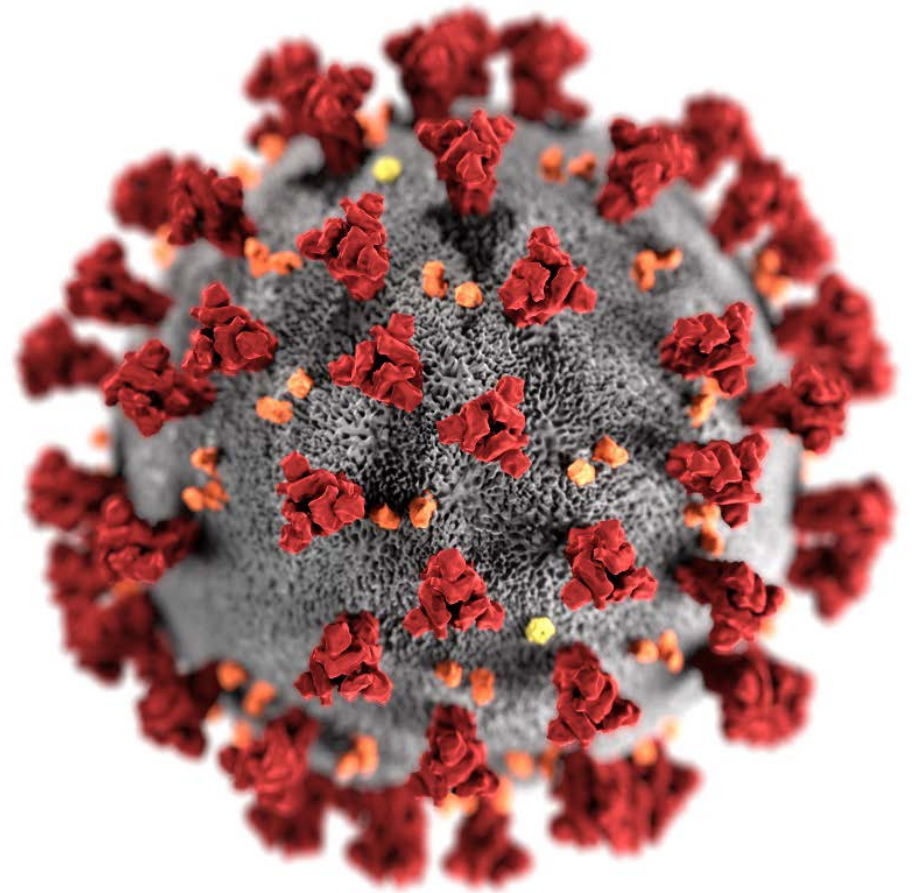


## Phased Allocation of COVID-19 Vaccines

Kathleen Dooling, MD, MPH  
ACIP meeting  
December 20, 2020



# Objective

**Policy Question:**

**Which groups should be offered COVID-19 vaccination in Phase 1b & 1c?**

# **Work Group Considerations: Goals of the COVID-19 Vaccine Program**

- **Ensure safety and effectiveness of COVID-19 vaccines**
- **Reduce transmission, morbidity, mortality of COVID-19 disease**
- **Help minimize disruption to society and the economy, including maintaining healthcare capacity**
- **Ensure equity in vaccine allocation and distribution**

# Work Group considerations: Balancing Goals

**Prevention of  
Morbidity & Mortality**



**Preservation of  
Societal Functioning**

# Work Group considerations: Balancing Goals

Prevention of  
Morbidity & Mortality

1a

LTCF residents



Preservation of  
Societal Functioning

Health care personnel

- Ensure safety and effectiveness of COVID vaccines
- Ensure equity in vaccine allocation and distribution

# Work Group considerations: Balancing Goals

- 10 public ACIP meetings, 28 COVID-19 Work Group meetings
- Evidence: Scientific, Implementation, Ethical
- External Expert Advice
  - National Academies of Science Engineering Medicine
  - Academic Reports
  - International Recommendations
- Public Input
  - Focus groups
  - Population surveys
  - Pandemic preparedness
  - ACIP public comment and federal register

# Work Group considerations: Balancing Goals

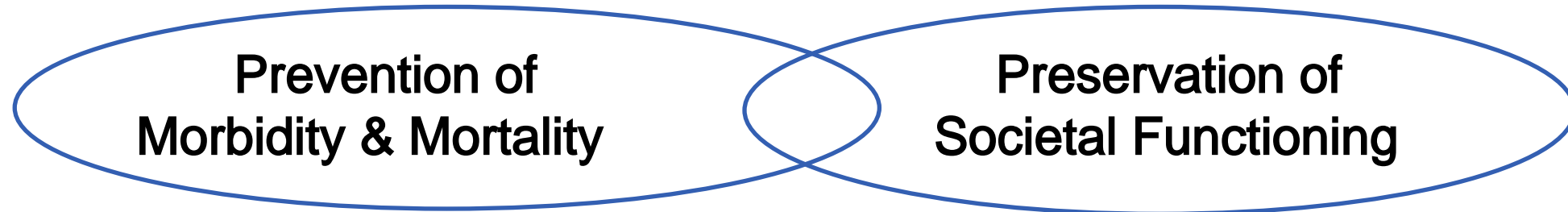
Prevention of  
Morbidity & Mortality

Preservation of  
Societal Functioning

|    |   |                             |
|----|---|-----------------------------|
| 1a | LTCF residents  | Health care personnel       |
| 1b | Persons 75 years and older  | Frontline Essential Workers |
| 1c | Persons 65-74 years<br>Persons 16-64 with high-risk<br>medical conditions | Other Essential Workers     |

- Ensure safety and effectiveness of COVID-19 vaccines
- Ensure equity in vaccine allocation and distribution

# Work Group considerations: Balancing Goals



|    |  |                             |
|----|--|-----------------------------|
| 1a | LTCF residents   | Health care personnel       |
| 1b | Persons 75 years and older   | Frontline Essential Workers |
| 1c | Persons 65-74 years<br>Persons 16-64 with high-risk medical conditions | Other Essential Workers     |

- Ensure safety and effectiveness of COVID-19 vaccines
- Ensure equity in vaccine allocation and distribution



# NASEM Framework

| Phase 1   | Phase 2   | Phase 3  |
|---|---|--|
| <p><b>Phase 1a “Jumpstart Phase”</b></p> <ul style="list-style-type: none"><li>• High-risk health workers</li><li>★ First responders</li></ul> <p><b>Phase 1b</b></p> <ul style="list-style-type: none"><li>• People of all ages with comorbid and underlying conditions that put them at <i>significantly</i> higher risk</li><li>• Older adults <b>living in congregate or overcrowded settings</b></li></ul> | <ul style="list-style-type: none"><li>★ K-12 teachers and school staff and child care workers</li><li>★ Critical workers in high-risk settings—workers who are in industries essential to the functioning of society and substantially higher risk of exposure</li><li>• People of all ages with comorbid and underlying conditions that put them at <i>moderately</i> higher risk</li><li>• People in homeless shelters or group homes for individuals with disabilities, including serious mental illness, development and intellectual disabilities, and physical disabilities or in recovery, and</li><li>★ staff who work in such settings</li><li>• People in prisons, jails, detention centers, and similar facilities, and</li><li>★ staff who work in such settings</li><li>• All older adults not included in Phase 1</li></ul> | <ul style="list-style-type: none"><li>• Young adults</li><li>• Children</li><li>★ Workers in industries and occupations important to the functioning of society and at increased risk of exposure not included in Phase 1 or 2</li></ul> |

