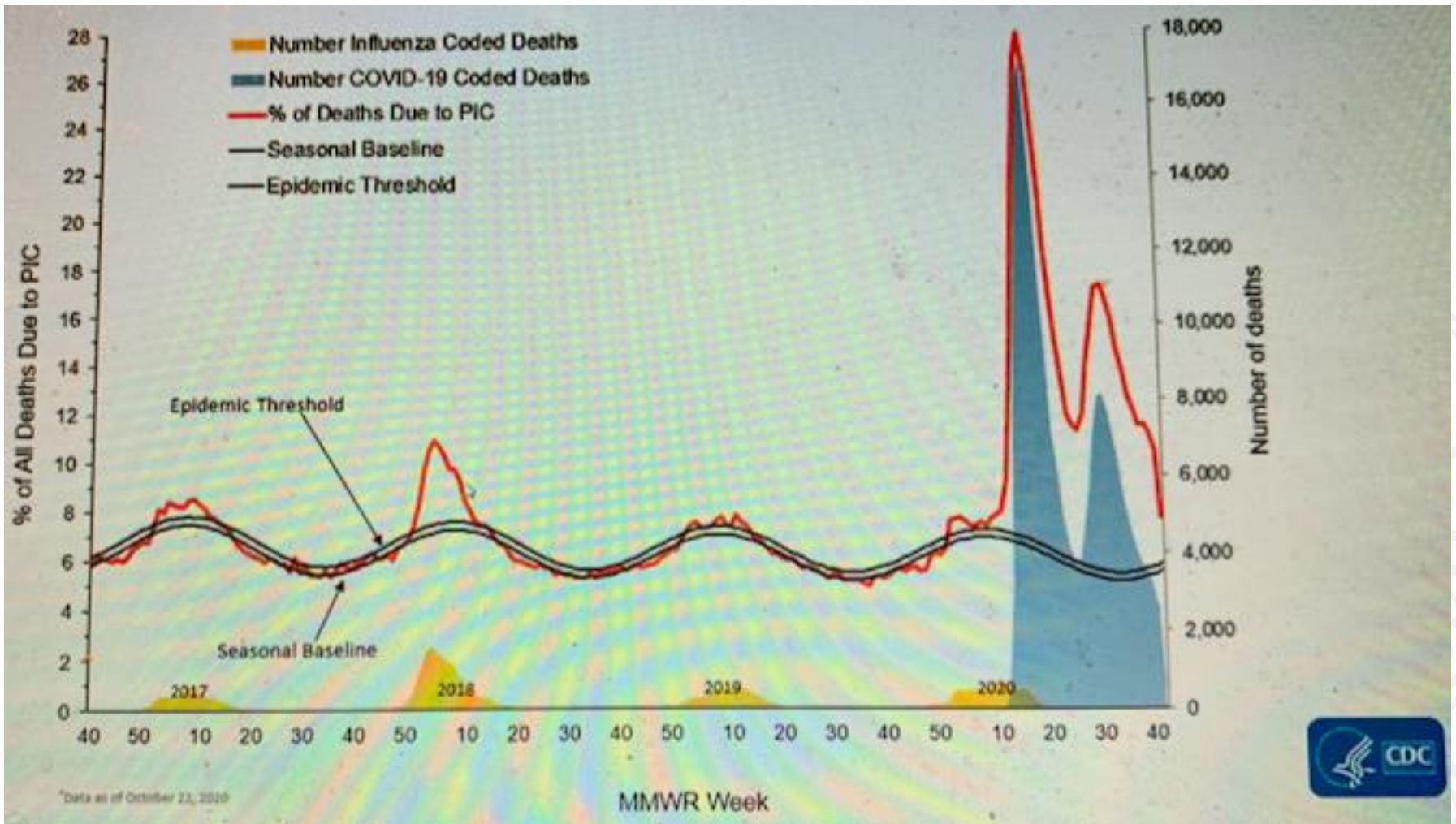
University at Buffalo



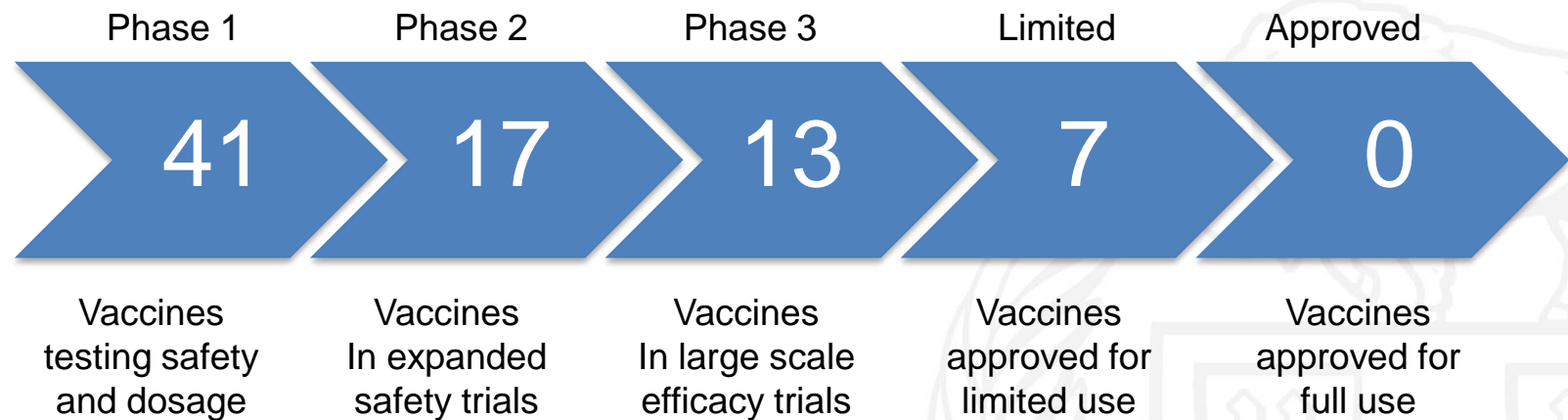
Objectives

- Vaccines currently in clinical trials globally and how they work
- Results of phase 3 vaccine trials thus far
- Vaccine administration priorities
- Vaccine acceptance





Coronavirus Vaccine Tracker



12-2-20

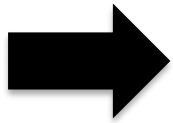
