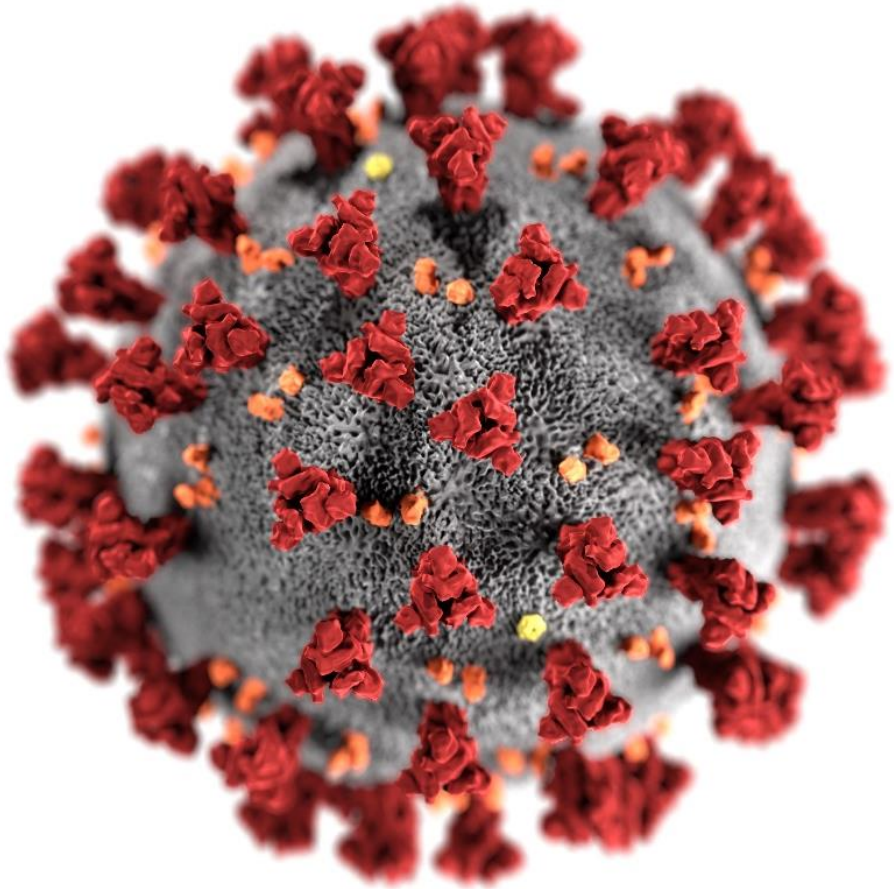
Phased Allocation of COVID-19 Vaccines

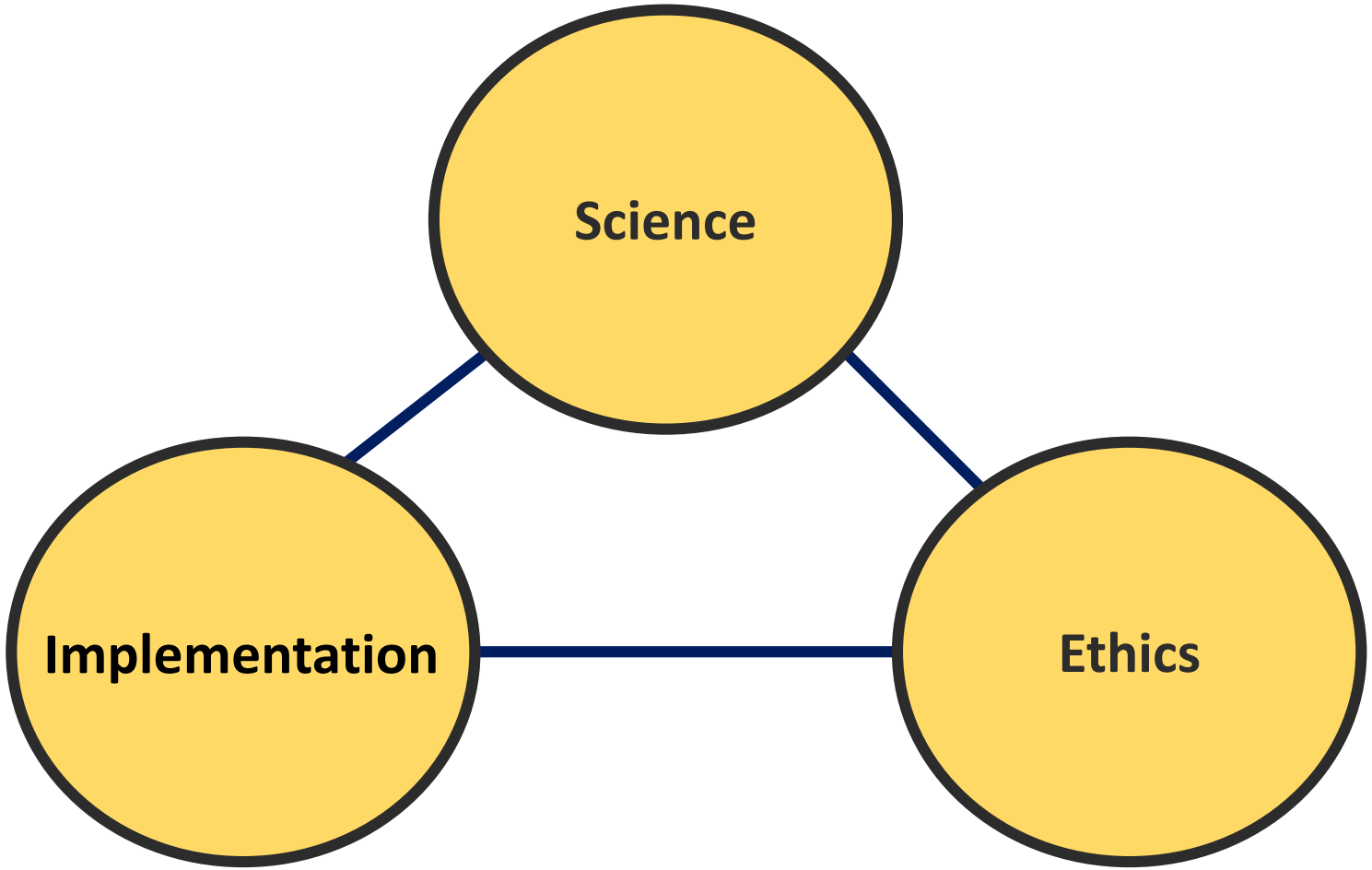


Kathleen Dooling, MD, MPH
ACIP meeting
November 23, 2020

Objective

- Select groups for COVID-19 vaccine allocation in Phase 1a, Phase 1b & Phase 1c

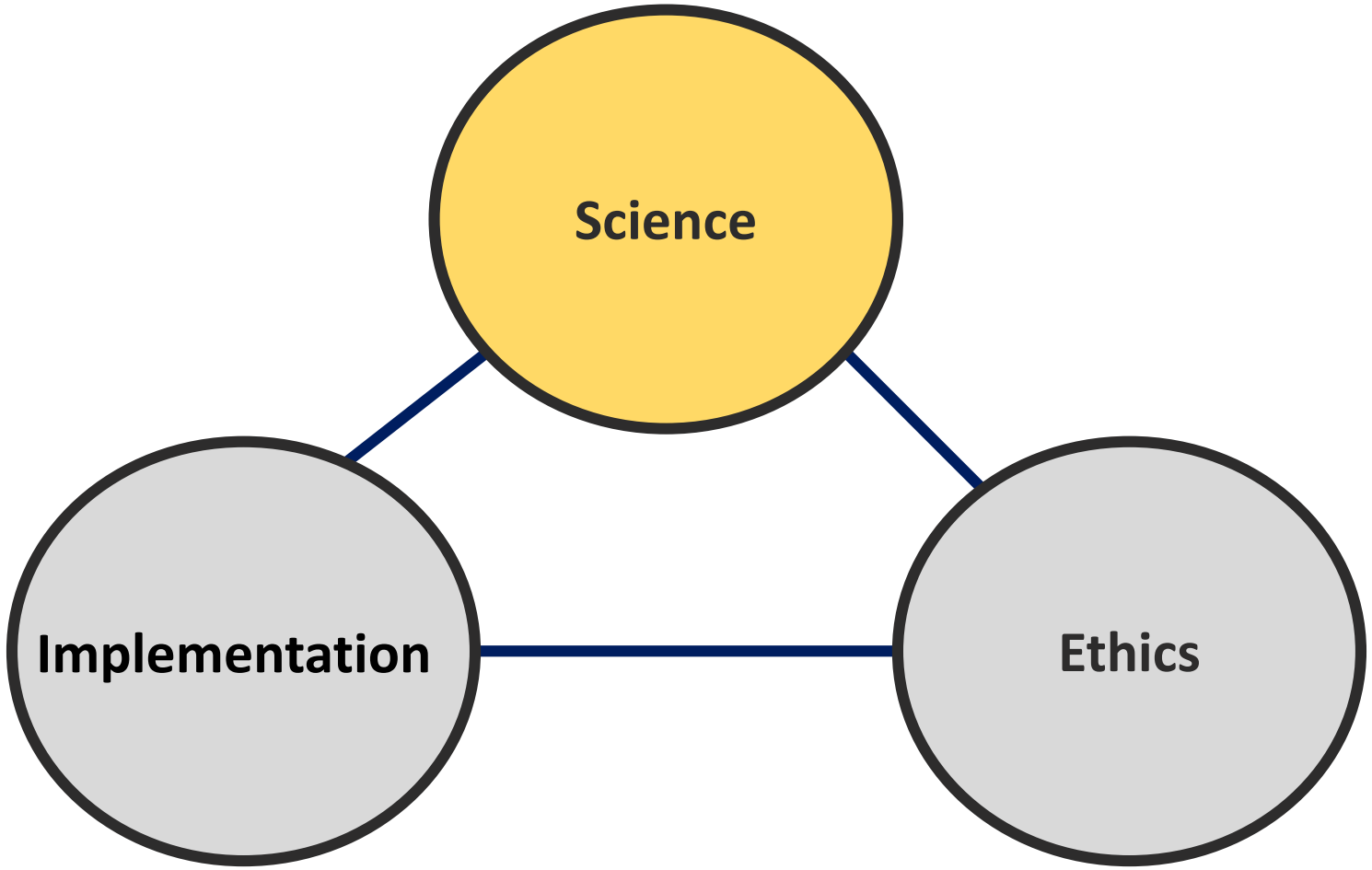
Allocation of COVID-19 vaccine



<u>Policy Question #2</u>

Which groups should be recommended to receive COVID-19 vaccine ‘X’ during Phase 1?

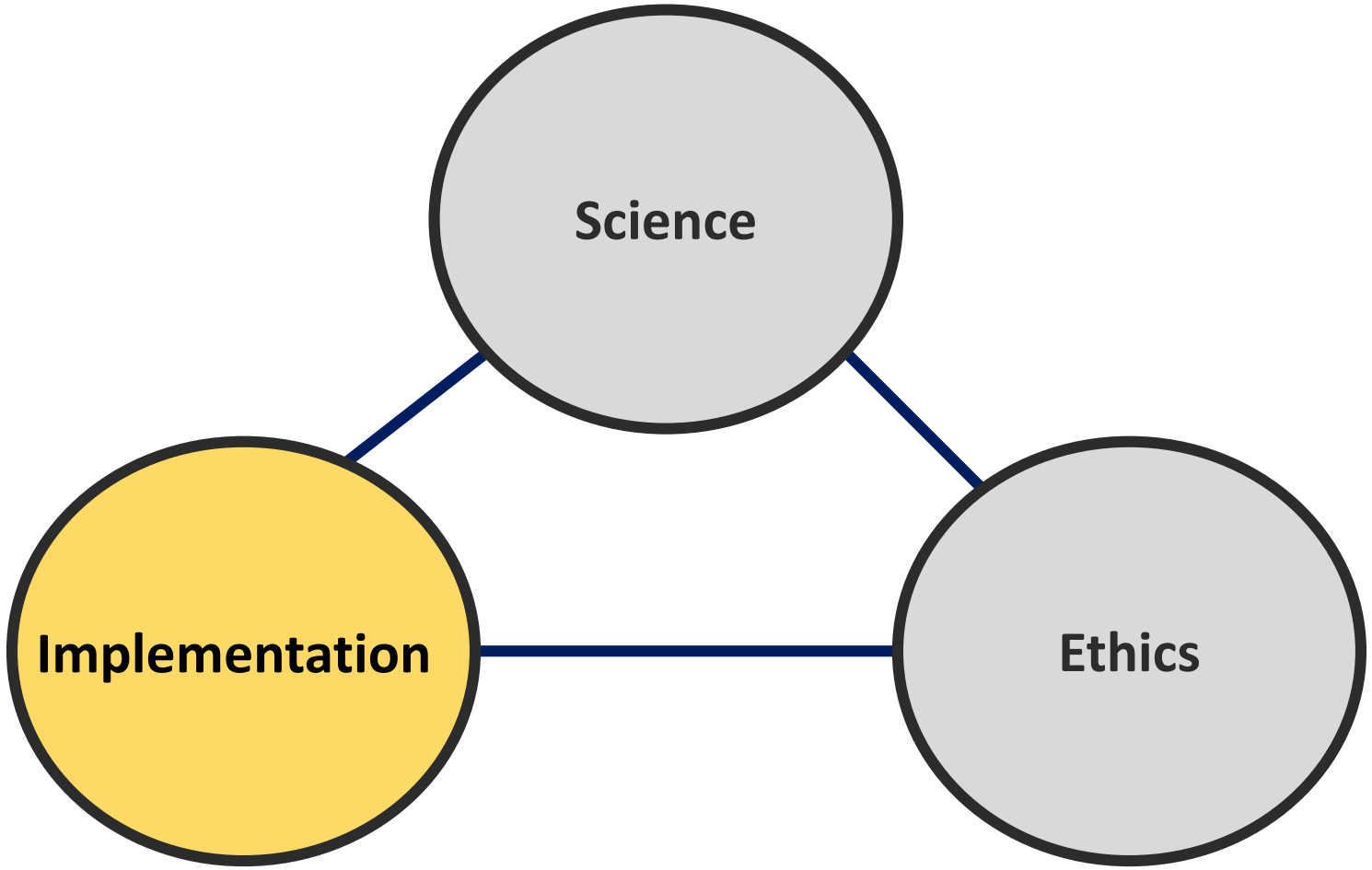
Allocation of initial COVID-19 vaccine: Phase 1