# Essential Workers\* (total ~87M)

## Frontline Essential Workers (~30M)

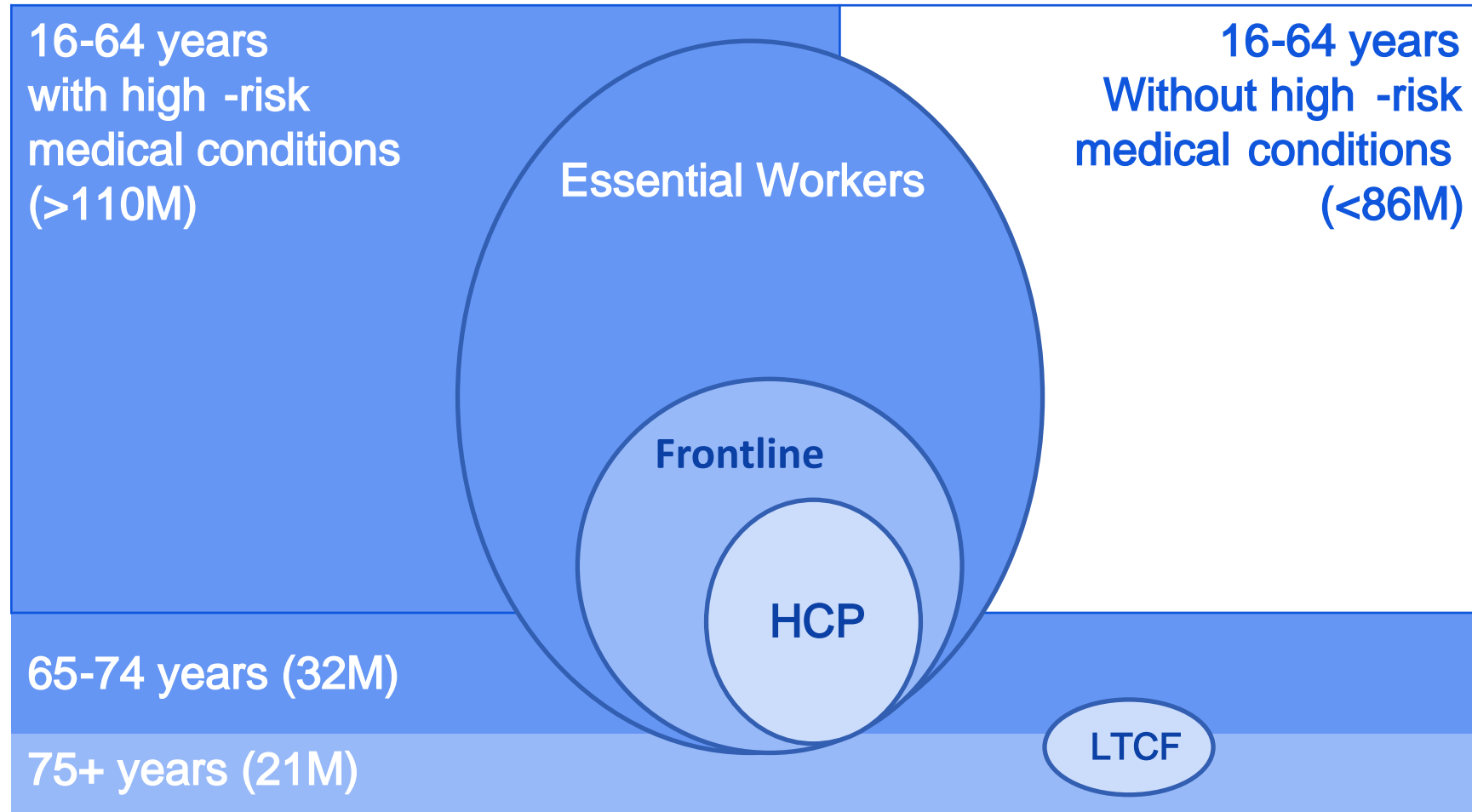
- First Responders (Firefighters, Police)
- Education (teachers, support staff, daycare)
- Food & Agriculture
- Manufacturing
- Corrections workers
- U.S. Postal service workers
- Public transit workers
- Grocery store workers

## Other Essential Workers (~57M)

- Transportation and logistics
- Food Service
- Shelter & Housing (construction)
- Finance
- IT & Communication
- Energy
- Media
- Legal
- Public Safety (Engineers)
- Water & Wastewater

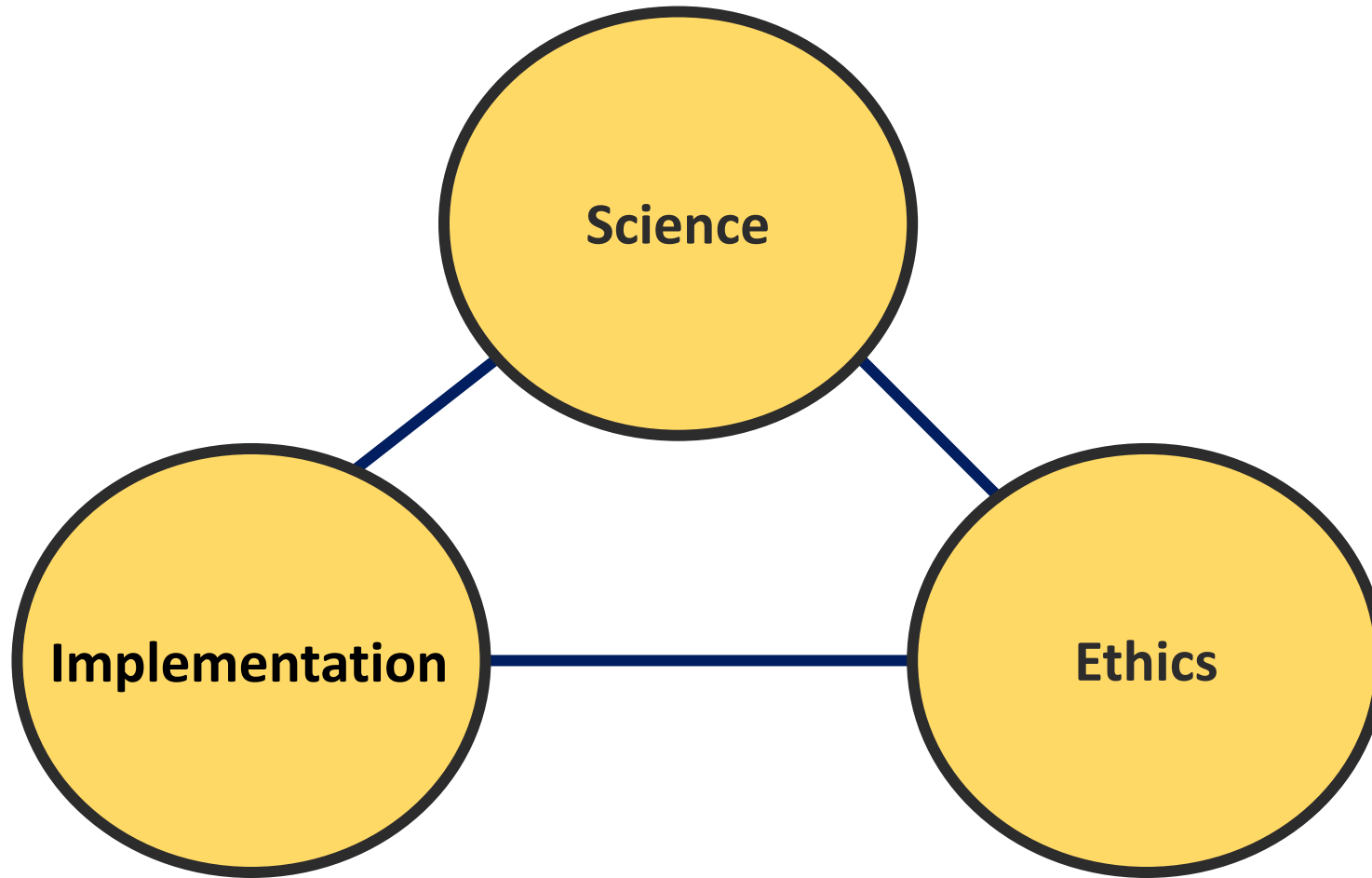
**Frontline Essential Workers:** workers who are in sectors essential to the functioning of society and are at substantially higher risk of exposure to SARS-CoV-2

