COVID-19 Vaccines: Where are we? What's coming?

Requested by Patrick Glew of the Indiana Immunization Coalition

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Disclaimer

- **The COVID-19 pandemic is a rapidly evolving situation, thus more up-to-date information will be available.**
- **Due to the complexity of this topic the scope of this slide deck is limited to a general overview of important aspects of the virus and the pandemic.**
- **Please consult local health authorities for up-to-date information.**

Disclaimer

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This information is provided in response to your unsolicited request. The intent of this document is to provide an overview of the subject matter and should not be considered an all-inclusive resource. This response is not intended to recommend interventions or programs. Due to the dynamic healthcare environment this information is subject to change.

This is a formal group presentation requested by Patrick Glew of the Indiana Immunization Coalition

Objectives

– Review COVID-19 vaccine candidate status updates

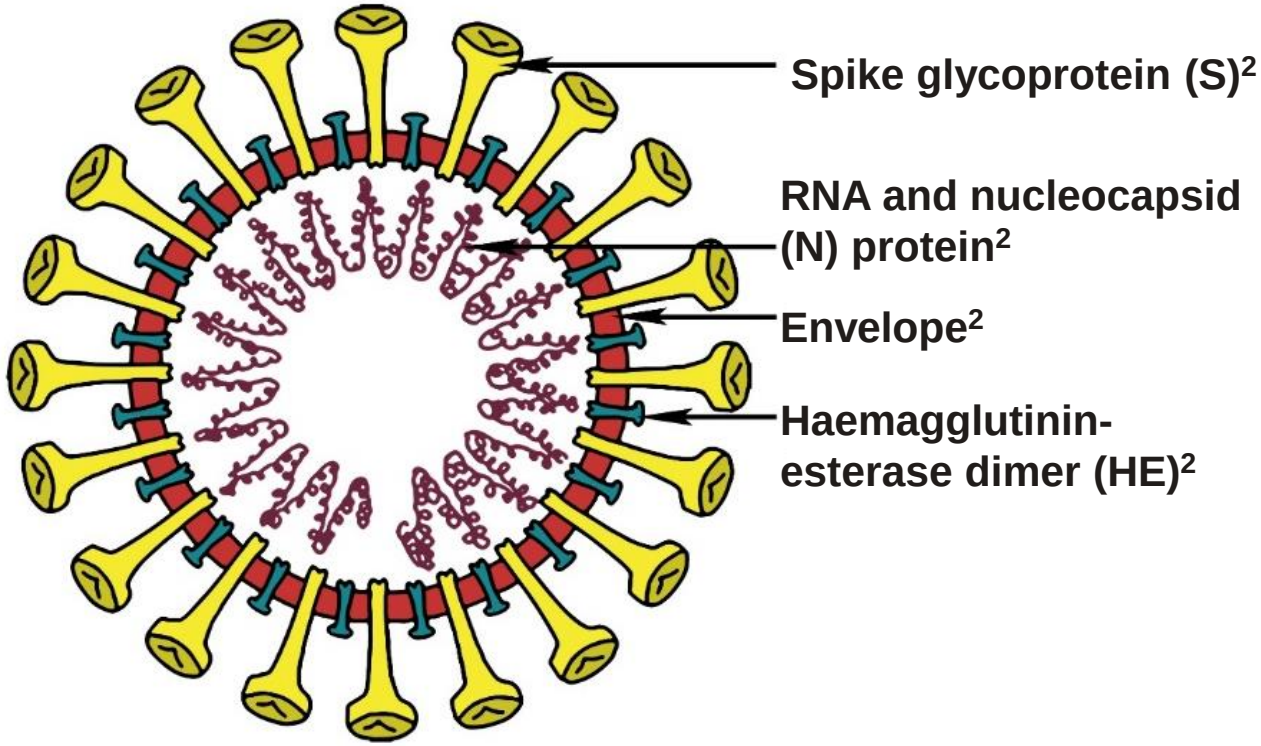
– Explain the COVID-19 vaccine regulatory process

– Summarize safety monitoring for COVID-19 vaccine candidates

– Discuss supply and distribution considerations for COVID-19 vaccines

What are Coronavirus (CoVs)?