Science:

- COVID-19 disease burden
- Balance of benefits & harms of vaccine

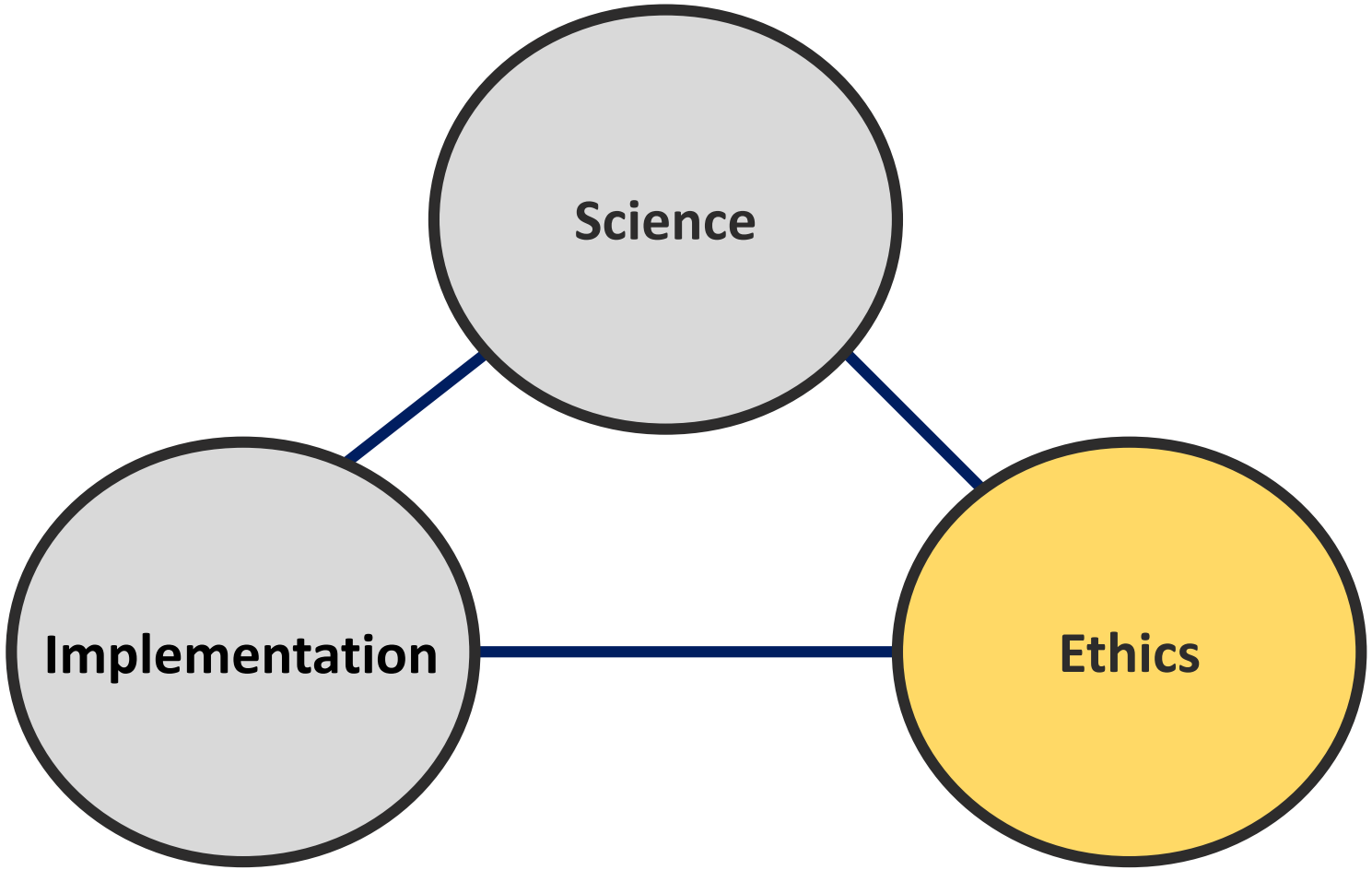
Allocation of initial COVID-19 vaccine: Phase 1



Implementation:

- Values of target group
- Feasibility

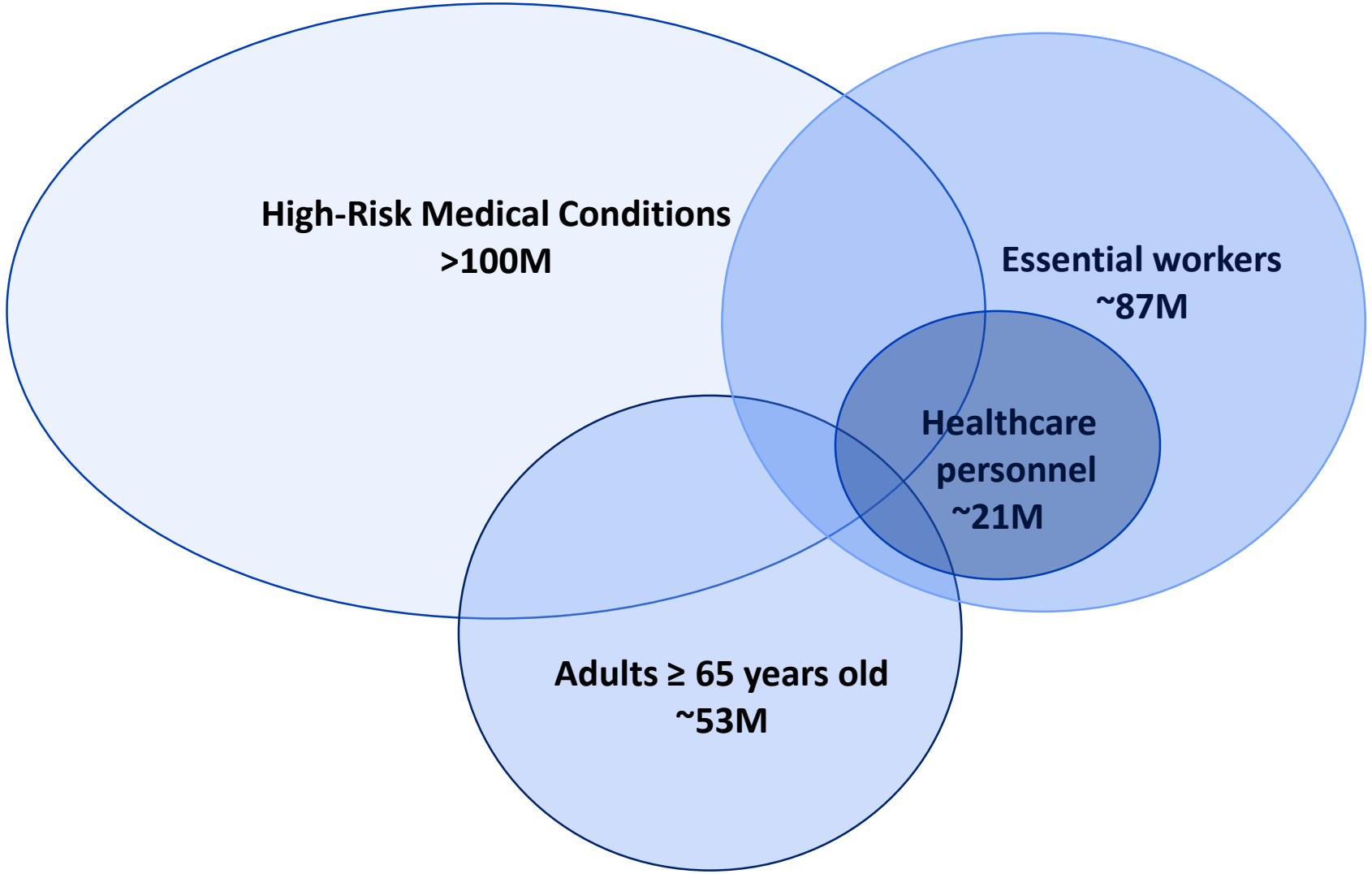
Allocation of initial COVID-19 vaccine: Phase 1



Ethical Principles:

- Maximize benefits & minimize harms
- Promote justice
- Mitigate health inequities
- Promote transparency

Proposed Groups for Phase 1 vaccination



<u>August ACIP meeting</u>

Phase 1a:

-Healthcare Personnel

Phase 1b:

-Essential Workers

-High-Risk Med Conditions

-Adults ≥ 65 years old

Proposed groups for Phase 1 vaccination

Healthcare Personnel[1] (~21million)	Essential Workers (non-healthcare)[1] (~87 million)	Adults with high-risk medical conditions[2] (>100 Million)	Adults age ≥65 years[3] (53 Million)
Examples			
Hospitals Long-term care facilities Outpatient Home health care Pharmacies EMS Public health	Food & Agriculture Food Service Transportation Education Energy Police Firefighters Manufacturing IT & Communication Water & Wastewater	Obesity Severe Obesity Diabetes COP Heart Condition Chronic kidney Cancer Smoking Solid Organ Transplant Sickle cell disease	Community Dwelling Congregate ~3M[4] -Skilled Nursing Facility (~1.3 M) -Assisted living Facilities (~0.8 M) -Residential care communities (~0.6 M) -HUD Senior Housing (~0.3M)

1. https://www.cisa.gov/publication/guidance-essential-critical-infrastructure-workforce
2. https://www.cdc.gov/coronavirus/2019-ncov/need-extra-precautions/people-with-medical conditions.html?CDC_AA_refVal=https%3A%2F%2Fwww.cdc.gov%2Fcoronavirus%2F2019-ncov%2Fneed-extra-precautions%2Fgroups-at-higher-risk.html
3. United States Census Bureau https://www.census.gov/topics/population/older-aging.html
4. Vital and Health Statistics, Series 3, Number 43 (cdc.gov)

Summary of Work Group Considerations supporting vaccinating healthcare personnel in Phase 1a

Science

- As of Nov 21, at least 228,503 confirmed COVID-19 cases among HCP, with 822 deaths[1]
- COVID-19 exposure (inside and outside the healthcare setting) results in absenteeism due to quarantine, infection and illness. Vaccination has the potential to reduce HCP absenteeism
- LTCF modeling demonstrates more cases and death averted at the facility by vaccinating staff compared to vaccinating residents[2]

Implementation

- Acute care HCPs have high uptake of influenza vaccine[3]– high vaccine acceptance
- Many acute healthcare facilities have the equipment and expertise to carry out large scale vaccination with a vaccine that requires ultra-cold storage