# Proposed Phases of COVID-19 Vaccination



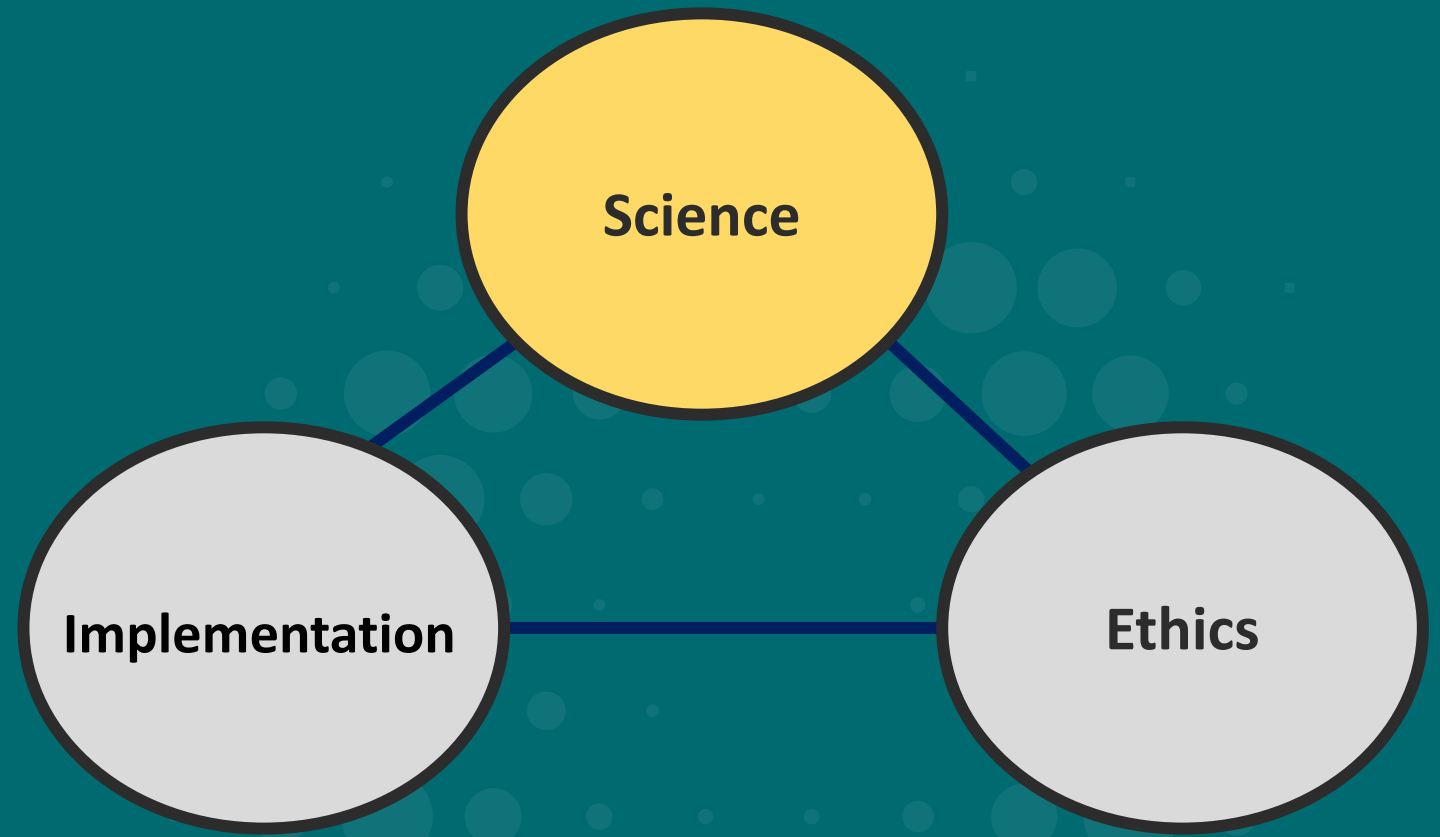
|  |          |  |          |  |          |  |         |
|--|----------|--|----------|--|----------|--|---------|
|  | Phase 1a |  | Phase 1b |  | Phase 1c |  | Phase 2 |
|--|----------|--|----------|--|----------|--|---------|

# Allocation of COVID-19 vaccine



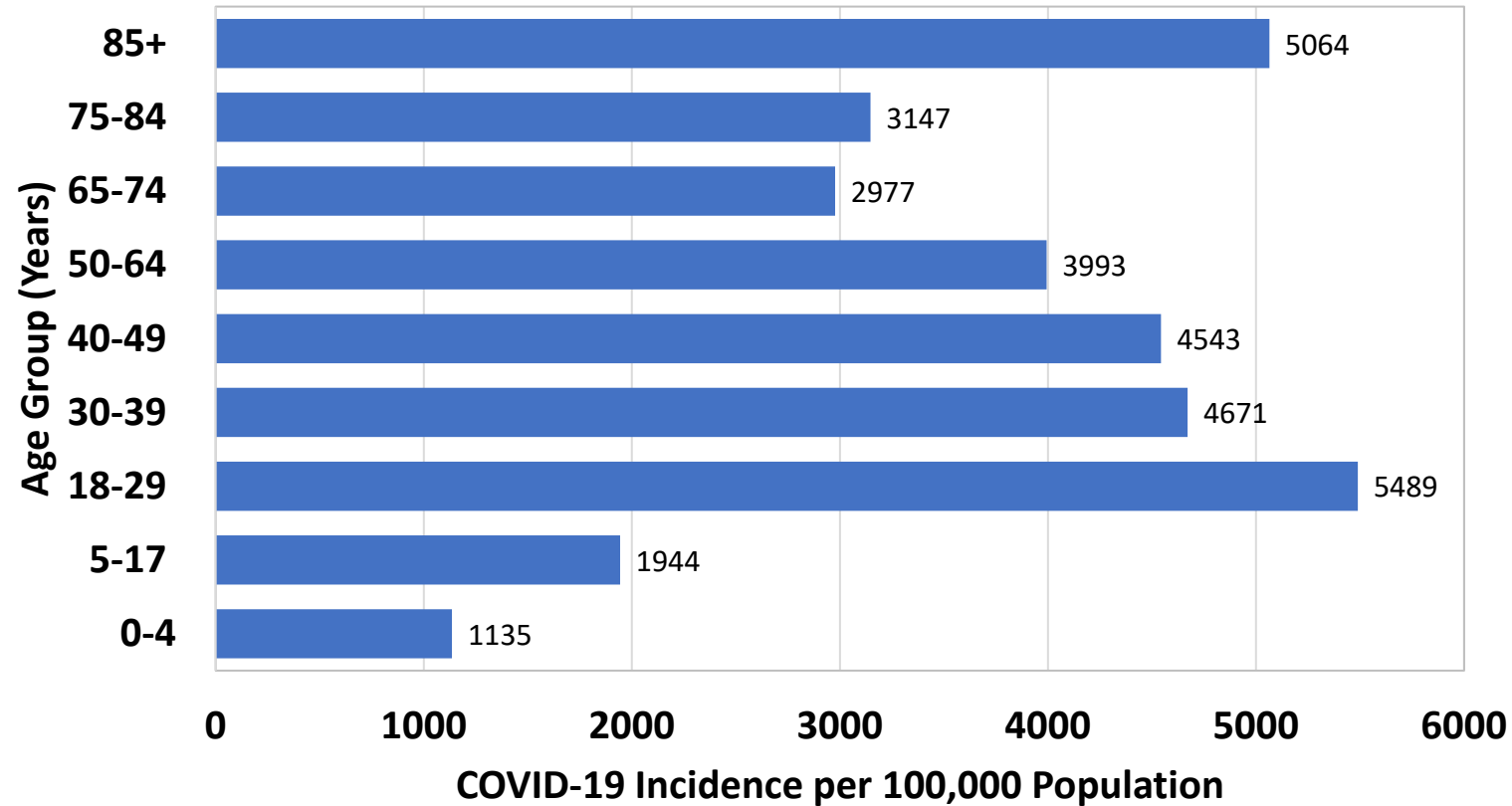
**Which groups should be recommended to receive COVID-19 vaccines in Phase 1b & 1c?**