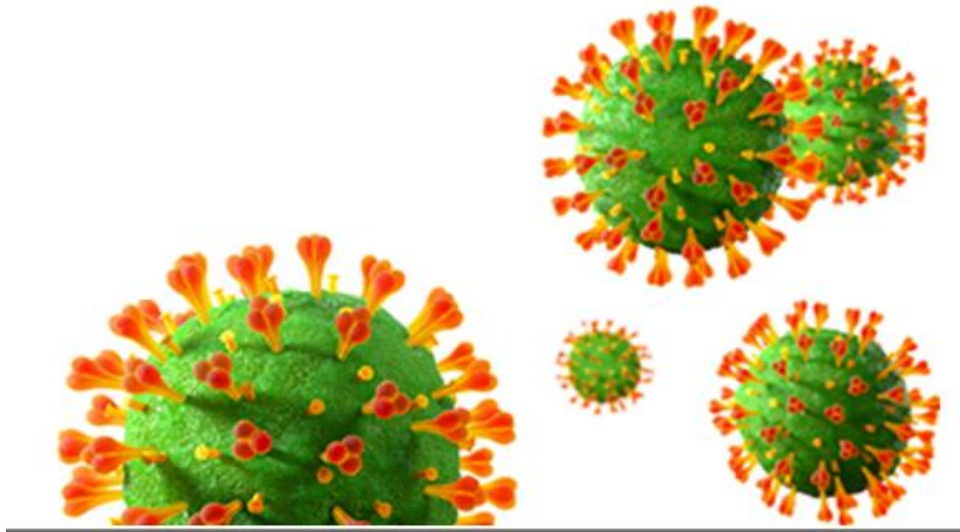
- Positive-strand **enveloped RNA viruses** that belong to the family *Coronaviridae*[1]
- Characteristic **spicules** on the surface like a '**crown**'[1]



RNA, ribonucleic acid.

1. Cui J., et al. *Nat Rev Microbiol*. 2019; 17(3): 181–192; 2. Fehr A.R., Perlman S. (2015) Coronaviruses: An Overview of Their Replication and Pathogenesis. In: Maier H., Bickerton E., Britton P. (eds) *Coronaviruses. Methods in Molecular Biology*, vol 1282. Humana Press, New York, NY.

Candidate Vaccine Status Updates



Vaccine Trials in the U.S. – As of mid-October

COVID-19 vaccines in human clinical trials – United States*

Candidate	Manufacturer	Type	Phase	Trial characteristics	Trial #	Recruiting
mRNA-1273	Moderna TX, Inc.	mRNA	III	• 2 doses (0, 28d) • IM administration • 18-55, 56+ years	NCT04470427	✓
mRNA-BNT162	Pfizer, Inc./BioNTech	mRNA	II/III	• Single or 2 doses • IM administration • 18-85 years	NCT04368728	✓
AZD1222	University of Oxford/AstraZeneca consortium**	Viral vector (NR)	III	• 2 doses (0, 28d) • IM administration • ≥18 years	NCT04516746	On Hold
Ad26COVS1	Janssen Pharmaceutical Companies	Viral vector (NR)	I/II	• 2 doses (0,56d) • IM administration • 18-55, 65+	NCT04436276	✓
--	Sanofi/GSK	Protein Subunit	I/II	• Single or 2 doses • 18-49, 50+	NCT04537208	✓
NVX-CoV2373	Novavax	Protein Subunit	I/II		NCT04368988	✓
AV-COVID-19	Aivita	AuDendritic cell	I/II		NCT04386252	
INO-4800	Inovio Pharmaceuticals, Inc.	DNA plasmid	I	• 2 doses (0, 4w) • SC administration/ electroporation • ≥18 years	NCT04336410	

RESUMED

RESUMING

Milken Institute https://covid-19tracker.milkeninstitute.org/

https://clinicaltrials.gov

ACIP September 2020 Presentation Bell https://www.cdc.gov/vaccines/acip/meetings/downloads/slides-2020-09/COVID-01-Bell-508.pdf

Vaccine Trials outside of the U.S. – Actively Recruiting

- **Inactivated Vaccines**
  - 2 candidates currently approved for emergency and/or limited use
  - China, UAE, Indonesia, Brazil
- **Viral Vector Vaccines**
  - 1 candidate currently approved for emergency and/or limited use
  - Russia
- **Protein Subunit Vaccines**
- **mRNA/DNA Vaccines**

ACIP September 2020 Presentation Bell https://www.cdc.gov/vaccines/acip/meetings/downloads/slides-2020-09/COVID-01-Bell-508.pdf