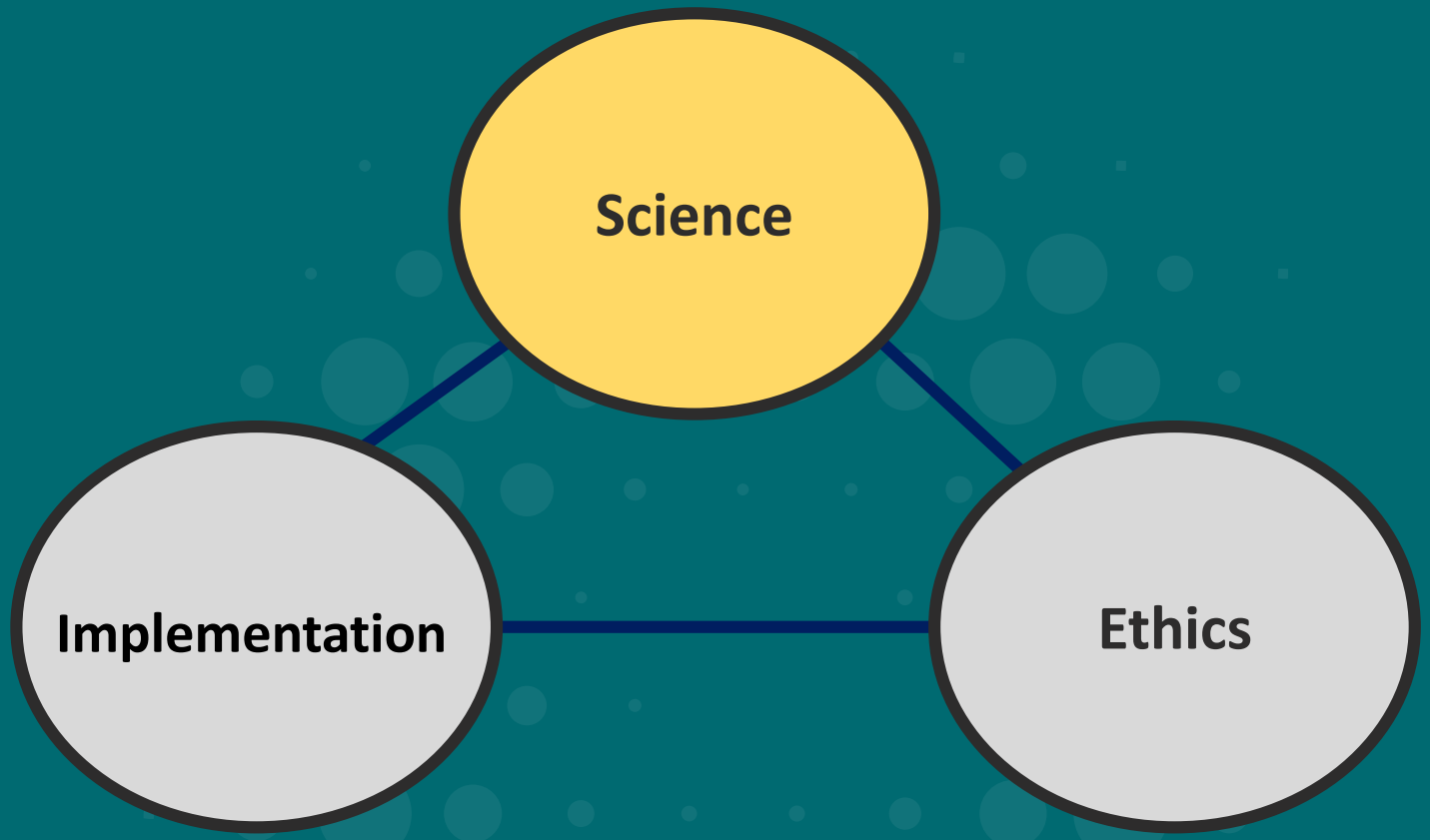
Ethics

- Preserves health care services essential to the COVID-19 response and the overall health care system
- HCP group is inclusive of all job types in healthcare settings and is racially and ethnically diverse

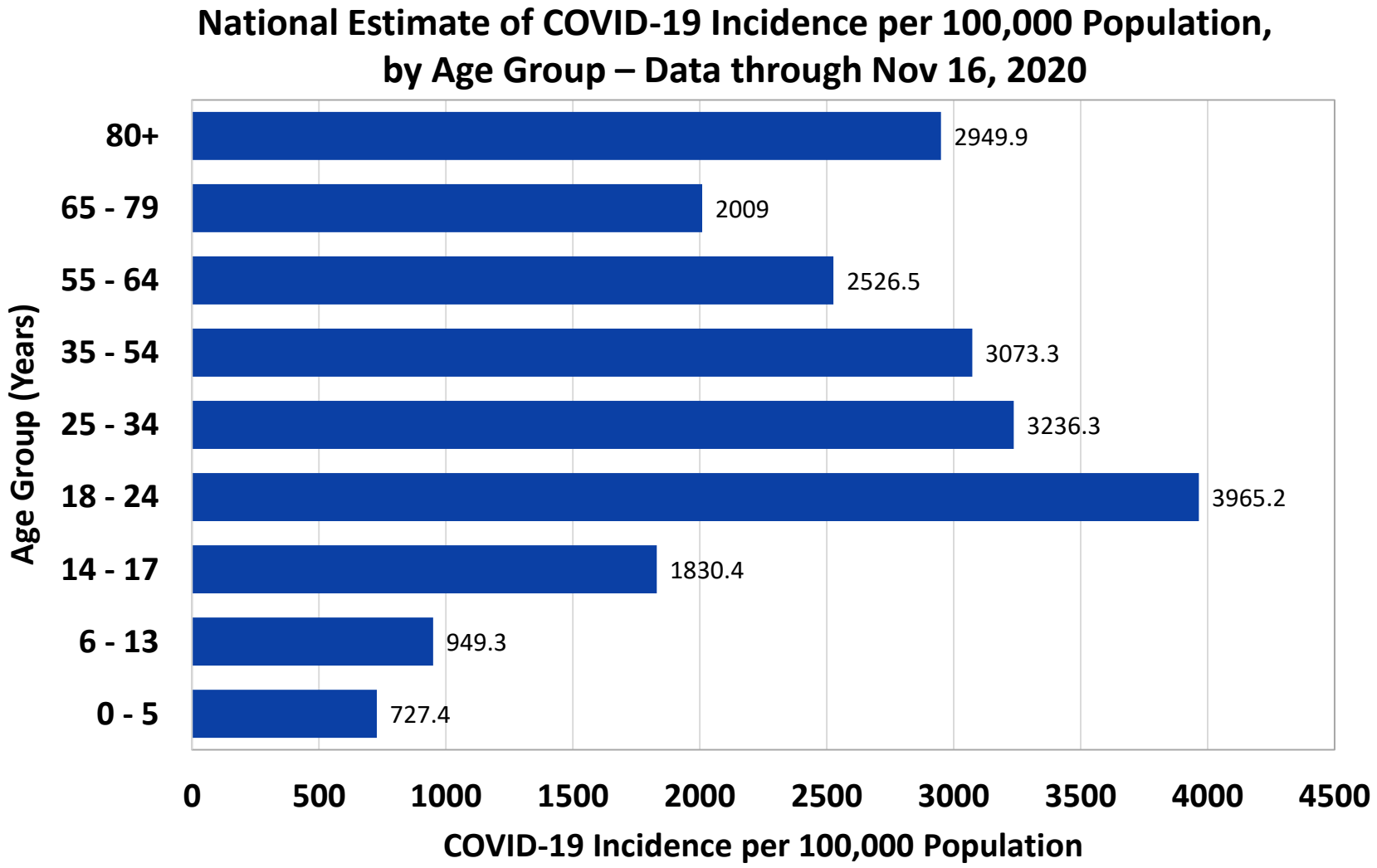
1. https://covid.cdc.gov/covid-data-tracker/#health-care-personnel
2. Slayton, Modeling Allocation Strategies for the initial SARS-CoV-2 Vaccine Supply, ACIP Aug 21, 2020, https://www.cdc.gov/vaccines/acip/meetings/slides-2020-08.html
3. Influenza Vaccination Coverage Among Health Care Personnel- United States, 2018-2019 Influenza Season, https://www.cdc.gov/vaccines/acip/meetings/slides-2020-08.html

	Essential Workers (non-healthcare) (~87 million)	Adults with high-risk medical conditions (>100 Million)	Adults age ≥65 years (53 Million)
Science	?	?	?
Implementation	?	?	?
Ethics	?	?	?