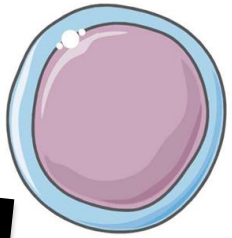
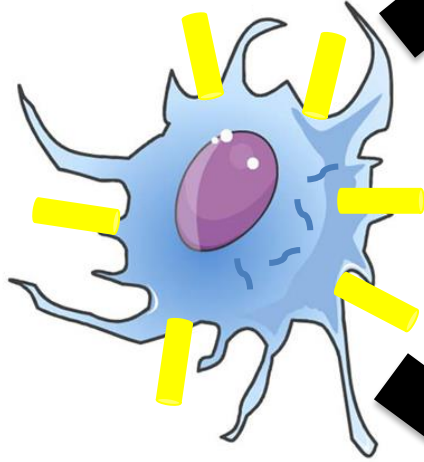
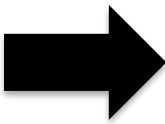
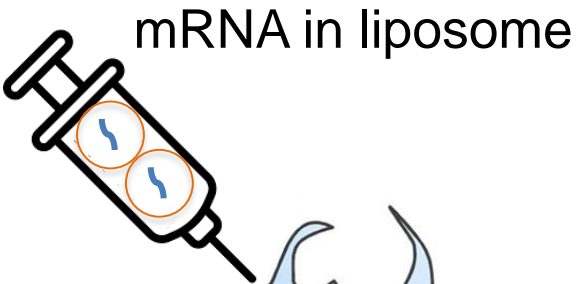
New York Times Coronavirus Vaccine Tracker

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

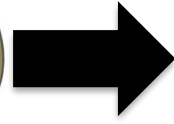
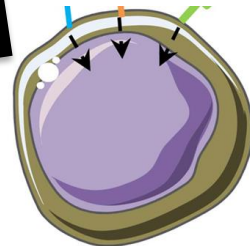
Coronavirus Phase 3 Clinical Trials