# Science



# COVID-19 incidence is highest in young adults

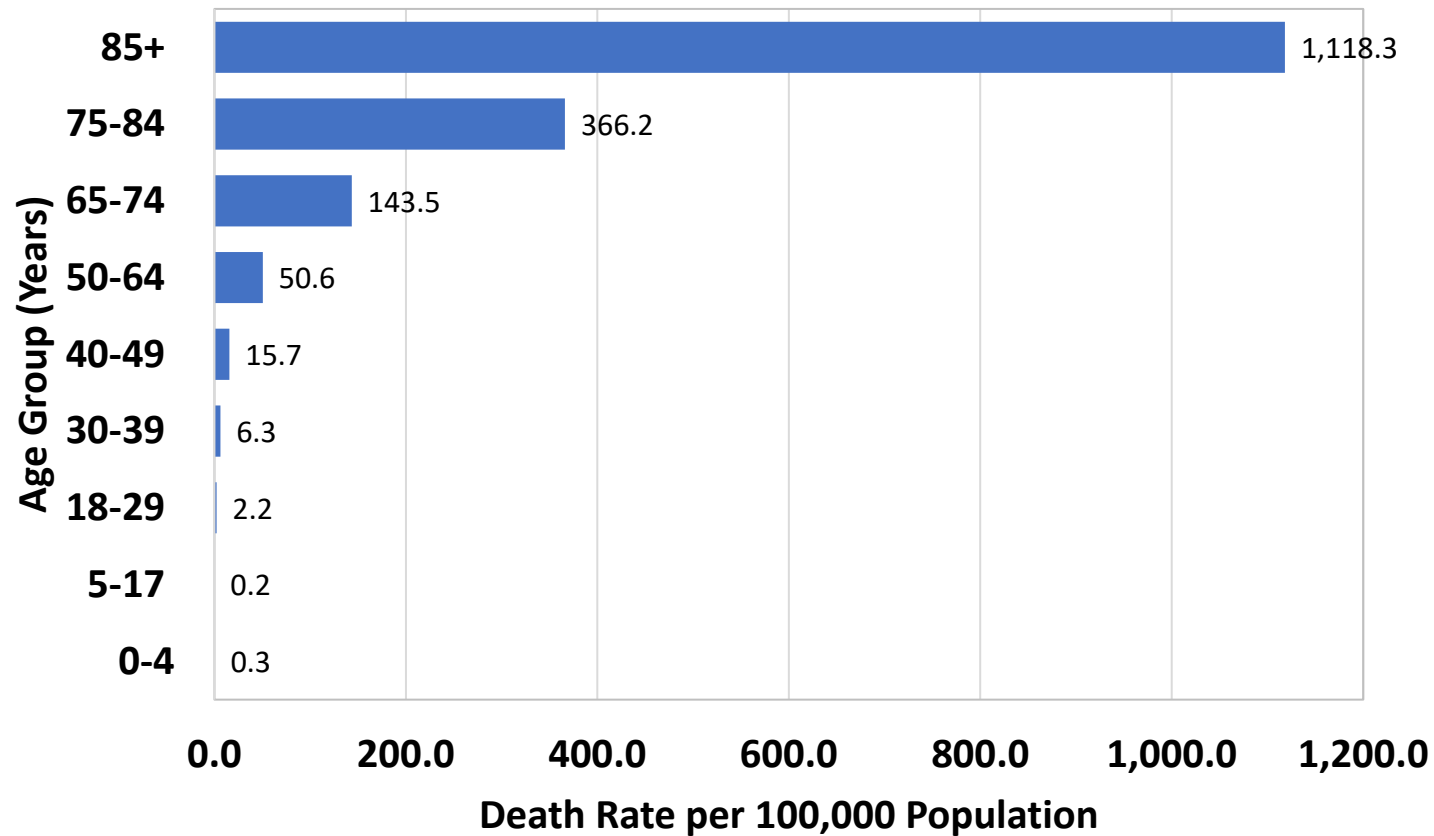
National Estimate of COVID-19 Incidence per 100,000 Population, by Age Group – Data through Dec 16, 2020



\*Data sources: CDC COVID-19 data tracker. Population estimates from 2019 US Census Bureau. Data provisional, subject to change.

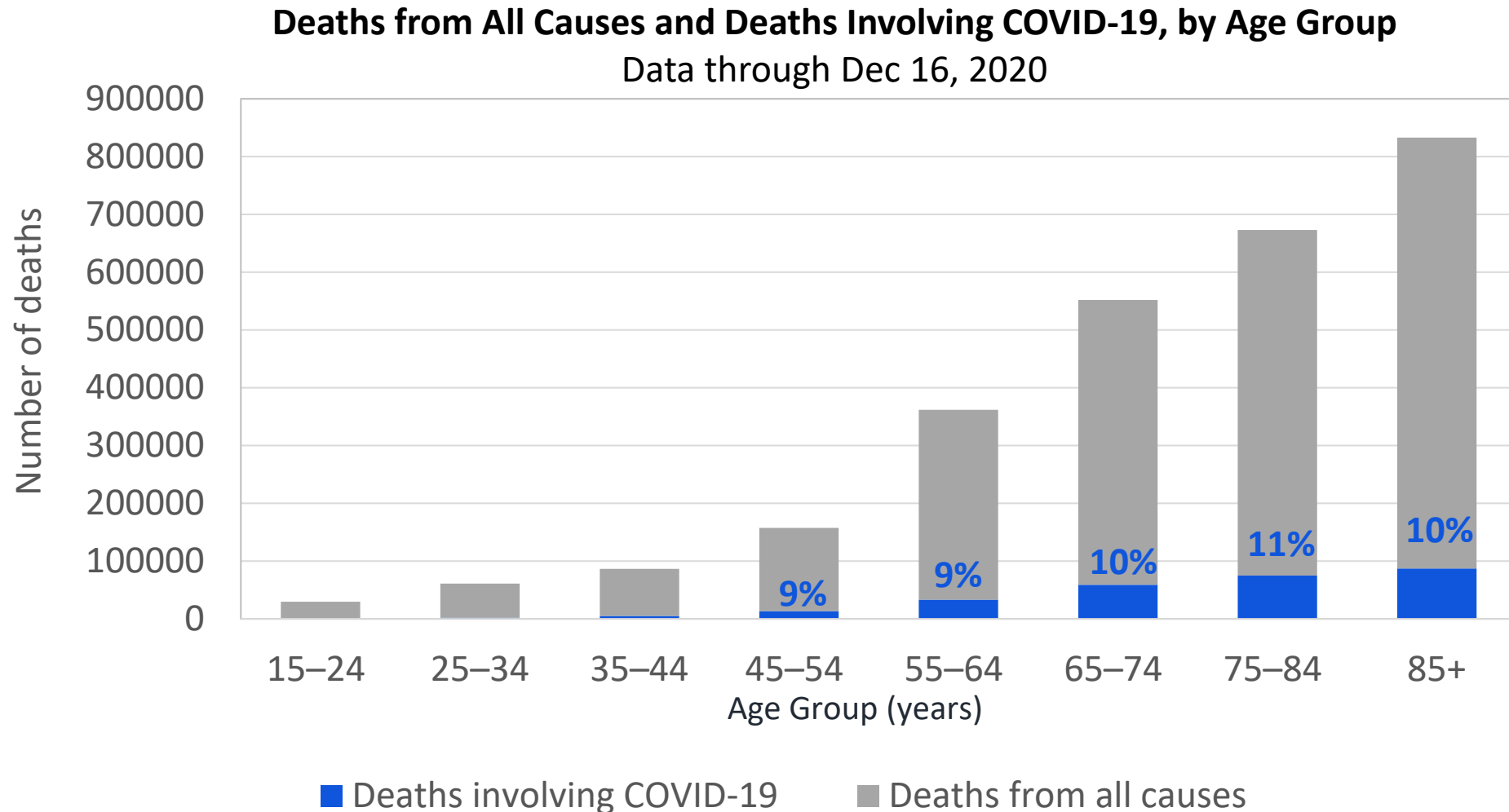
# COVID-19 mortality rates are highest in older adults

National Estimate of COVID-19 Deaths per 100,000 Population, by Age Group – Data through Dec 16, 2020



\*Data sources: CDC COVID-19 data tracker. Population estimates from 2019 US Census Bureau. Data provisional, subject to change.