Science

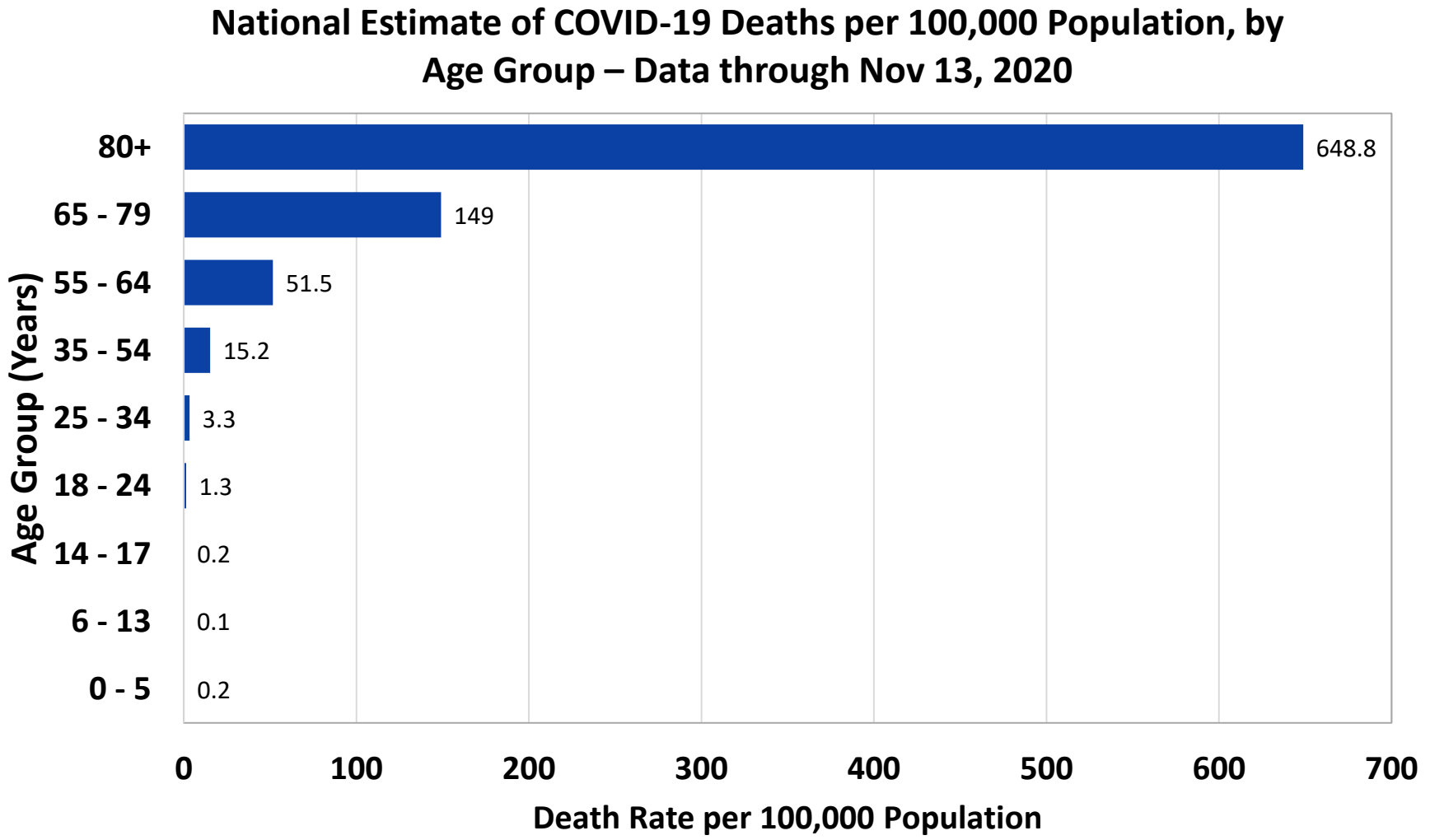


COVID-19 incidence is highest in young adults



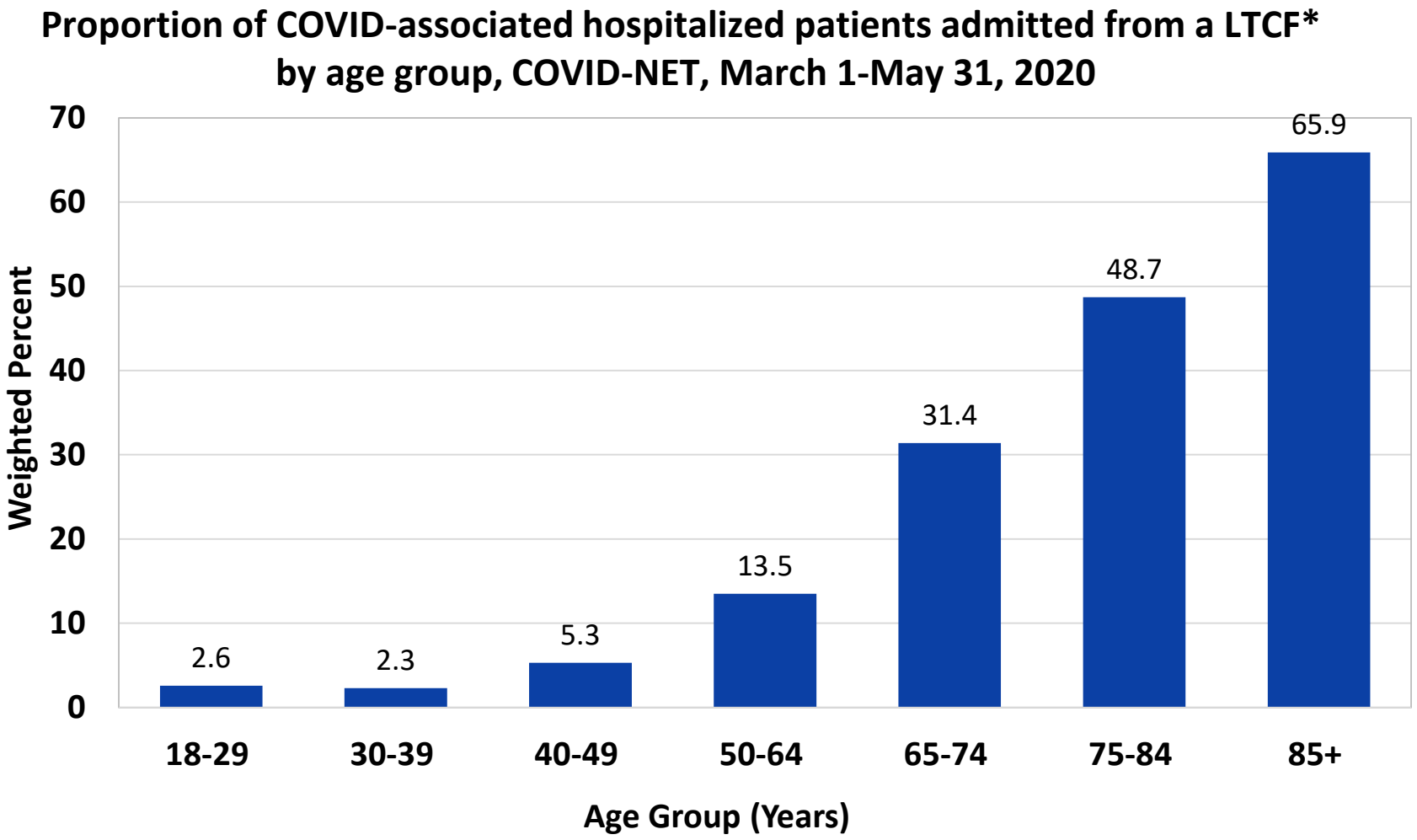
*Data sources: CDC COVID-19 case reports from jurisdictions. Population estimates from 2019 US Census Bureau. Data provisional, subject to change, incomplete for some jurisdictions. Age missing for 1% of case reports

COVID-19 mortality rates are highest in older adults



*Data sources: CDC COVID-19 case reports from jurisdictions. Population estimates from 2019 US Census Bureau. Data provisional, subject to change, incomplete for some jurisdictions. Age missing for 21% of deaths. No deaths have been reported since 11/13/2020.

The majority of COVID-associated hospitalized patients older than 75 years, were admitted from a LTCF*



*LTCF= Nursing home/skilled nursing facility, rehabilitation facility, assisted living/residential care, LTACH, group home/retirement, psychiatric facility, or other long-term care facility

Data Source: COVID-19 associated hospitalizations reported to Coronavirus Disease 2019 (COVID-19)-Associated Hospitalization Surveillance Network (COVID-NET) surveillance system. COVID-NET is a population-based surveillance system that collects data on laboratory-confirmed COVID-19-associated hospitalizations among children and adults through a network of over 250 acute-care hospitals in 14 states.

Risk for COVID-19 associated hospitalization increased with the number of underlying medical conditions

Unadjusted and Adjusted[a] Rate Ratios for Number of Underlying Medical Conditions and COVID-19-Associated Hospitalization, COVID-NET March 1- June 23, 2020

	Unadjusted Rate Ratio (95%CI)	Adjusted Rate Ratio[a] (95%CI)
Number of conditions[b]		
1	2.8 (2.7, 3.1)	**2.5 (2.1, 3.0)**
2	5.6 (5.2, 6.1)	**4.5 (3.7, 5.5)**
3+	7.2 (6.6, 7.9)	**5.0 (3.9, 6.3)**
Age 45-64 years[c]	-----	**1.8 (1.5, 2.2)**
Age 65+ years[c]	-----	**2.6 (2.1, 3.1)**
Male sex[d]	-----	**1.2 (1.1, 1.4)**
Non-Hispanic black[e]	-----	**3.9 (3.3, 4.7)**
Other race/ethnicity[e]	-----	**3.3 (2.8, 3.9)**

CI: Confidence Interval; COVID-NET: Coronavirus Disease 2019-Associated Hospitalization Surveillance Network

[a]Model for number of conditions (variable) is adjusted for age, sex, and race/ethnicity

[b]Reference group is no underlying medical condition; Number of conditions is a sum of underlying medical conditions excluding hypertension; the most recent year of available BRFSS data for hypertension was 2017.

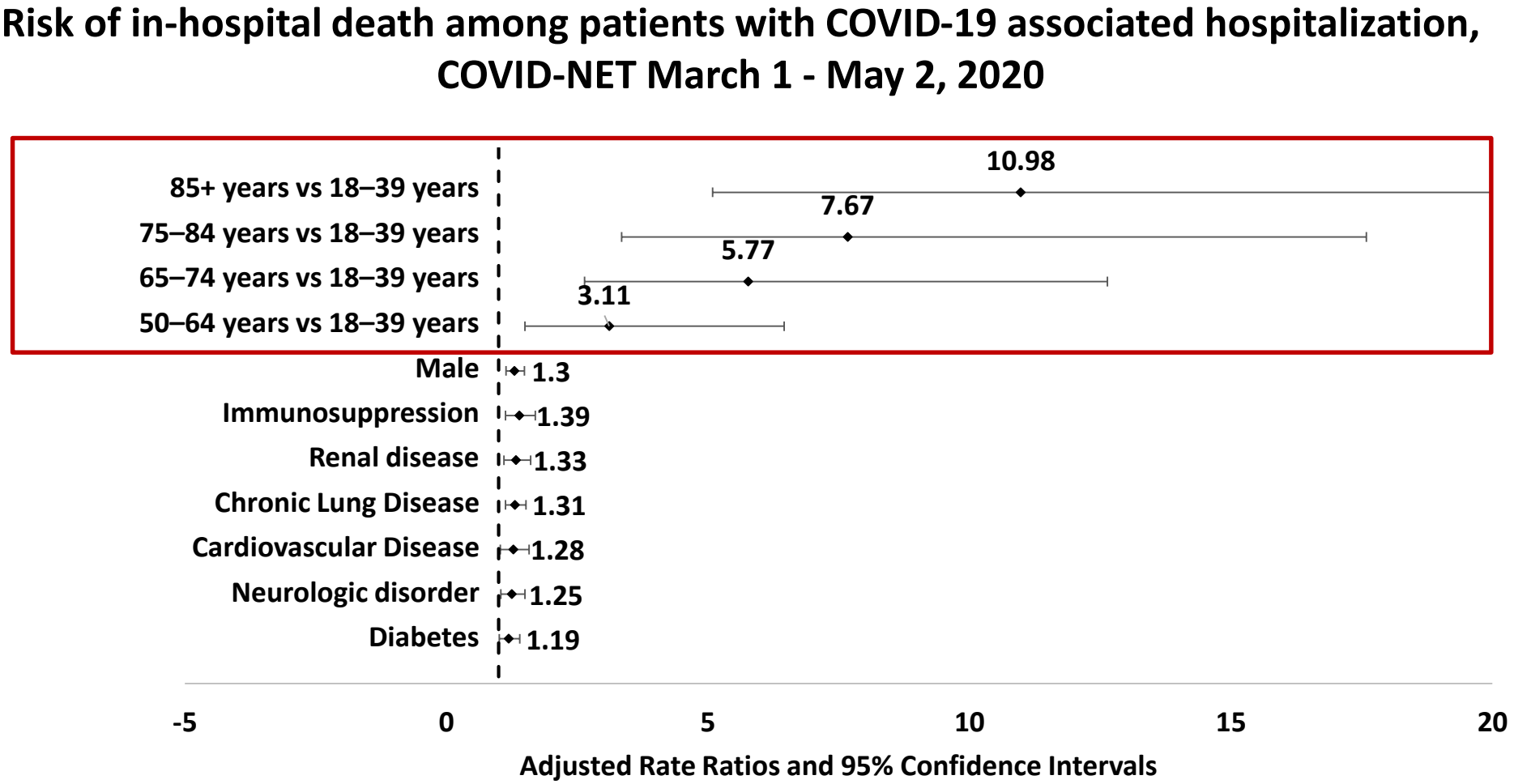
[c]Reference group is 18-44 years

[d]Reference group is female

[e]Reference group is non-Hispanic white

Ko, Sept 2020, doi: 10.1093/cid/ciaa1419

Risk of in-hospital death among persons hospitalized for COVID-19 increased with age



*COVID-NET Surveillance; Final model adjusted for age, sex, race/ethnicity, smoker, hypertension, obesity, diabetes, chronic lung disease, cardiovascular disease, neurologic disease, renal disease, immunosuppression, hematologic disorders, and rheumatologic or autoimmune disease. Kim *et al*, 2020, https://academic.oup.com/cid/advance-article/doi/10.1093/cid/ciaa1012/5872581

Older adults in congregate settings are disproportionately affected by COVID-19

- **Long-Term Care Facility (LTCF) residents and staff accounted for 6% of cases and 39% of deaths in the U.S.**[1] (Nov 6, 2020)
  - **Skilled Nursing Facilities** (~1.3M) (as of Nov 8, 2020)[2]
    - ~470,000 confirmed + probable cases
    - >67,000 deaths
  - **Assisted Living Facilities** (~0.8M) (as of Oct 15/2020)[3]
    - 27,965 confirmed + suspected cases (based on 23 states)
    - 5,469 deaths (based on 20 states)

1. Kaiser Family Foundation. State data and policy actions to address coronavirus: COVID-19: metrics by state. San Francisco, CA: Kaiser Family Foundation; 2020. https://www.kff.org/health-costs/issue-brief/ state-data-and-policy-actions-to-address-coronavirus/#long-term-carecases-deaths
2. CMS COVID-19 data: https://data.cms.gov/stories/s/COVID-19-Nursing-Home-Data/bkwz-xpvg/
3. Yi SH, See I, Kent AG, et al. Characterization of COVID-19 in Assisted Living Facilities — 39 States, October 2020. MMWR Morb Mortal Wkly Rep 2020;69:1730–1735. DOI: http://dx.doi.org/10.15585/mmwr.mm6946a3