Protein Subunit Vaccine	mRNA Vaccine	Adenovirus Vector Vaccines	Whole inactivated Virus vaccine
Novavax (US)	Moderna/NIH (US)	University of Oxford/ AstraZenica (UK)	Sinovac (China)
Sanofi/GSK (France, UK)	Pfizer/BioNTech (US, Germany)	CanSinoBio/Beijing Institute of Biotechnology (China)	Wuhan Institute of Biological Products/ Sinopharm (China)
Anhui Zhifei Longcom Biopharmaceutical (China)		Gamaleya Research Institute (Russia)	Beijing Institute of Biological Products/ Sinopharm (China)
		Johnson & Johnson/ Janssen Pharmaceuticals (US)	

mRNA Vaccine



Antibody mediated immunity



Cell mediated immunity

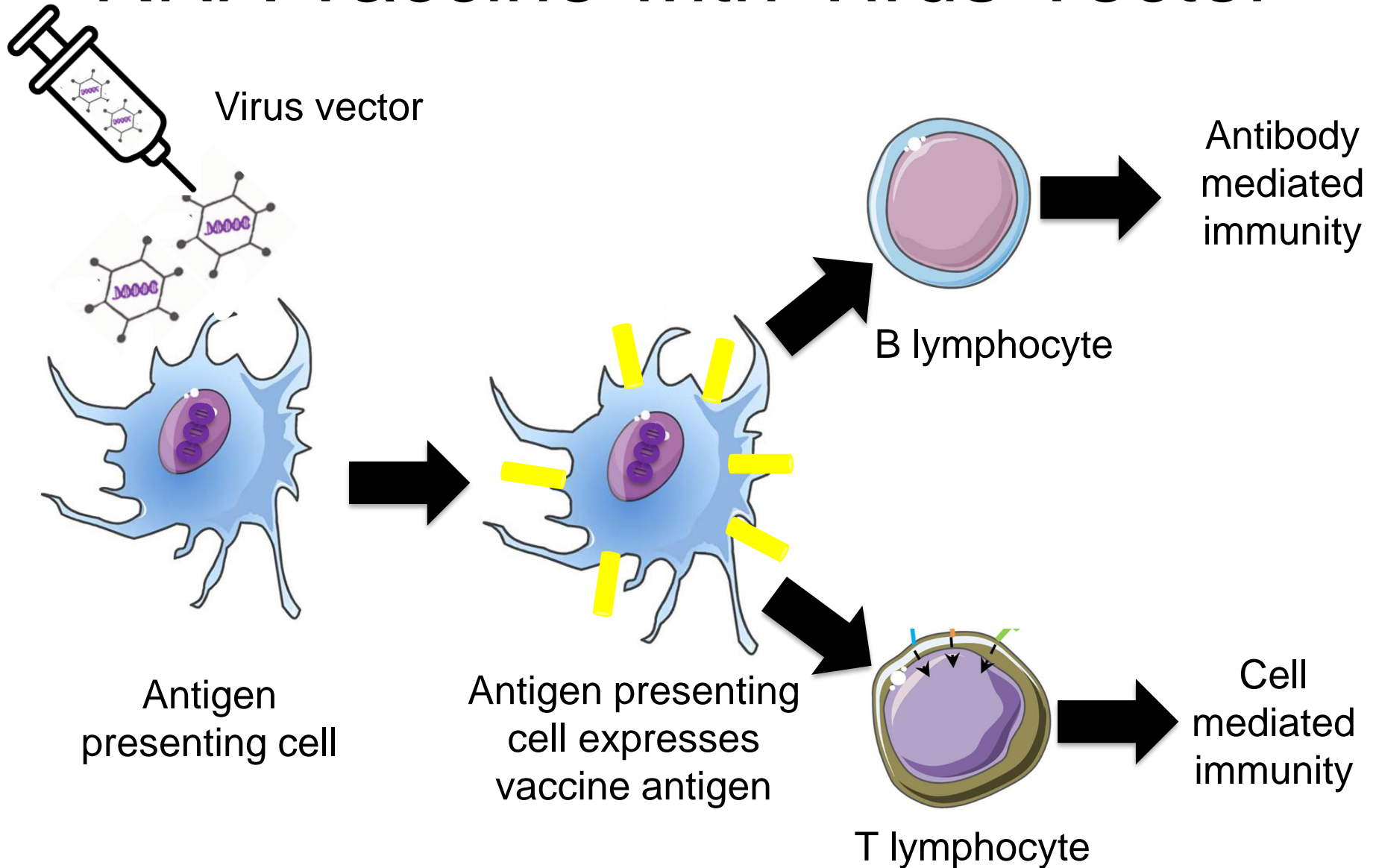
Pfizer/BioNTec COVID Vaccine

- Study began 7/28/20 (149 sites)
- 43,538 people enrolled (40% underrepresented minority)
- Final analysis: 170 cases of COVID
- 95% effective to prevent symptomatic infection
- 94% effective in >65 year olds
- No serious adverse adverse effects
- 9 of 10 severe cases in the placebo group
- Submitted Emergency Use Authorization 11/23/20
- FDA review meeting 12/10/20