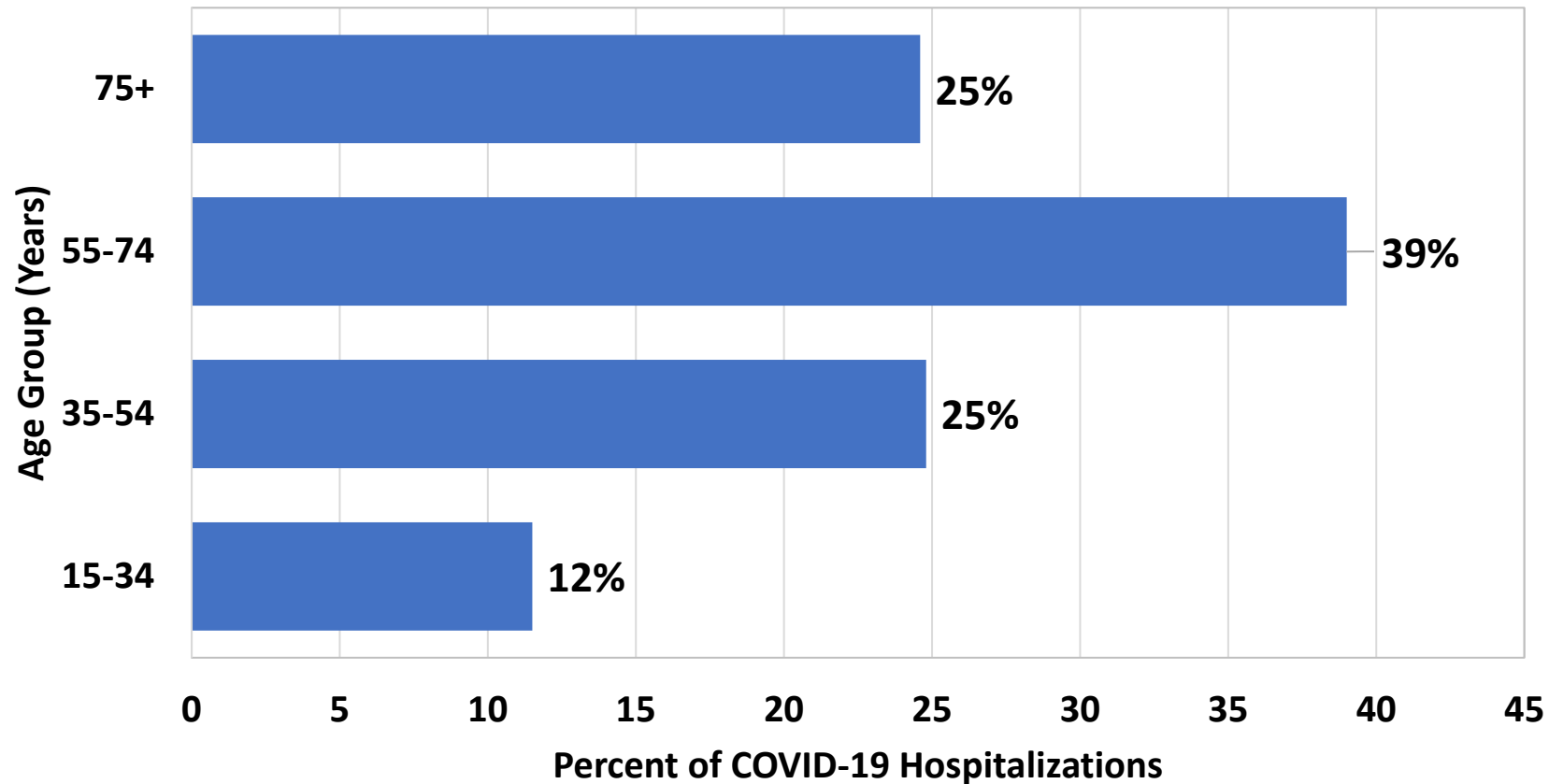
# Although overall mortality increases with age, the proportion of deaths associated with COVID-19 is similar across middle-age and older adults





# Adults 75 years and older account for 25% of COVID-19 associated hospitalizations

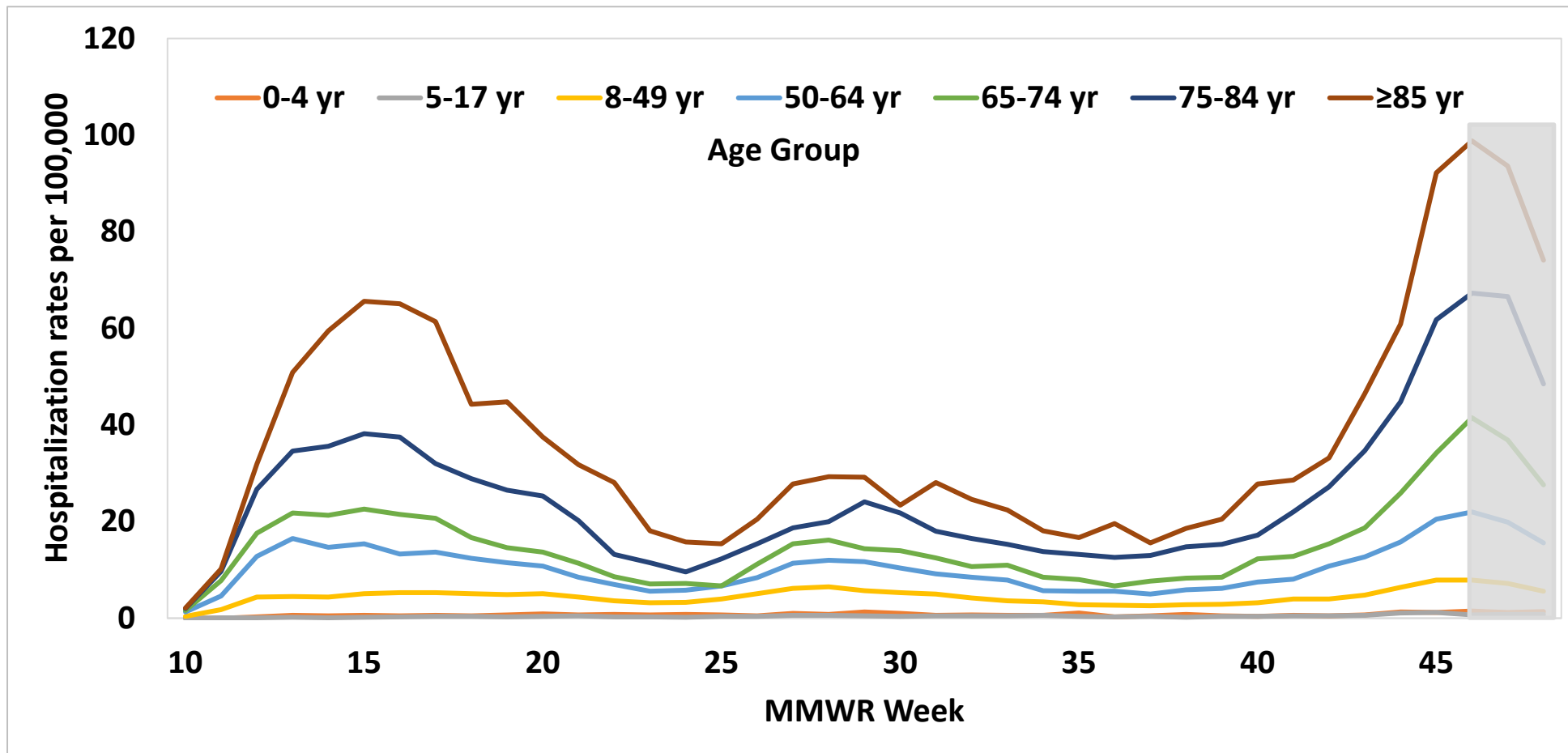
Percent of COVID-19-Associated Hospitalizations, by Age Group  
Data through Dec 5, 2020



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.