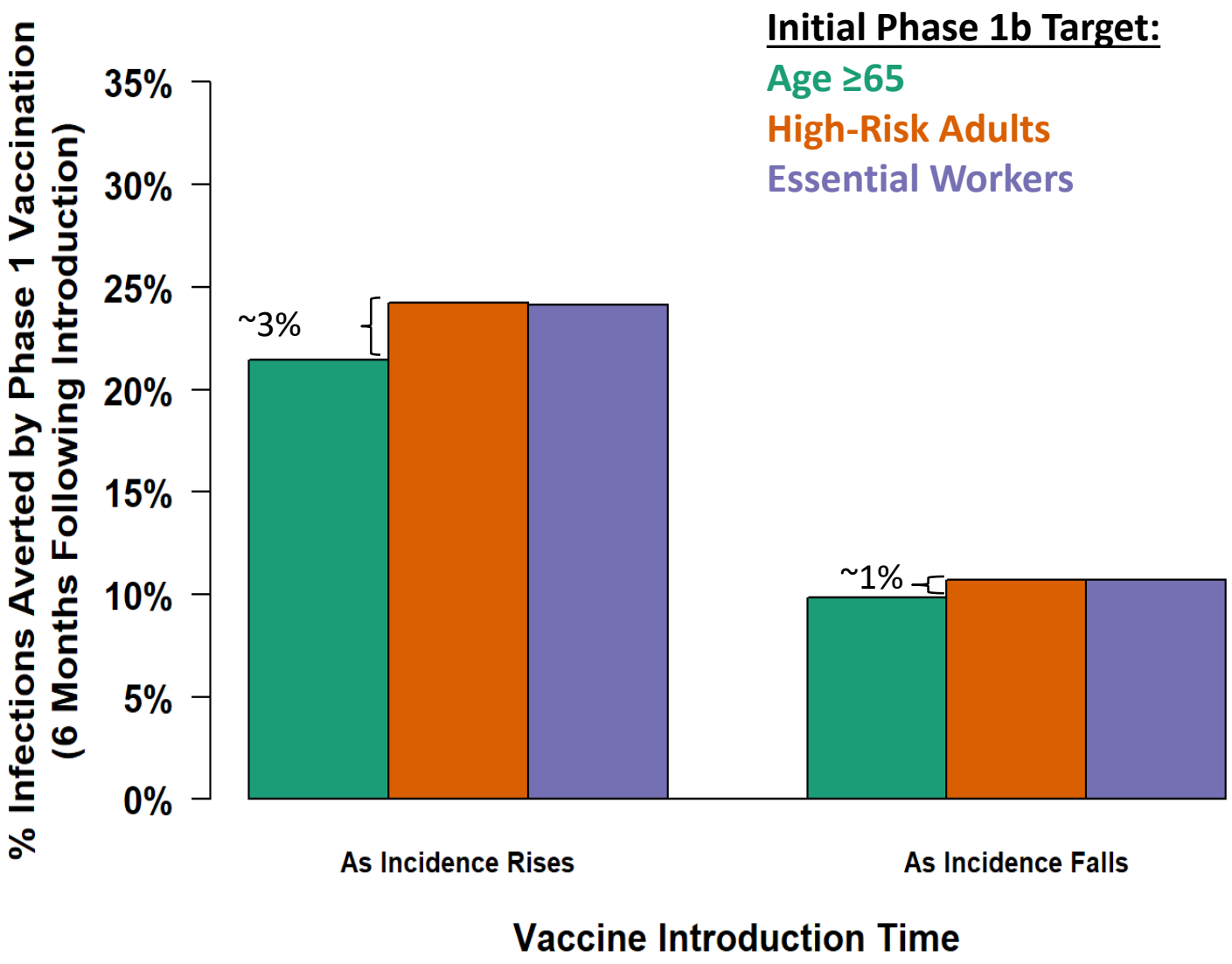
Modeling: What is the potential impact on preventing COVID-19 infections and deaths, of initially allocating vaccine to one of the following groups after vaccinating healthcare personnel in Phase 1a?

Updated: 90% VE (younger and older adults)

Biggerstaff, Modeling Strategies for the Initial Allocation of SARS-CoV-2 Vaccines, Oct ACIP:

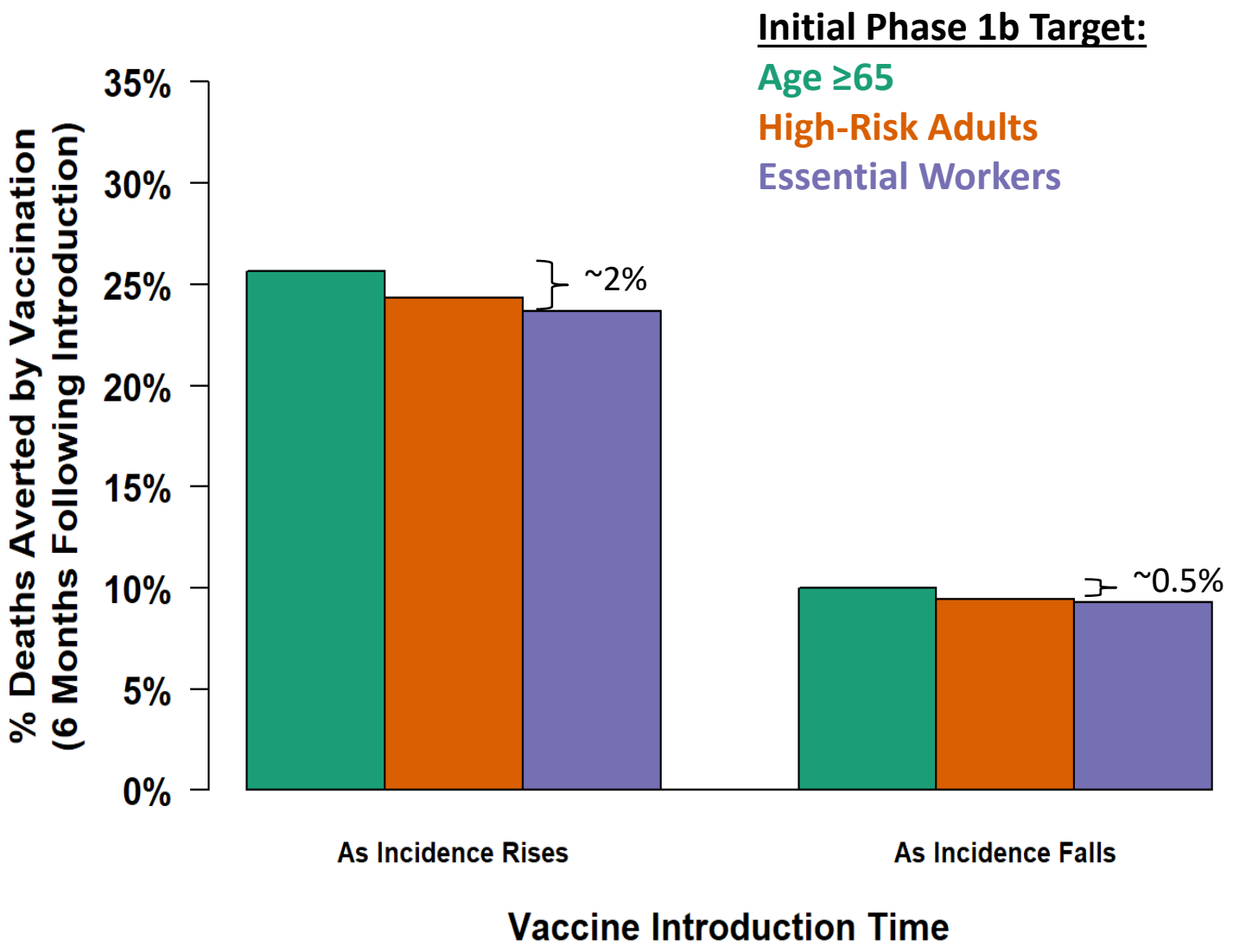
https://www.cdc.gov/vaccines/acip/meetings/downloads/slides-2020-10/COVID-Biggerstaff.pdf

Population-Wide Averted Infections: Infection-Blocking Vaccine



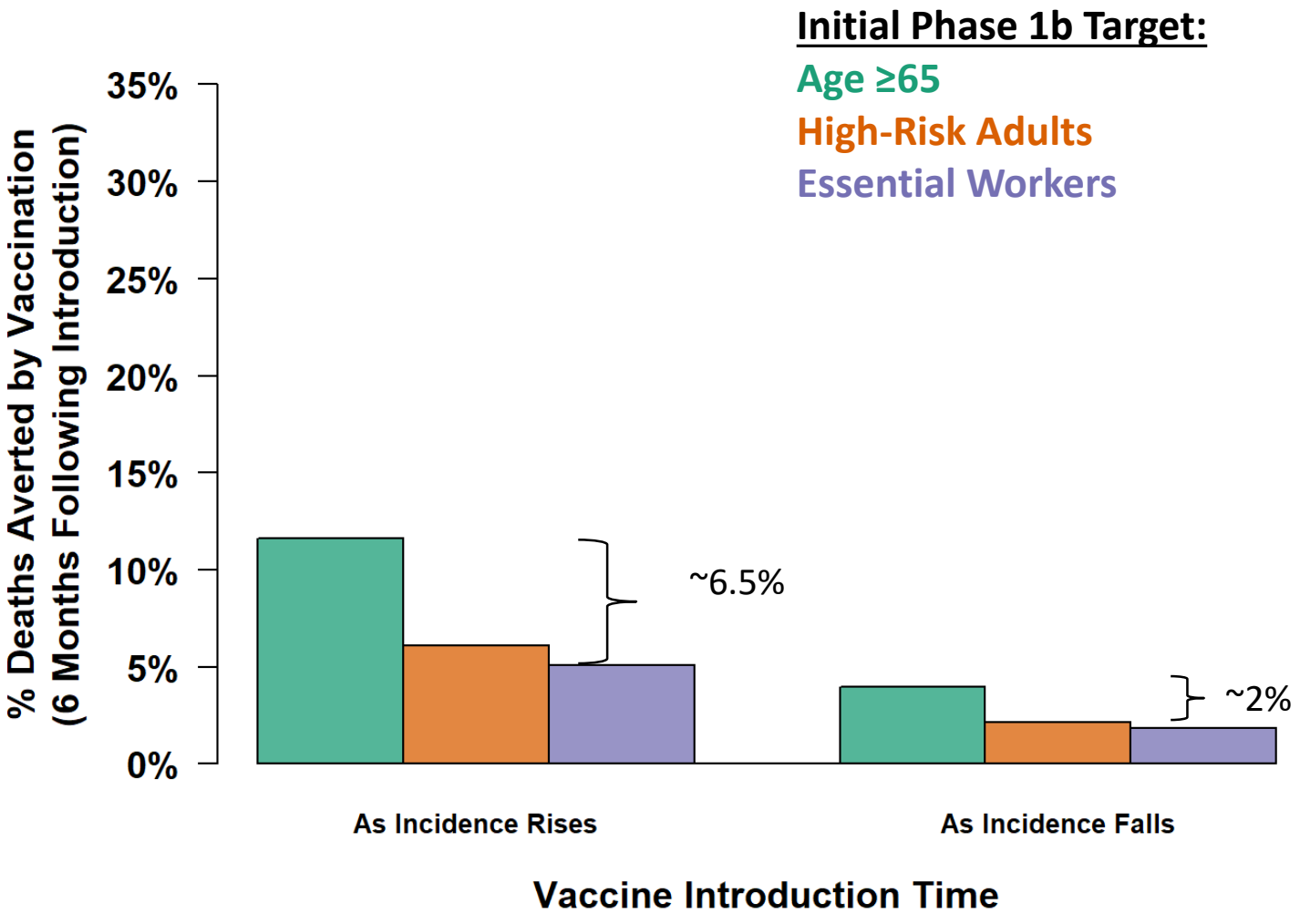
- Initially vaccinating high-risk adults or essential workers in Phase 1b averts approximately 1–3% more infections, compared to targeting age ≥65
  - This difference is greatest in the scenario where the vaccine is introduced before incidence peaks
- Findings are robust to assumptions of reduced VE in older populations

Population-Wide Averted Deaths: Infection-Blocking Vaccine



- Initially vaccinating age ≥65 in Phase 1b averts approximately 0.5–2% more deaths, compared to targeting high-risk adults or essential workers
  - As before, this difference is greatest in the scenario where the vaccine is introduced before incidence peaks

Population-Wide Averted Deaths: Disease-Blocking Vaccine



- Initially vaccinating age ≥65 in Phase 1b averts approximately 2–6.5% more deaths, compared to targeting high-risk adults or essential workers
  - As before, this difference is greatest in the scenario where the vaccine is introduced before incidence peaks
- Findings robust to assumptions of reduced VE in older populations but percentage averted drops