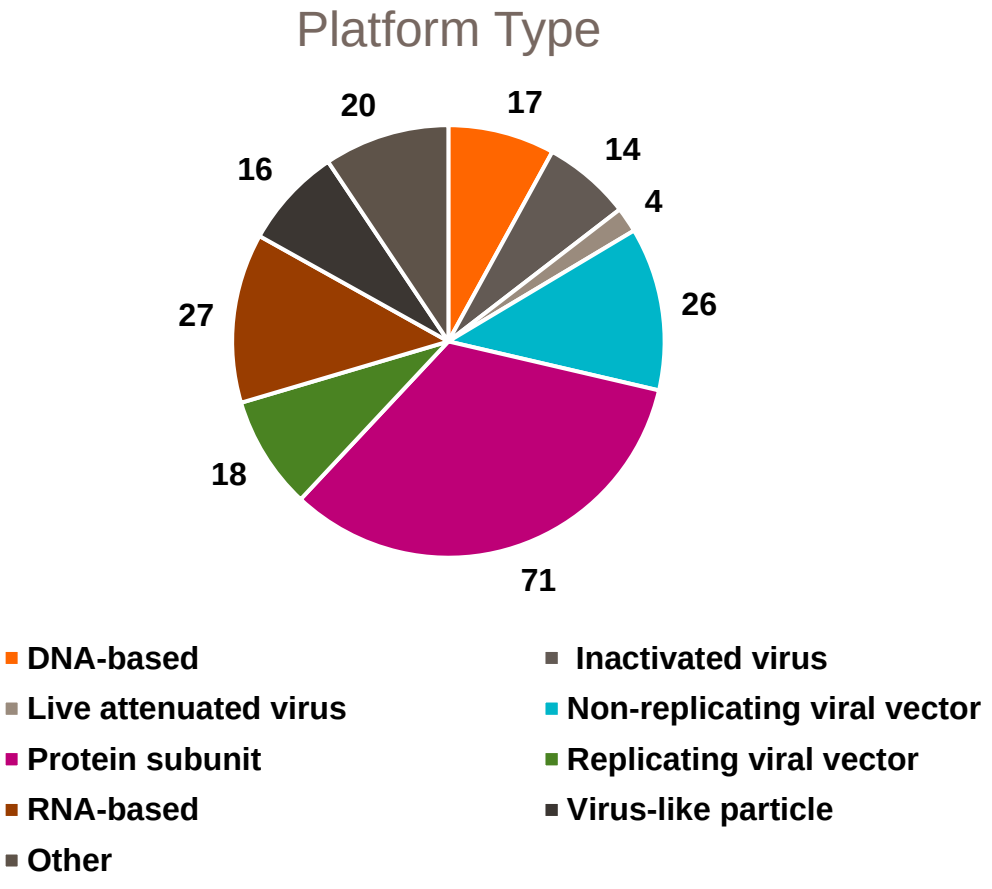
https://milkeninstitute.org/covid-19-tracker

https://www.who.int/who-documents-detail/draft-landscape-of-covid-19-candidate-vaccines;