Moderna COVID Vaccine

- Study began 7/28/20 (99 sites)
- 30,000 people enrolled (35% underrepresented minority)
- Interim analysis: 196 cases of COVID
- 94.1% effective to prevent symptomatic infection
- No serious adverse adverse effects
- All 30 severe cases in the placebo group
- Submitted Emergency Use Authorization 11/30/20

RNA Vaccine with Virus Vector



Oxford/Astrazenica COVID Vaccine

- Study began 8/31/20 (99 sites)
- Study population: >18 yo medically stable and at increased risk for COVID-19
- Interim analysis: 11,636 people enrolled, 130 COVID cases
- 62% effective in full dose, full dose regimen (N=8,895)
- 90% effective in half dose, full dose regimen (N=2,741)
- No serious adverse effects

Vaccine Hesitancy

- There is no simple strategy that can address all of the barriers to vaccine acceptance.
- Perception and vaccine decision making are often intuitive, made at the unconscious level and more influenced by emotions and beliefs than facts.
- Campaigns that address knowledge deficits alone have not been effective in decreasing hesitancy and improving vaccine acceptance.

Vaccine Hesitancy

- Heightened emotions in the pandemic:
 - dramatic societal changes
 - loss of loved ones
 - isolation and loneliness due to social distancing
 - trepidations about the management of pandemic
 - fear of contracting the virus
 - fears over vaccine safety
 - financial hardships

Vaccine Hesitancy

- Counteracting negative emotions:
 - Negative emotions related to fear: highlight feelings of control through vaccination
 - Risk and severity of COVID are exaggerated: communicate risk of contracting and morbidity
 - “Anti-vaxers”: point out how misinformation is manipulative through negative emotions
- Activating positive emotions:
 - Altruism and benefits to the community
 - Return to closer interactions with loved ones and friends

COVID-19 Vaccine Priorities

- Advisory Committee on Immunization Practices (ACIP) of the CDC met December 1, 2020
- First priority for vaccines:
 - Healthcare personnel
 - Residents of long term care facilities

Morbidity and Mortality Weekly Report Vol. 69, 12-3-20

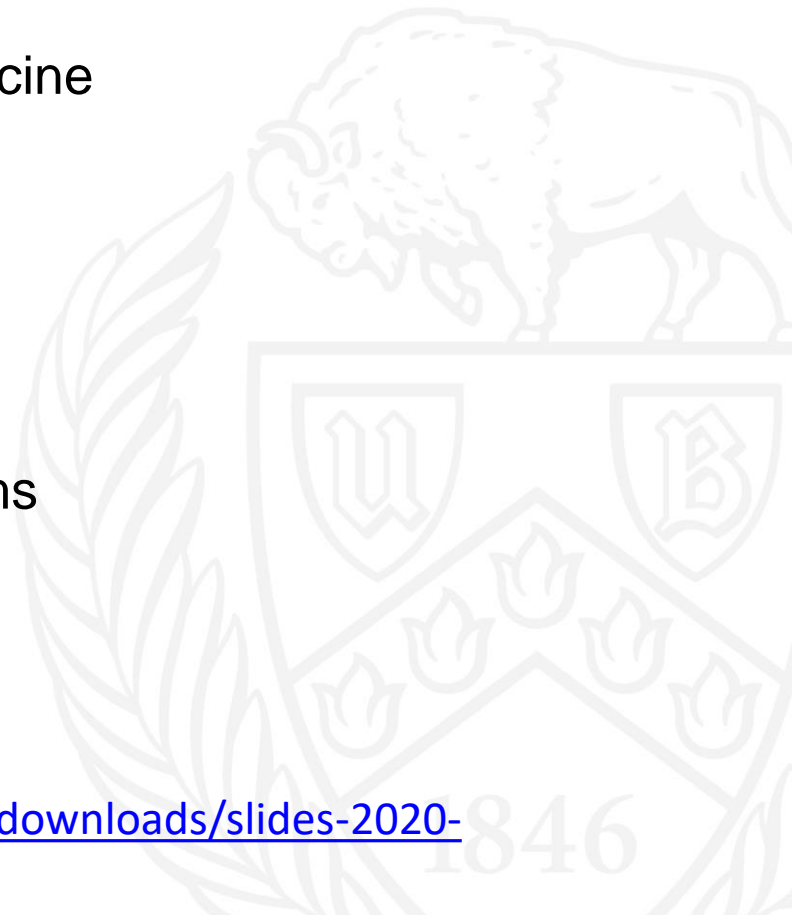
<https://www.cdc.gov/vaccines/acip/meetings/downloads/slides-2020-11/COVID-04-Dooling.pdf>