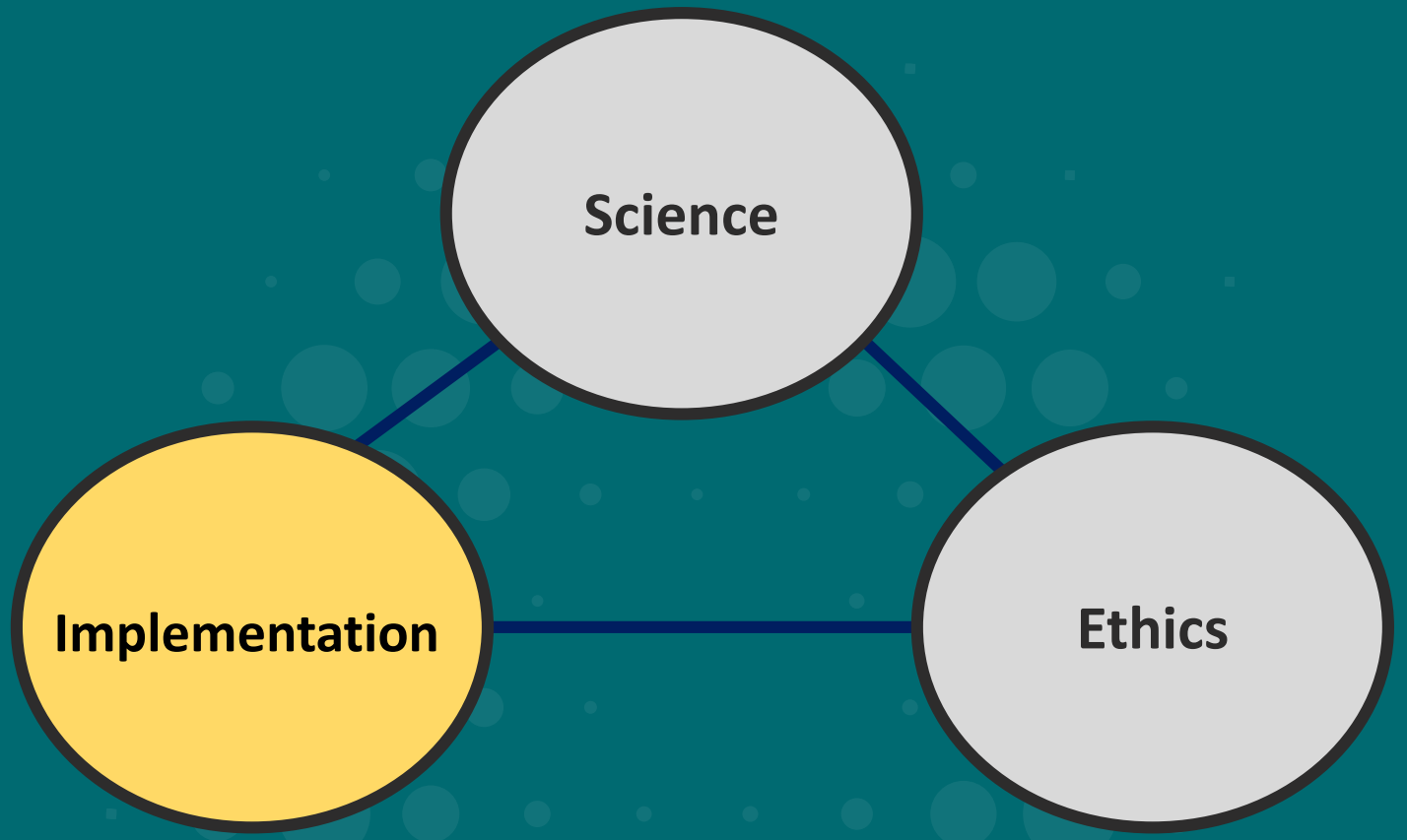
Summary of Work Group interpretation: Modeling

- Differences among 3 strategies is minimal
  - Ethical principles and implementation considerations may greatly contribute to selecting the optimal sequence in Phase Ib
- Largest impact in averted deaths and infections is the timing of vaccine introduction in relation to increases in COVID-19 cases
  - Emphasizes the need to continue non-pharmaceutical interventions (e.g. wearing a mask, social distancing)
- Many factors will inform interpretation of modeling data and allocation decisions
  - VE in older adults
  - Vaccine's ability to prevent asymptomatic infection & transmission

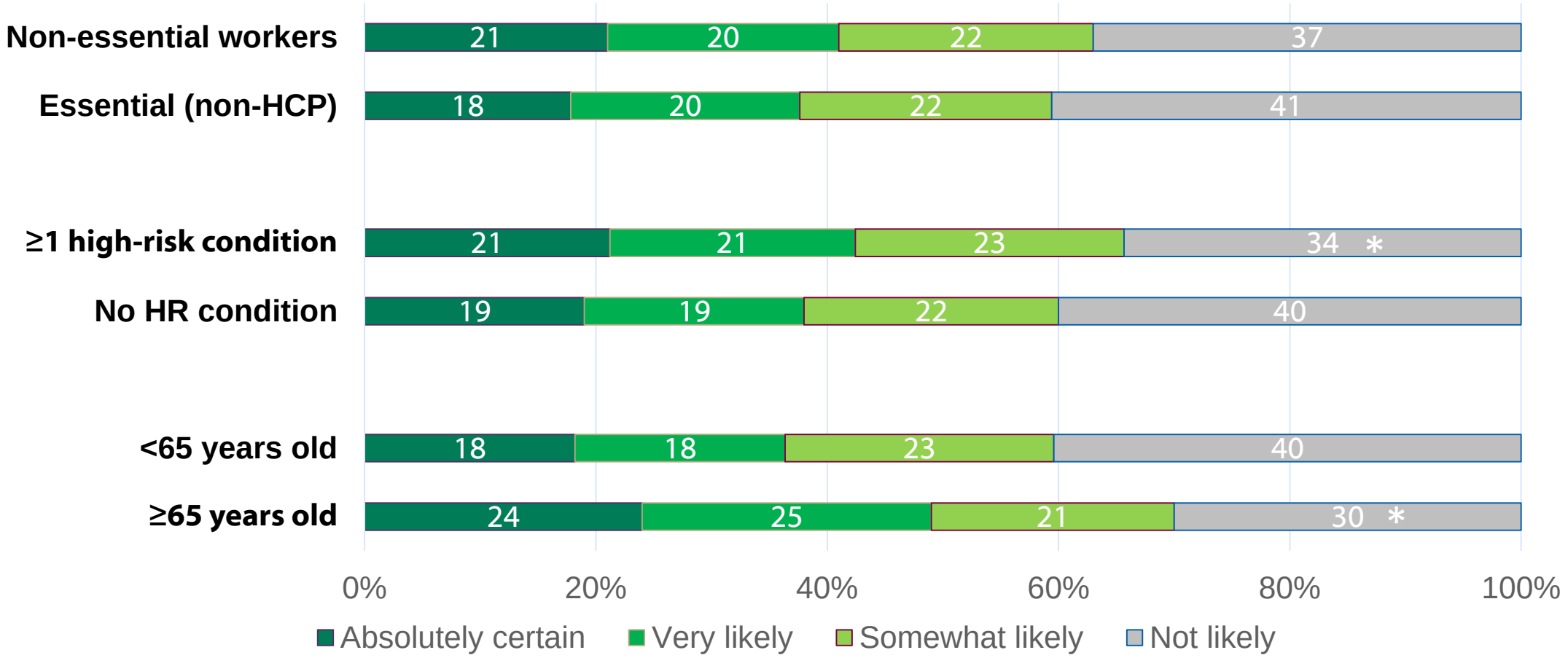
Work Group assessment: Science

	Essential Workers (non-healthcare) (~87 million)	Adults with high-risk medical conditions (>100 Million)	Adults age ≥65 years (53 Million)
Science	+++	+++	+++
Implementation			
Ethics			

Implementation



Intent to receive COVID-19 vaccine, September, 2020

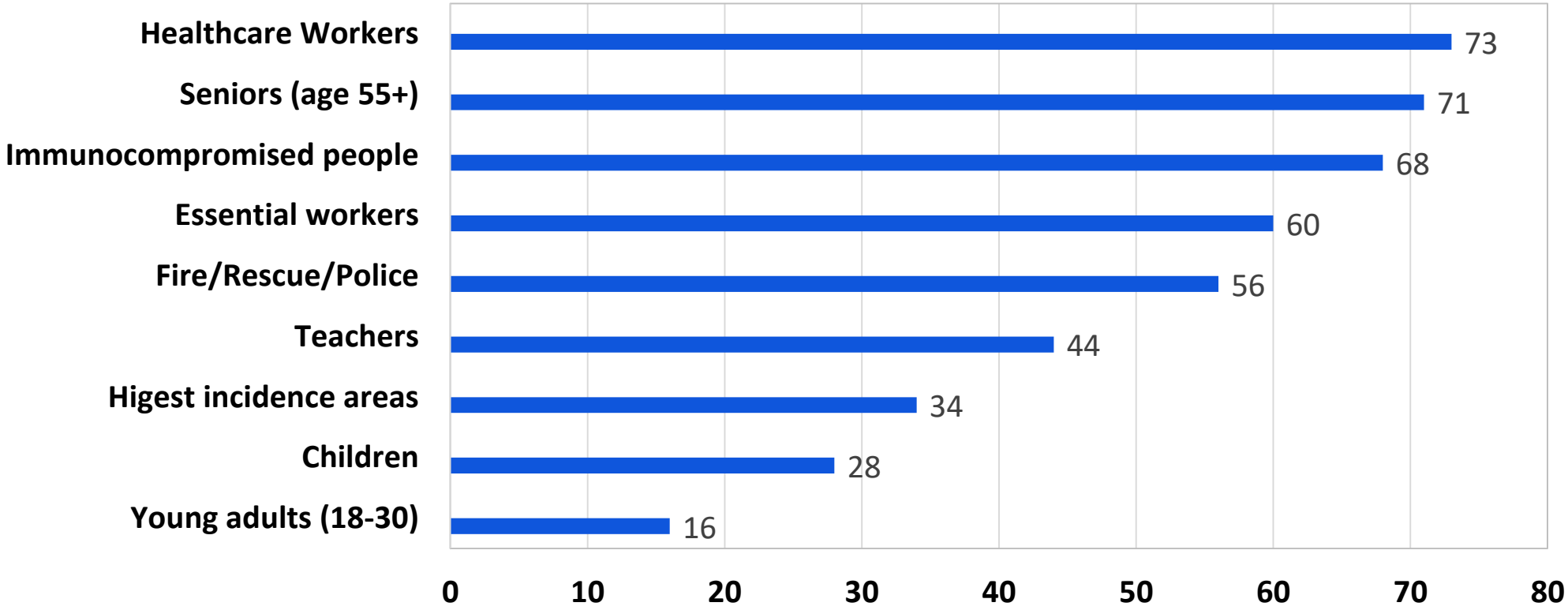


* Statically significant at p<0.05 of "not likely" response vs comparator

Source: Probability-based internet panel survey of 3,541 adults ≥18 years old, conducted Sept. 3-Oct. 1, 2020. CDC, unpublished data.

Survey respondents supported early allocation to groups proposed for Phase 1

Which of the following groups should receive priority when a COVID-19 vaccine is available?
The Harris Poll, n=1399 U.S. Adults, August 14-16, 2020



Source: https://theharrispoll.com/americans-want-high-risk-people-to-get-a-coronavirus-vaccine-first/

Feasibility

Essential workers

- Challenging to reach workers in rural locations, shift workers, those with multiple jobs or working in small cohorts
- Jurisdictions approaches include on site occupational clinics/pharmacies/Health Dept POD strike teams
- Most jurisdictions have an allocation “microplan” which includes prioritization among non-healthcare essential workers when vaccine supply is limited

Adults with high-risk medical conditions

- Determining eligibility: healthcare homes, such as provider offices or pharmacies, could be better suited to verifying underlying medical conditions
- Minimum size of vaccine orders may preclude involvement of small clinics

Adults ≥65 years

- Long distances to central clinics and high throughput of clinics
- Pharmacy program already established to reach LTCF residents