Vaccine Candidate Numbers

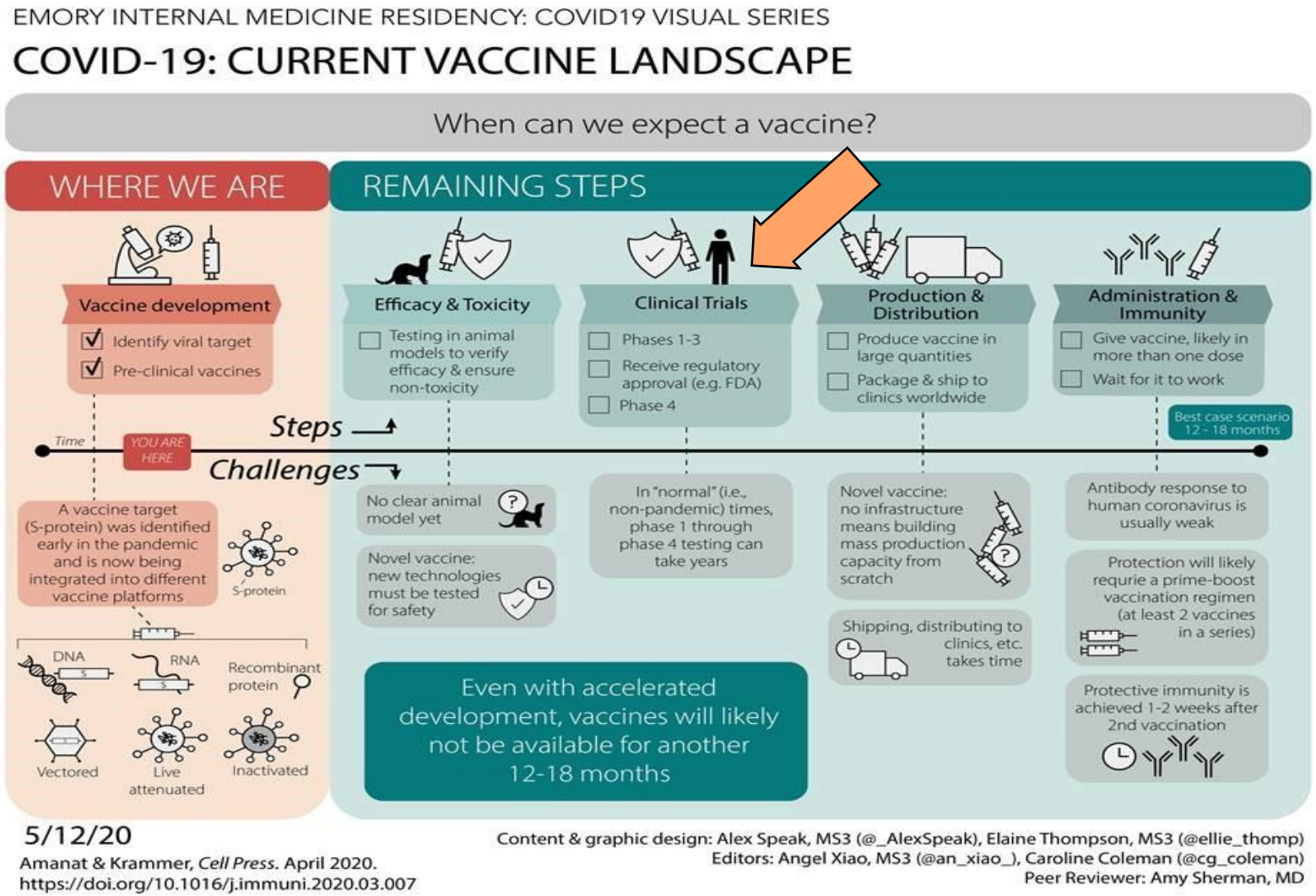
As of October 8th, 2020

- **213** vaccines in development
- **35** vaccines in clinical testing
- **9** different technology platforms



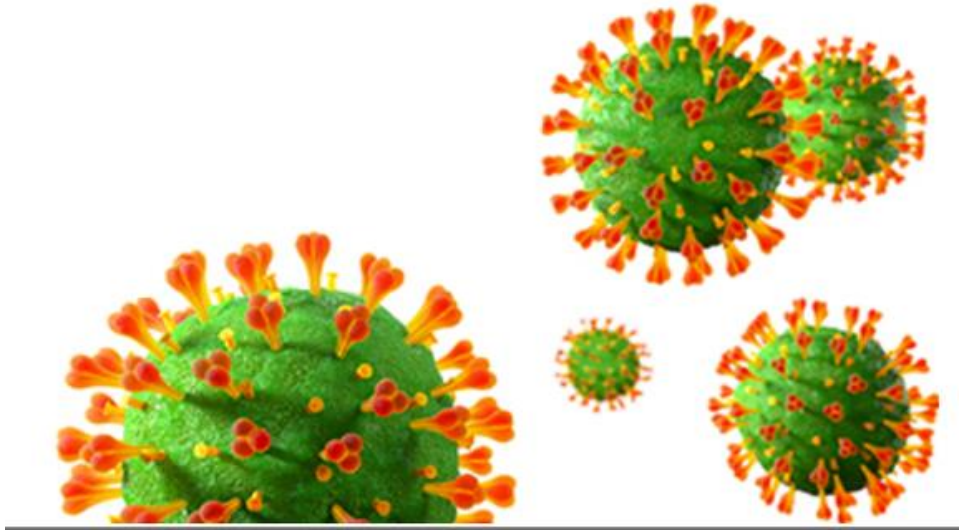
Milken Institute https://milkeninstitute.org/covid-19-tracker

When Can We Expect a Vaccine?



The graphic is reproduced with the permission of Jennifer Spicer, Emory University School of Medicine.

Regulatory Process



Drug (Vaccine) Development & Approval Process Overview

	Discovery/ Pre-clinical Testing	Phase 1	Phase 2	Phase 3	FDA Review
Years	6.5 years	1.5 years	2 years	3.5 years	1.5 years
Population	Laboratory and animal studies	20 -100 healthy volunteers	100 - 500 patient volunteers	1000 - 5000 patient volunteers	Review and approval process
Purpose	Assess safety and biological activity, formulations	Evaluate safety and dosage	Evaluate effectiveness, identify side effects	Confirm effectiveness, monitor adverse reactions with longer use/duration	

PHASE 4 REQUIREMENTS

- During a pandemic, multiple activities are started earlier in the process including manufacturing development and large scale manufacturing without knowing if the vaccine candidate will be successful

https://www.fdareview.org/issues/the-drug-development-and-approval-process/

Lurie, et al. Published at NEJM.com on March 30, 2020.