# COVID-19-associated hospitalization rates are highest in older adults

COVID-19-Associated Hospitalization Rates per 100,000 population  
Preliminary Weekly Rates as of Dec 5, 2020



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

## Unadjusted and Adjusted<sup>a</sup> 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 <sup>a</sup> (95%CI) |
|-----------------------------------|-------------------------------|--|
| Number of conditions <sup>b</sup> |                               |  |
| 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 <sup>c</sup>      | -----                         | 1.8 (1.5, 2.2)                           |
| Age 65+ years <sup>c</sup>        | -----                         | 2.6 (2.1, 3.1)                           |
| Male sex <sup>d</sup>             | -----                         | 1.2 (1.1, 1.4)                           |
| Non-Hispanic black <sup>e</sup>   | -----                         | 3.9 (3.3, 4.7)                           |
| Other race/ethnicity <sup>e</sup> | -----                         | 3.3 (2.8, 3.9)                           |

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

<sup>a</sup>Model for number of conditions (variable) is adjusted for age, sex, and race/ethnicity

<sup>b</sup>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.

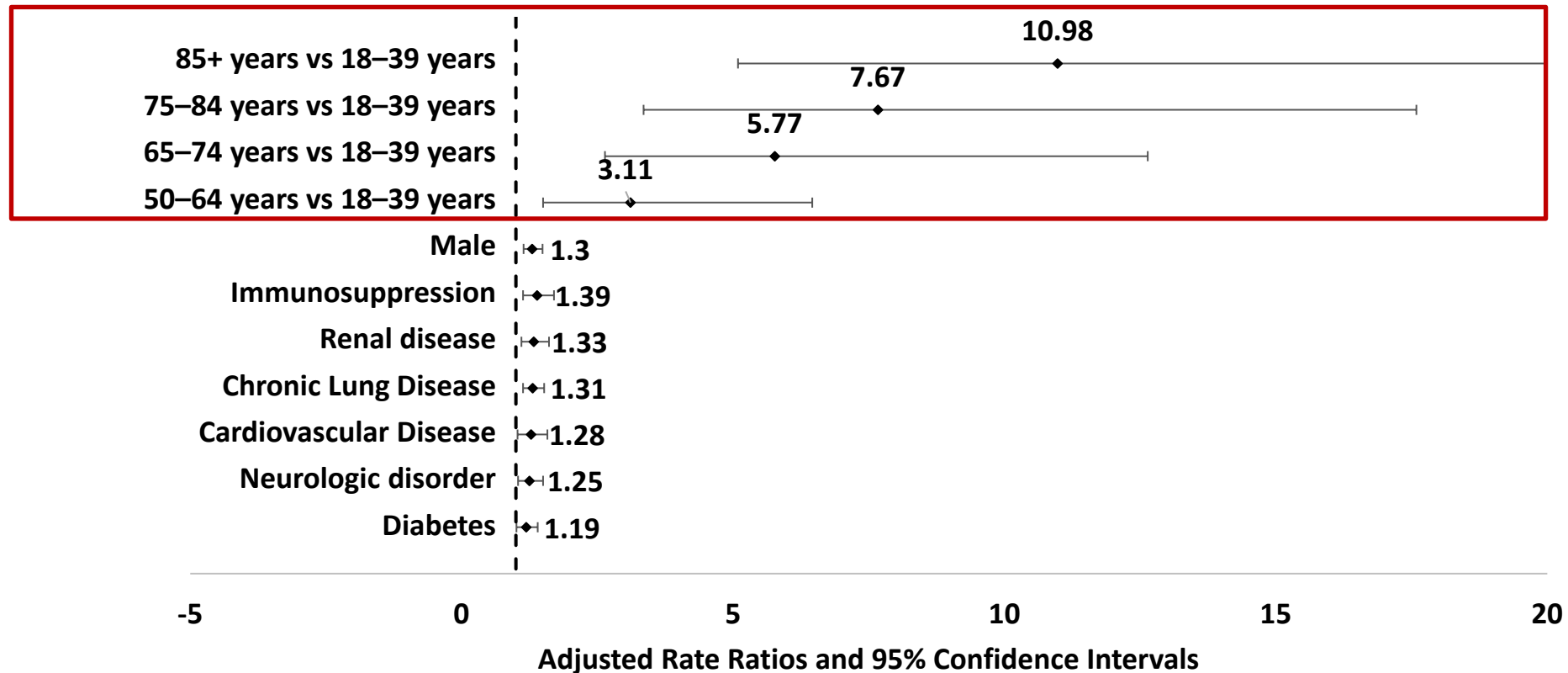
<sup>c</sup>Reference group is 18-44 years

<sup>d</sup>Reference group is female

<sup>e</sup>Reference group is non-Hispanic white

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

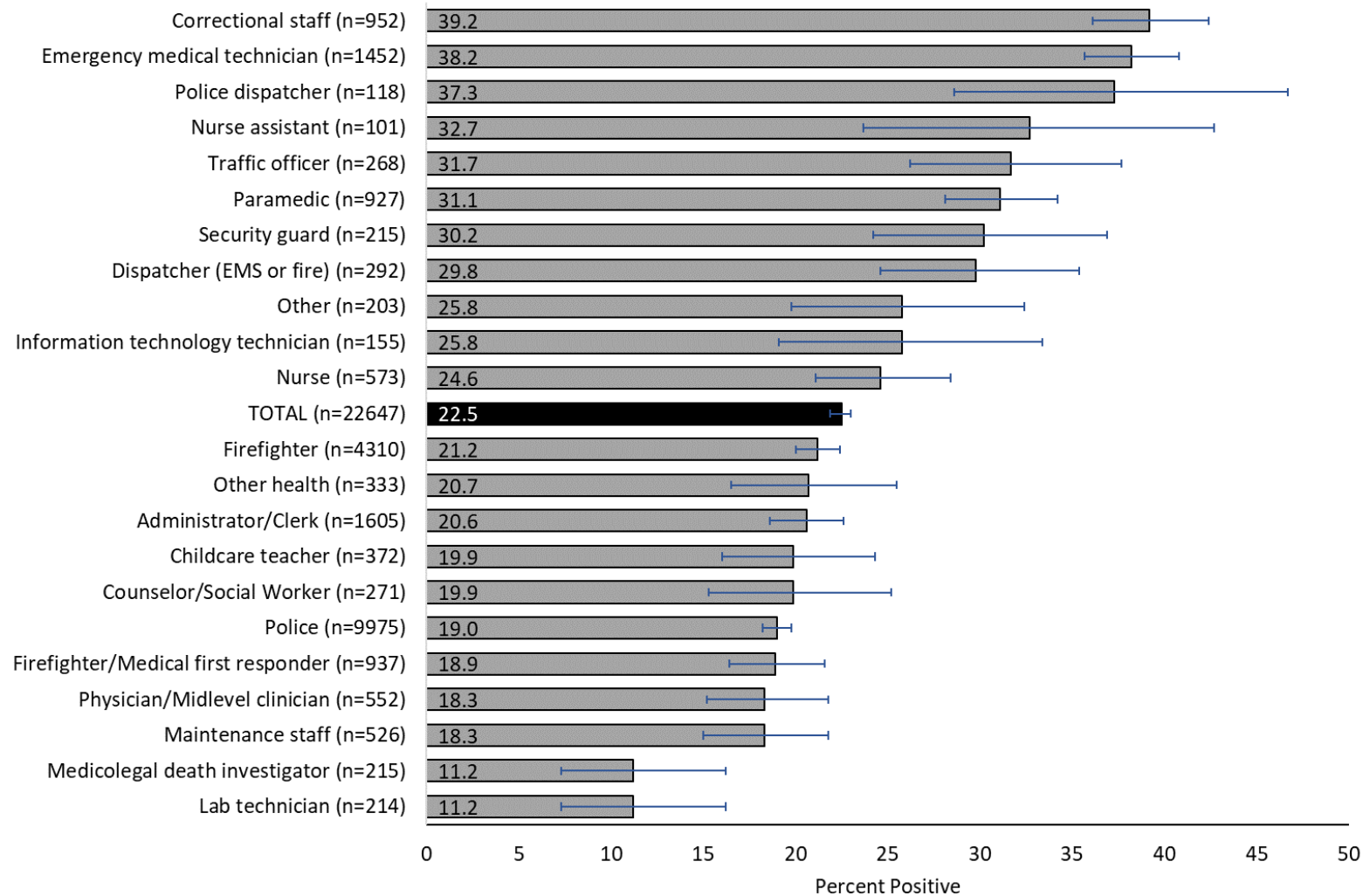
Risk of in-hospital death among patients with COVID-19 associated hospitalization, COVID-NET March 1 - May 2, 2020