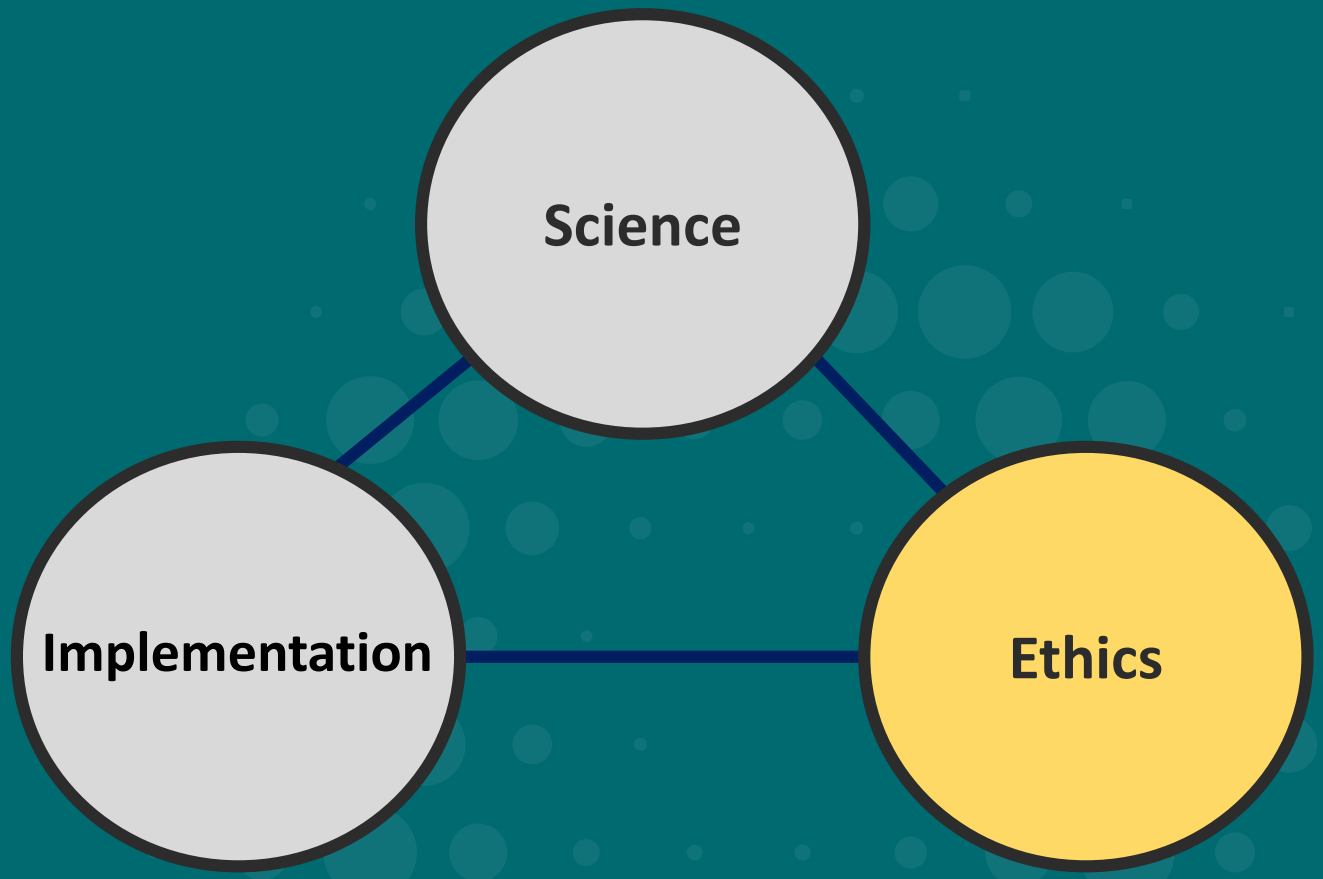
Work Group assessment: Implementation

	Essential Workers (non-healthcare) (~87 million)	Adults with high-risk medical conditions (>100 Million)	Adults age ≥65 years (53 Million)
Values of target group	+	++	+++
Feasibility	++	+	++

Overall

	Essential Workers (non-healthcare) (~87 million)	Adults with high-risk medical conditions (>100 Million)	Adults age ≥65 years (53 Million)
Science	+++	+++	+++
Implementation	++	++	+++
Ethics			

Ethics



Ethical Principle	Essential Workers (non-healthcare) (~87 million)	Adults with high-risk medical conditions (>100 Million)	Adults age ≥65 years (53 Million)
Maximize benefits and minimize harms	Preserves services essential to the COVID-19 response and overall functioning of society "Multiplier effect"	Reduces morbidity and mortality in persons with high burden of COVID-19 disease and death	Reduces morbidity and mortality in persons with highest burden of COVID-19 hospitalization and death
Promote justice	-Workers unable to work from home (↑exposure risk) -Promotes access to vaccine and may reduce barriers for workers with low vaccine uptake	Will require focused outreach to those with limited or no access to healthcare	Will require focused outreach to those who experience barriers to access healthcare
Mitigate Health inequities	-Racial and ethnic minority groups disproportionately represented in many essential industries -~1/4 of essential workers live in low-income families	Increased prevalence of some medical conditions in race/ethnic minority groups & persons in rural areas -Diagnosis of medical conditions requires access to healthcare	-Highest incidence and mortality in congregate living --Racial and ethnic minority groups under-represented among adults ≥65

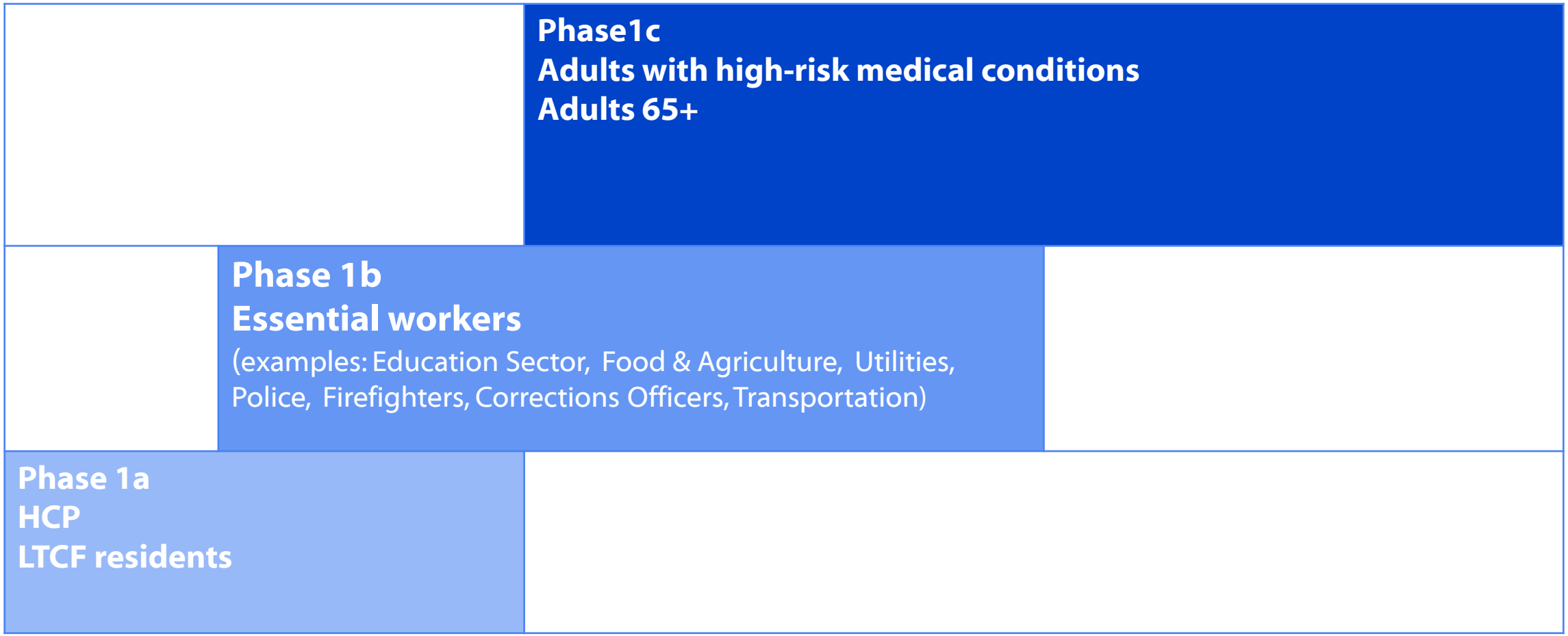
Work Group assessment: Ethics

Ethical Principle	Essential Workers (non-healthcare) (~87 million)	Adults with high-risk medical conditions (>100 Million)	Adults age ≥65 years (53 Million)
Maximize benefits & minimize harms	+++	++	+++
Promote justice	+++	++	++
Mitigate health inequities	+++	+	+

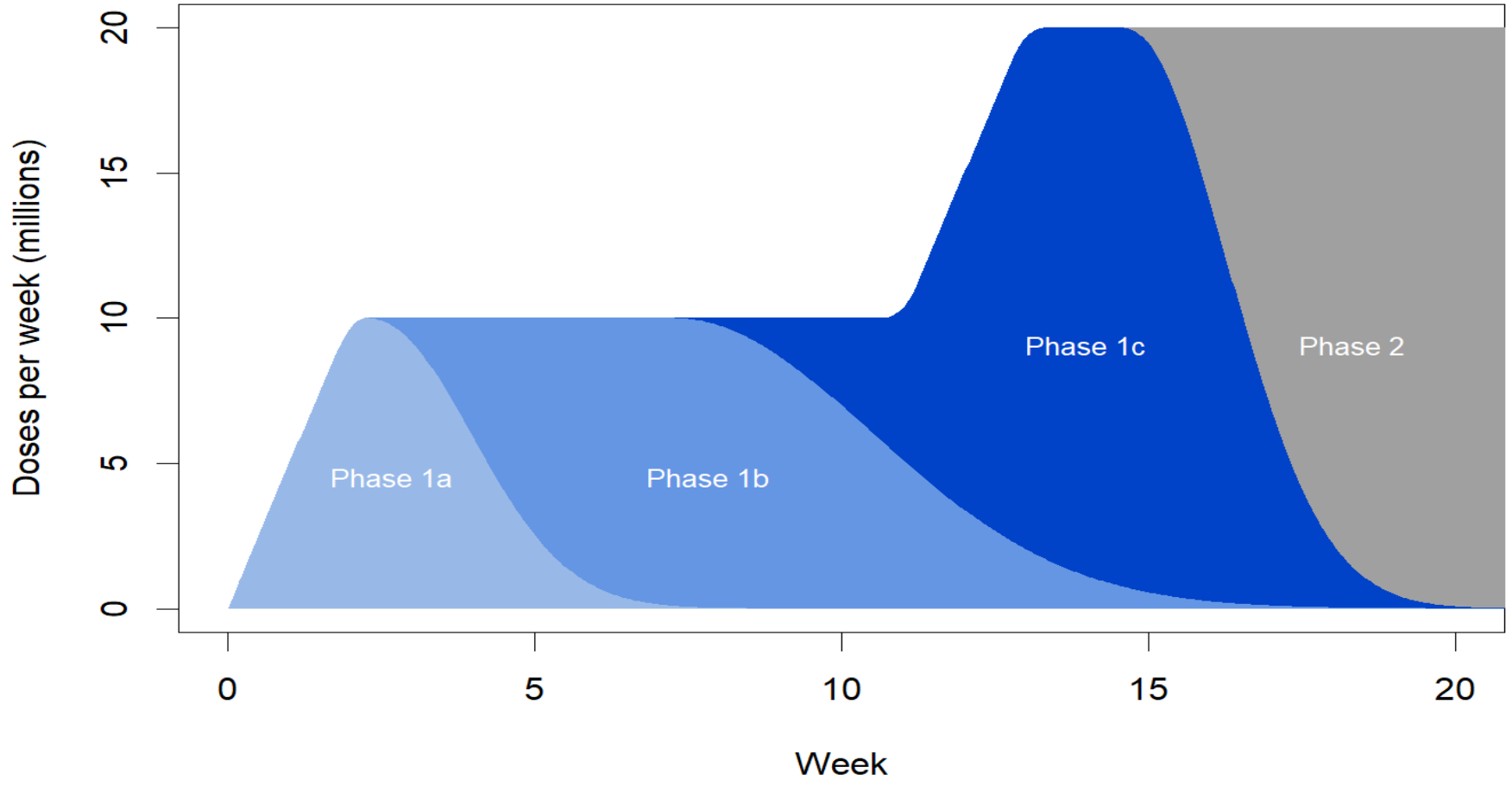
Overall

	Essential Workers (non-healthcare) (~87 million)	Adults with high-risk medical conditions (>100 Million)	Adults age ≥65 years (53 Million)
Science	+++	+++	+++
Implementation	++	++	+++
Ethics	+++	+	+