Considerations for Licensure

- Review clinical, non-clinical, and manufacturing data
- Information requests and meetings with applicant to resolve issues
- Site inspections
- Safety update with longer-term safety data
- Pharmacovigilance plan
- Plan to meet pediatric study requirements
- External scientific advisory committee input

ACIP July 2020 Fink Presentation https://www.cdc.gov/vaccines/acip/meetings/downloads/slides-2020-07/COVID-04-Fink-508.pdf

Emergency Use Authorization

Qualifying Criteria

1) HHS Secretary declares emergency situation leading to serious or life threatening disease or condition

2) Evidence of effectiveness for product anticipated to address emergency

3) Known and potential benefits for product outweigh known and potential risks

4) No approved alternatives

Non-COVID examples: Zika Virus, Ebola Virus, others

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https://www.fda.gov/emergency-preparedness-and-response/mcm-legal-regulatory-and-policy-framework/emergency-use-authorization#othercurrenteuas

EUA Process

1) Request made by government stakeholder or manufacturer

Materials submitted including details related to population, dose, regimen, supporting safety and effectiveness information

2) Regulations and law allow for more rapid review vs. licensure application

3) Conditions issued for authorization

Monitoring and reporting of adverse events required, duration of authorization specified, practices related to distribution and advertising

ACIP July 2020 Fink Presentation https://www.cdc.gov/vaccines/acip/meetings/downloads/slides-2020-07/COVID-04-Fink-508.pdf

ACIP Role in COVID-19 Vaccine Recommendation Process

Current: Workgroup meeting weekly; reviewing Phase 1 & 2 data as data is available, designing structure for independent data review when Phase 3 data is available

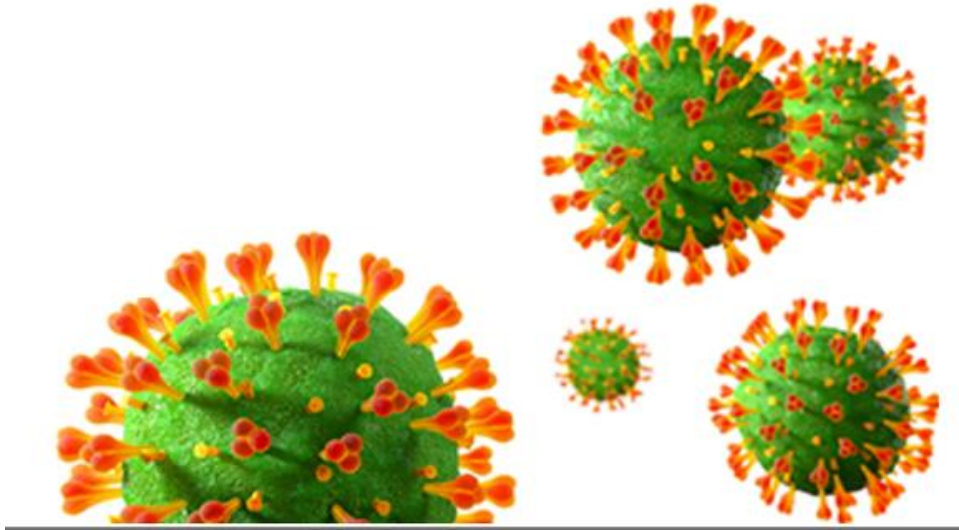
Future (Phase 3 data available): Workgroup to complete an independent review of safety and efficacy data and present options to full ACIP

Future (If/when FDA decision announced): ACIP to hold an emergency meeting; ACIP will vote on recommendations and populations for use

Future (After ACIP vote): ACIP submits recommendations to CDC director; If recommendations accepted, published in MMWR (CDC Policy)

ACIP September 2020 Bell Presentation https://www.cdc.gov/vaccines/acip/meetings/downloads/slides-2020-09/COVID-01-Bell-508.pdf

Safety Monitoring



VAERS

- VAERS = Vaccine Adverse Event Reporting System
- Established in 1990
- Co-managed by CDC and FDA
- Covers all 320 million+ U.S. residents for safety monitoring
  - All ages, races, states, co-morbidities, etc.
- Over 50,000 U.S. reports in 2019

VAERS Vaccine Adverse Event Reporting System
www.vaers.hhs.gov

ACIP August 2020 Shimabukuro Presentation https://www.cdc.gov/vaccines/acip/meetings/downloads/slides-2020-08/COVID-04-Shimabukuro.pdf
http://vaers.hhs.gov

VAERS Turnaround Time

-National early warning system to detect possible safety issues with U.S. vaccines

-Historically provided early data of safety profile of new vaccines when introduced for use in the population

-Planned COVID-19 vaccine report processing times

- Death reports – 1 day
- Reports classified as serious – 3 days
- Reports classified as non-serious – 5 days