\*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>



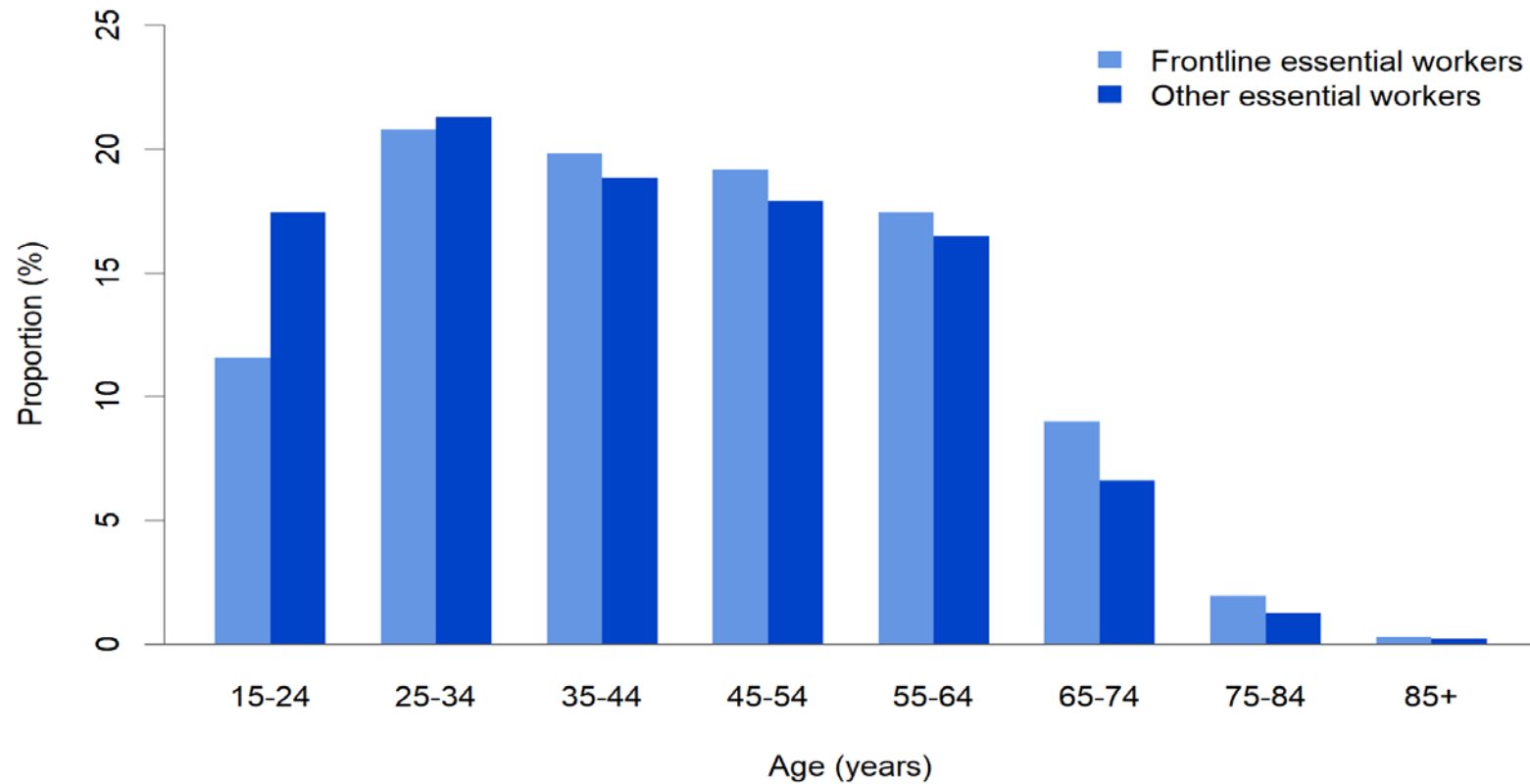
# Percent seropositive for SARS-CoV-2 IgG antibody, by occupation among workers in public service agencies — New York City, May–July 2020



**High seroprevalence among many frontline essential workers groups following first wave of pandemic in NYC**

Other includes Dietary Service Staff, Environmental Service Staff and participants who selected Other and were not reassigned to an existing category  
 Other Health includes Student/Trainee, Respiratory Therapist, Occupational/Speech/Physical Therapist, Therapy Aide/Assistant, Pharmacist, Diagnostic Imaging Technician, Phlebotomist, Medical Registrar, Orderly, Dietician, Dentist, Clinical Technician, Medical Assistant. Sami *et al.* Manuscript in preparation.

# Half of essential workers are older than 40 years



- 8-11% are  $\geq 65$  years old<sup>1</sup>
- >56% of adults 18-64 years have  $\geq 1$  high-risk medical condition<sup>2</sup>

# Summary of Work Group interpretation: Modeling

- In the scenarios considered, differences between strategies is minimal
  - Vaccinating older adults first averts slightly more deaths, vaccinating younger adults first (essential workers or younger adults with high-risk conditions) averts slightly more infections
  - Ethical principles and implementation considerations also contribute to selecting the optimal sequence in Phase 1b and 1c
- Largest driver of 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 to prevent cases so vaccine can have maximum impact)
- Vaccine's ability to prevent transmission will further inform future modeling analysis and interpretation