COVID-19 Vaccine Priorities

CDC Advisory Committee on Immunization Practices

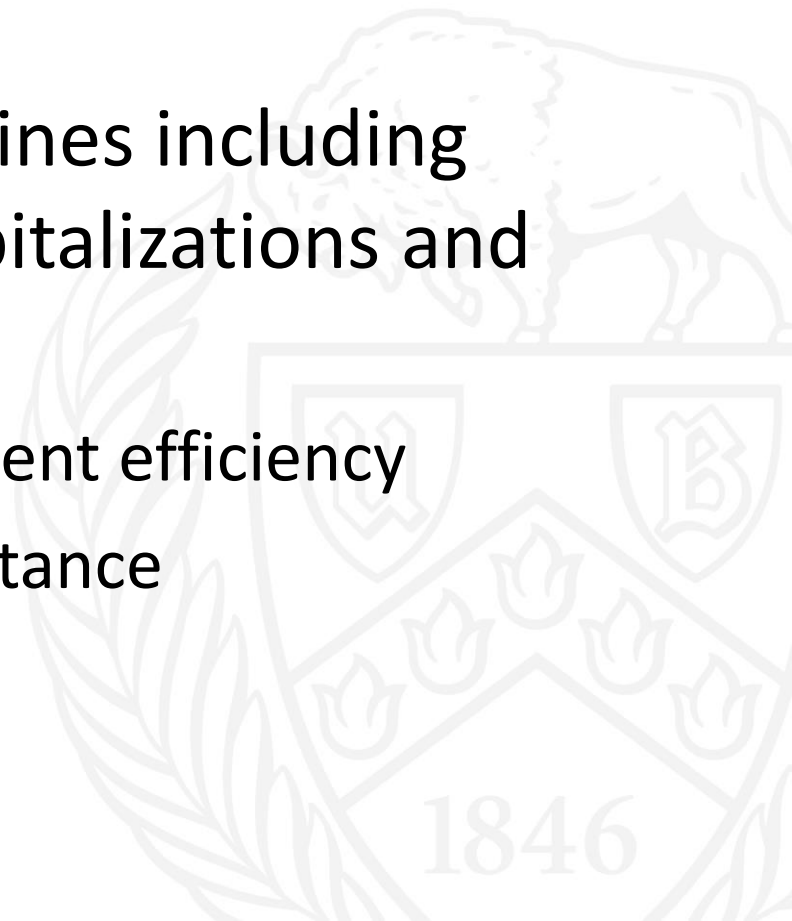
- Science
 - COVID-19 disease burden
 - Balance of benefits and harms of vaccine
- Implementation
 - Values of target group
 - Feasibility
- Ethics
 - Maximize benefits and minimize harms
 - Promote justice
 - Mitigate health inequities
 - Promote transparency

<https://www.cdc.gov/vaccines/acip/meetings/downloads/slides-2020-11/COVID-04-Dooling.pdf>



AD Paltiel et al. Clinical Outcomes of a COVID-19 Vaccine: Implementation over Efficacy. Health Affairs 40, No. 1, 2021.

- Modeled outcomes of vaccines including cumulative infections, hospitalizations and deaths based on effect of:
 - manufacturing and deployment efficiency
 - vaccine hesitancy and acceptance
 - epidemic severity
 - vaccine efficacy



Real World Impact of COVID-19 Vaccine

- The reproduction number (R_0) is a major determinant of vaccine effectiveness in a population.
- The benefits of a vaccine will decline substantially in the event of manufacturing or deployment delays, significant vaccine hesitancy, or greater epidemic severity (R_0).
- To maximize vaccine impact resources should be invested in:
 - encouraging adherence to mitigation approaches
 - vaccine production and distribution programs,
 - promote public confidence in COVID-19 vaccines

Sources of Reliable Information

Erie County Department of Health

<https://www2.erie.gov/health/>

New York State Department of Health

<https://health.ny.gov>

US Center for Disease Control <https://www.cdc.gov>

Johns Hopkins Coronavirus Resource Center

<https://coronavirus.jhu.edu/map.html>

New York Times

<https://www.nytimes.com/news-event/coronavirus?searchResultPosition=0>