– CDC and FDA will receive datasets daily

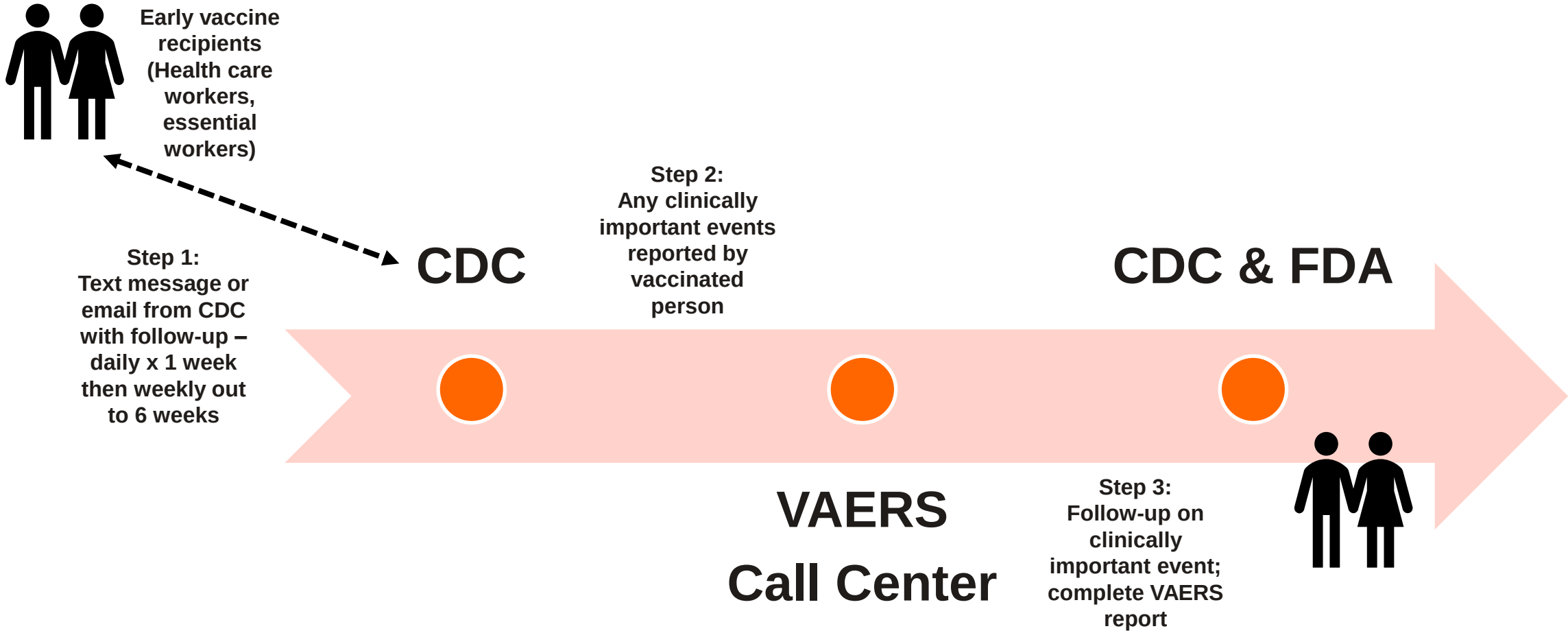
ACIP September 2020 Shimabukuro Presentation https://www.cdc.gov/vaccines/acip/meetings/downloads/slides-2020-09/COVID-03-Shimabukuro-508.pdf

Enhanced Monitoring Systems

Challenges	Possible Solutions
• Initial doses could be distributed to specific groups • Activities to augment normal public health monitoring will be needed	• Active surveillance using various technologies with directed reporting to VAERS • Vaccination capture and enhanced surveillance from various data sources

ACIP August 2020 Shimabukuro Presentation https://www.cdc.gov/vaccines/acip/meetings/downloads/slides-2020-08/COVID-04-Shimabukuro.pdf

Safety Monitoring Process Program: V-SAFE



Other Potential Information Sources

- State Vaccine Registries (i.e. CHIRP)
- Telehealth encounters
- Healthcare provider reporting
- General public reporting
- New electronic data sources via EHR partners