Proposed Interim Phase 1 Sequence



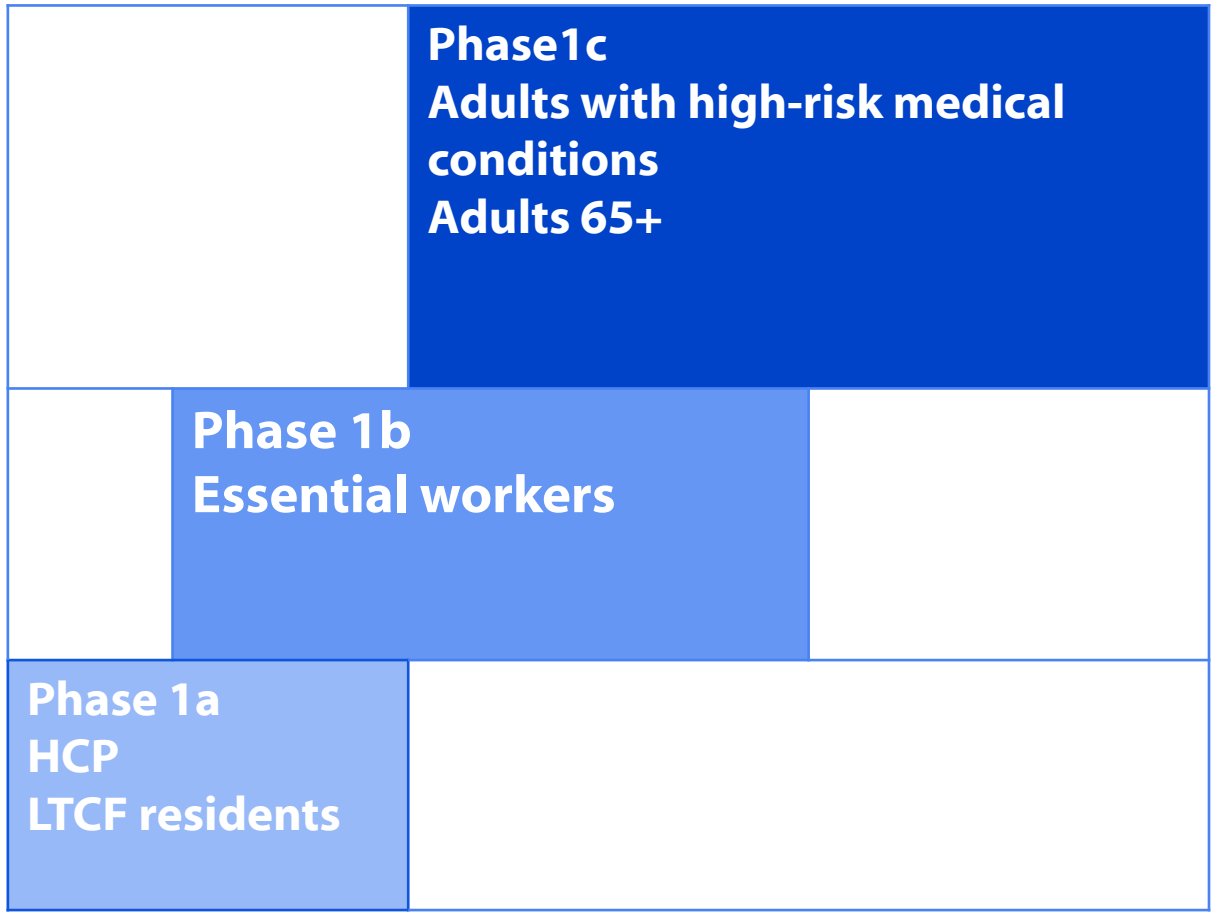
Example of a possible Phase 1 sequence



Additional Work Group considerations

- This represents an interim Phase 1 sequence– allocation policy will need to be dynamic and adapt as new information such as vaccine performance and supply and demand become clear
- Gating criteria will be necessary to move expeditiously from one Phase to the next, demand saturates
- Reaching essential workers (non-healthcare personnel) will require jurisdictions to identify critical sectors at risk and optimal strategies to reach them
- Following vaccination, measures to stop the possible spread of SARS-CoV-2, such as masks and social distancing, will still be needed
- The U.S. government is committed to making COVID-19 vaccines available to all residents who want them, as soon as possible

Proposed Interim Phase 1 Sequence



1) Do ACIP members agree with healthcare personnel and LTCF residents in Phase 1a?

2) Do ACIP members agree with essential workers (non healthcare) in Phase 1b?

3) Do ACIP members agree with adults with high-risk medical conditions and adults 65 years and older in Phase 1c?

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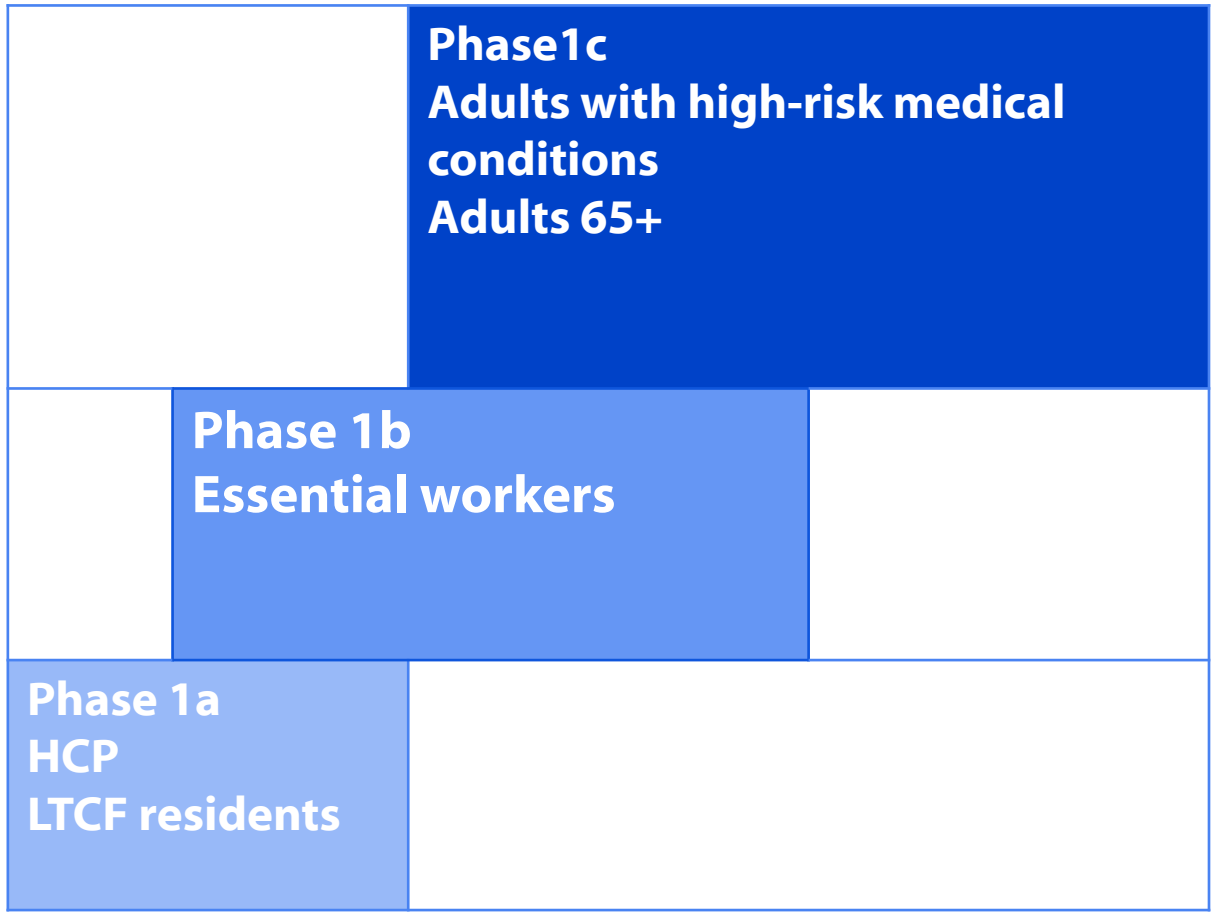

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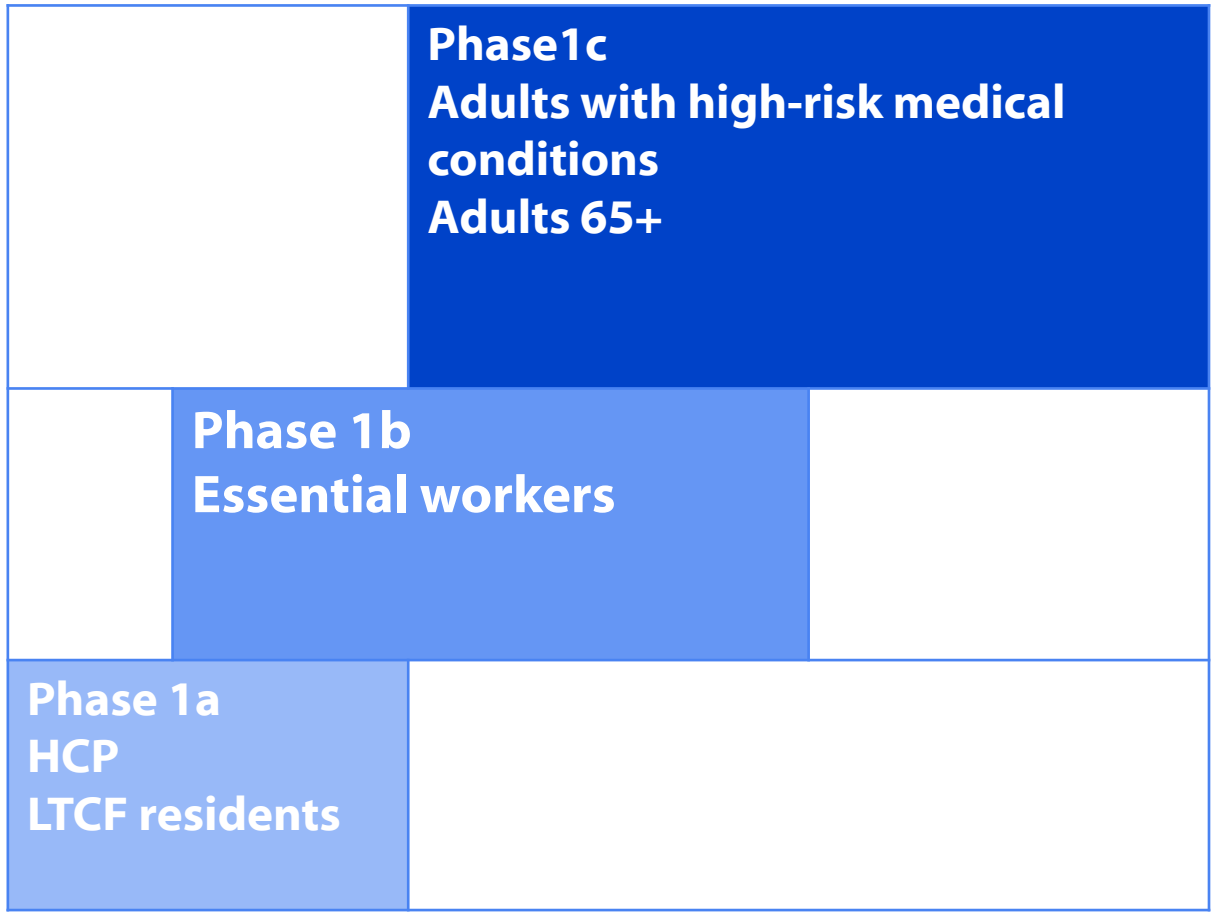

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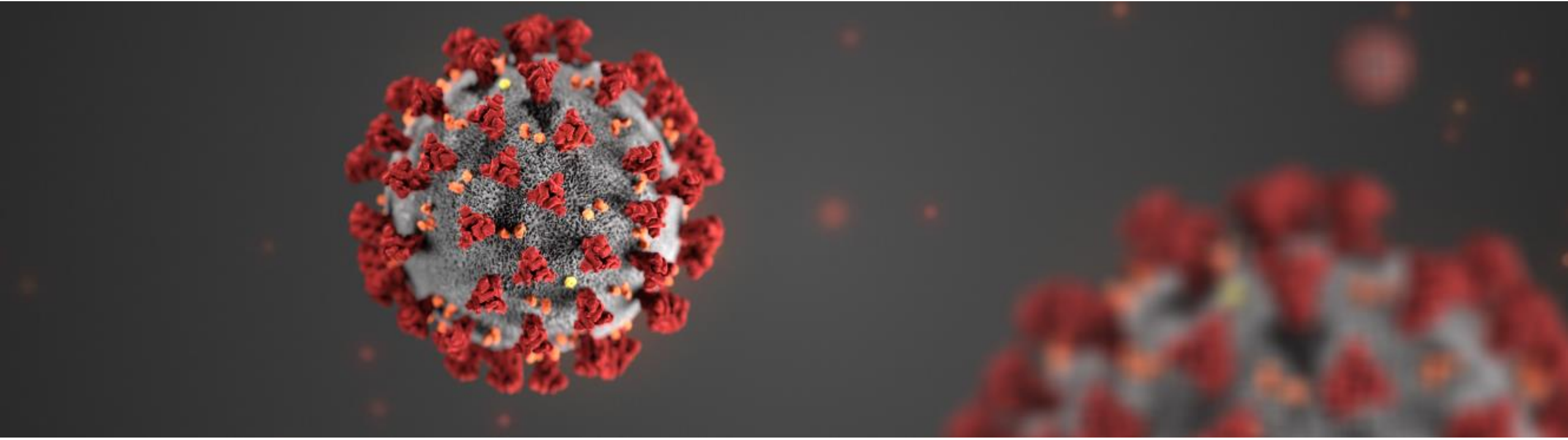

For more information, contact CDC
1-800-CDC-INFO (232-4636)
TTY: 1-888-232-6348 www.cdc.gov

Thank you

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.