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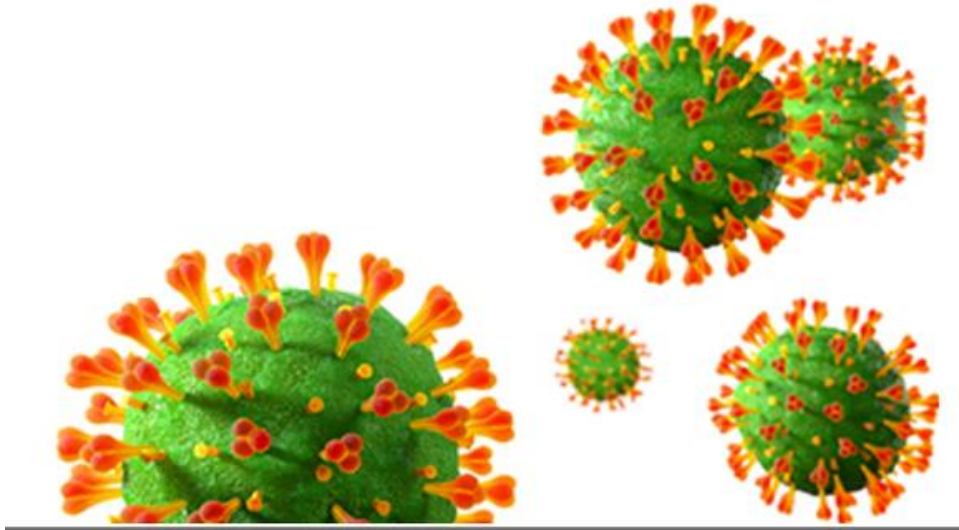
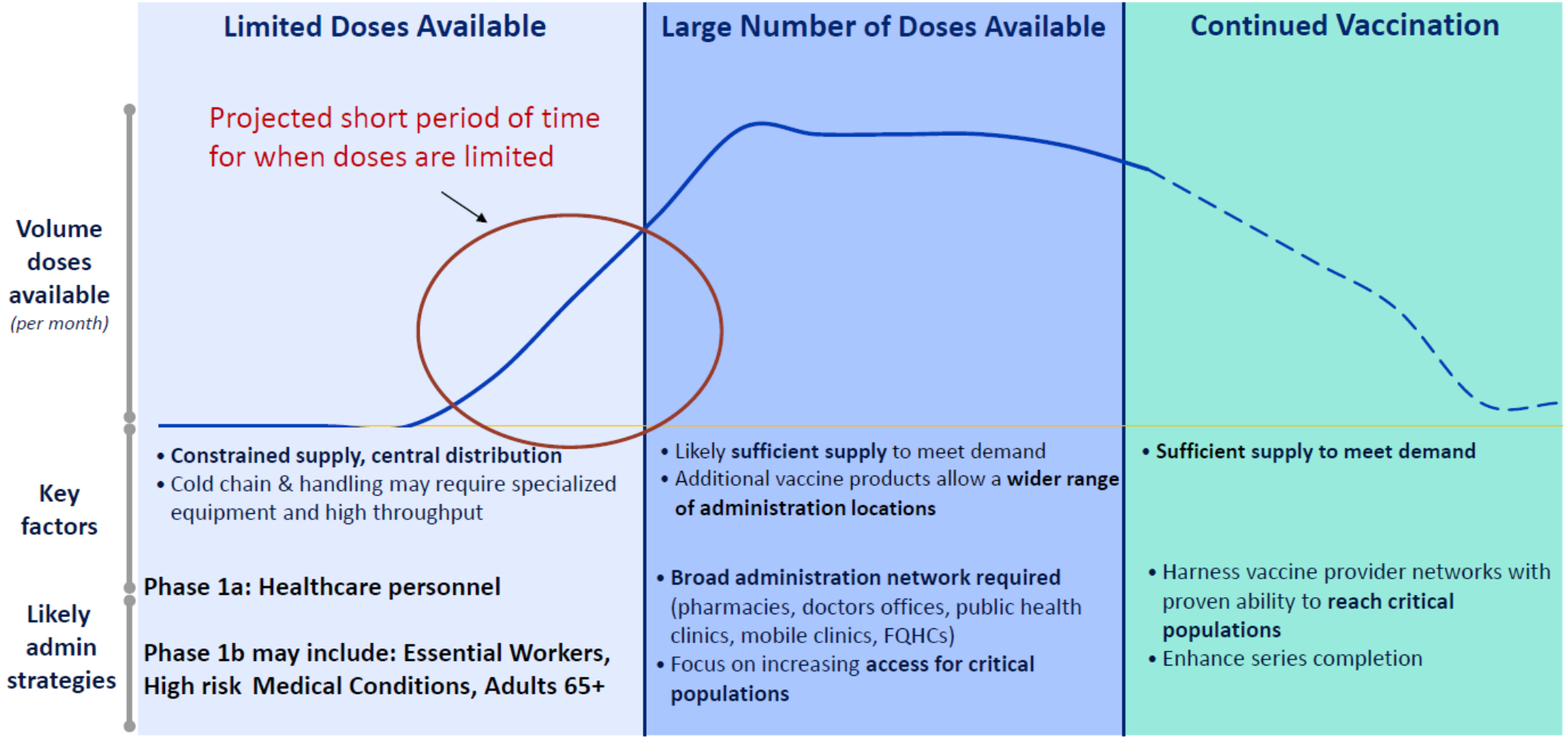
Supply and Distribution Considerations



Phased Approach Likely for Initial Distribution



ACIP September 2020 Dooling Presentation https://www.cdc.gov/vaccines/acip/meetings/downloads/slides-2020-09/COVID-07-Dooling-508.pdf
https://www.cdc.gov/vaccines/imz-managers/downloads/COVID-19-Vaccination-Program-Interim_Playbook.pdf

Groups Under Consideration for Initial Distribution Phase

Possible groups for Phase 1 vaccination

August ACIP meeting

Phase 1a:

-HCP

Phase 1b:

-Essential Workers

-High Risk Med Conditions

-Adults ≥ 65 years old

September ACIP meeting

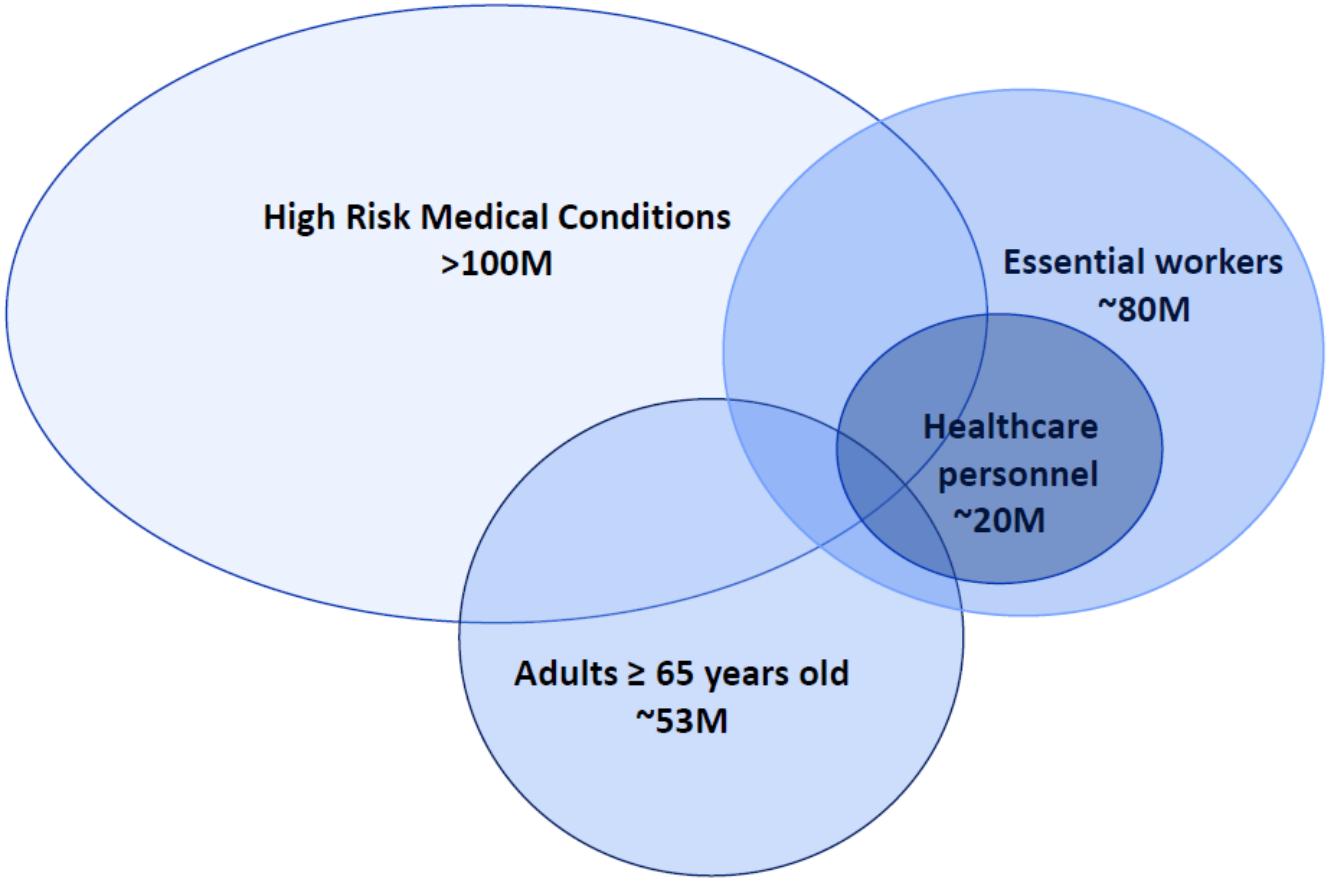
-Explore groups for phase 1b

  -risk for COVID-19

  -overlap between groups

  -racial and ethnic composition

-Summary of Work Group considerations



ACIP September 2020 Dooling Presentation https://www.cdc.gov/vaccines/acip/meetings/downloads/slides-2020-09/COVID-07-Dooling-508.pdf

CDC COVID-19 Vaccination Program Playbook – Version 1

- Released September 16th, 2020
- Includes a variety of considerations and guidance including:
  - Locating Critical Populations
  - Vaccination Provider Information
  - Vaccination Program Communication
  - Vaccine Ordering and Distribution
  - Vaccine Storage and Handling – PRELIMINARY
  - Vaccine Safety Monitoring – PRELIMINARY

https://www.cdc.gov/vaccines/imz-managers/downloads/COVID-19-Vaccination-Program-Interim_Playbook.pdf

Questions?

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