# Impacts of COVID-19 not represented in models: Late Sequelae of COVID-19

**Most commonly reported symptoms include:**

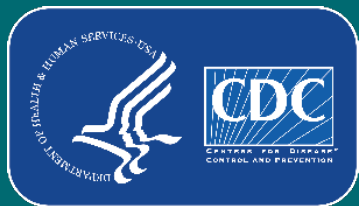
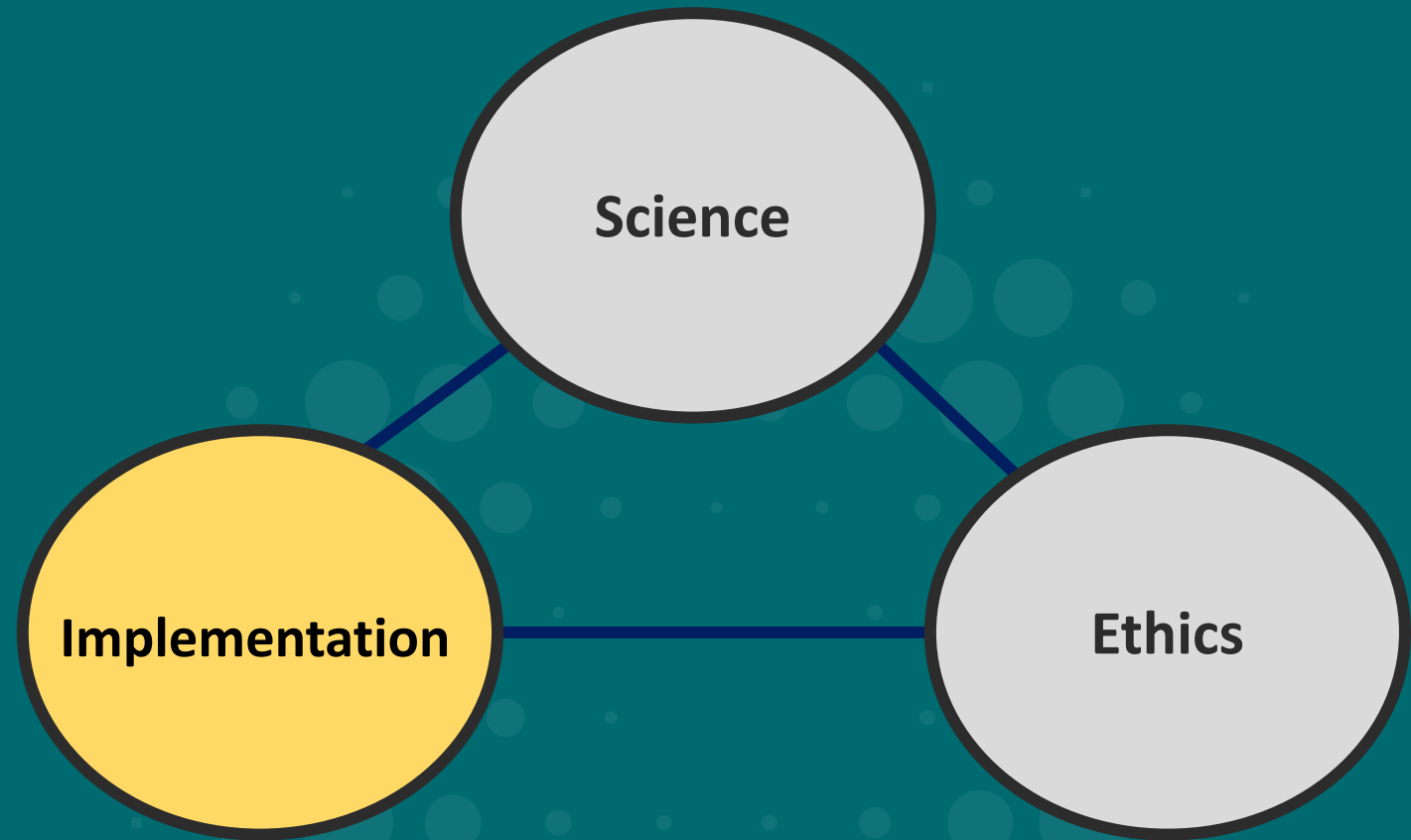
fatigue, dyspnea, cough, arthralgia, and chest pain

**More serious complications appear to be less common but have been reported:**

- Cardiovascular: myocardial inflammation, ventricular dysfunction
- Respiratory: pulmonary function abnormalities
- Renal: acute kidney injury
- Dermatologic: rash, alopecia
- Neurological: olfactory and gustatory dysfunction, sleep dysregulation, altered cognition, memory impairment
- Psychiatric: depression, anxiety, changes in mood

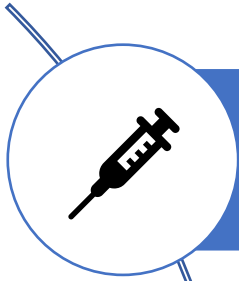


# Implementation



# ACIP COVID-19 Vaccine Work Group: Proposed Guiding Principles

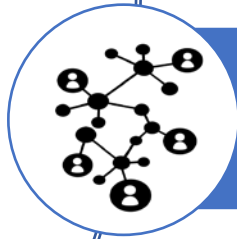
E  
Q  
U  
I  
T  
Y



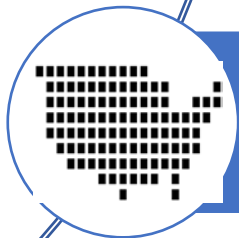
**Safety is paramount.** Vaccine safety standards will not be compromised in efforts to accelerate COVID-19 vaccine development or distribution



**Inclusive clinical trials.** Study participants should reflect groups at risk for COVID-19 to ensure safety and efficacy data are generalizable



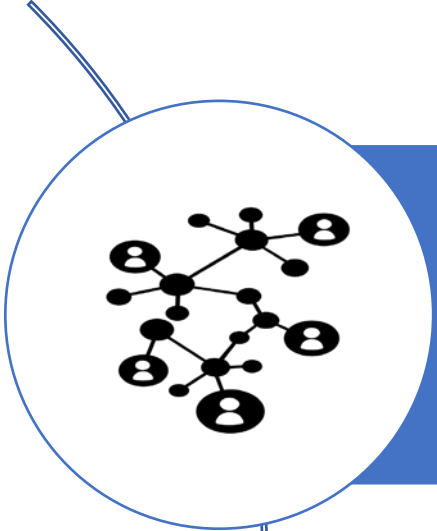
**Efficient Distribution.** During a pandemic, efficient, expeditious and equitable distribution and administration of approved vaccine is critical



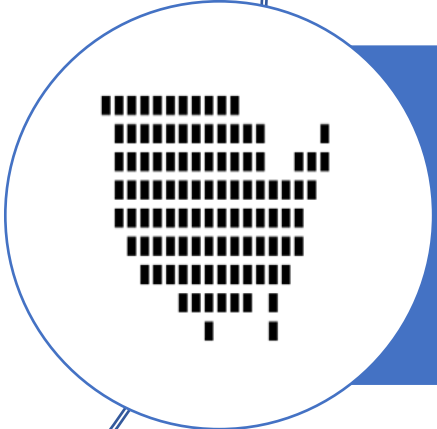
**Flexibility.** Within national guidelines, state and local jurisdictions should have flexibility to administer vaccine based on local epidemiology and demand

# ACIP COVID-19 Vaccine Work Group: Proposed Guiding Principles

E  
Q  
U  
I  
T  
Y



**Efficient Distribution.** During a pandemic, efficient, expeditious and equitable distribution and administration of authorized vaccine is critical



**Flexibility.** Within national guidelines, state and local jurisdictions should have flexibility to administer vaccine based on local epidemiology and demand

# Feasibility

## Adults $\geq 65$ years

- *Challenge*: long distances to central clinics and high throughput of clinics
- Older adults report high intent to receive COVID-19 vaccine
- Physician offices, pharmacies and public health clinics are established providers of adult vaccination
- Population surveys report 73% - 82% of respondents supported priority vaccination of persons aged  $\geq 65$  years/elderly in polls conducted in December 2020 <sup>2,3</sup>

# Feasibility

## Essential workers

- *Challenge:* reaching workers in rural locations, shift workers, those working multiple jobs or working in small cohorts
- Jurisdiction approaches include on site occupational clinics/pharmacies/Health Dept POD strike teams
- Population surveys report 68% - 87% of respondents supported prioritization of early allocation of COVID-19 vaccine supply to essential workers (eg. police/fire/rescue and teachers)<sup>1-3</sup>

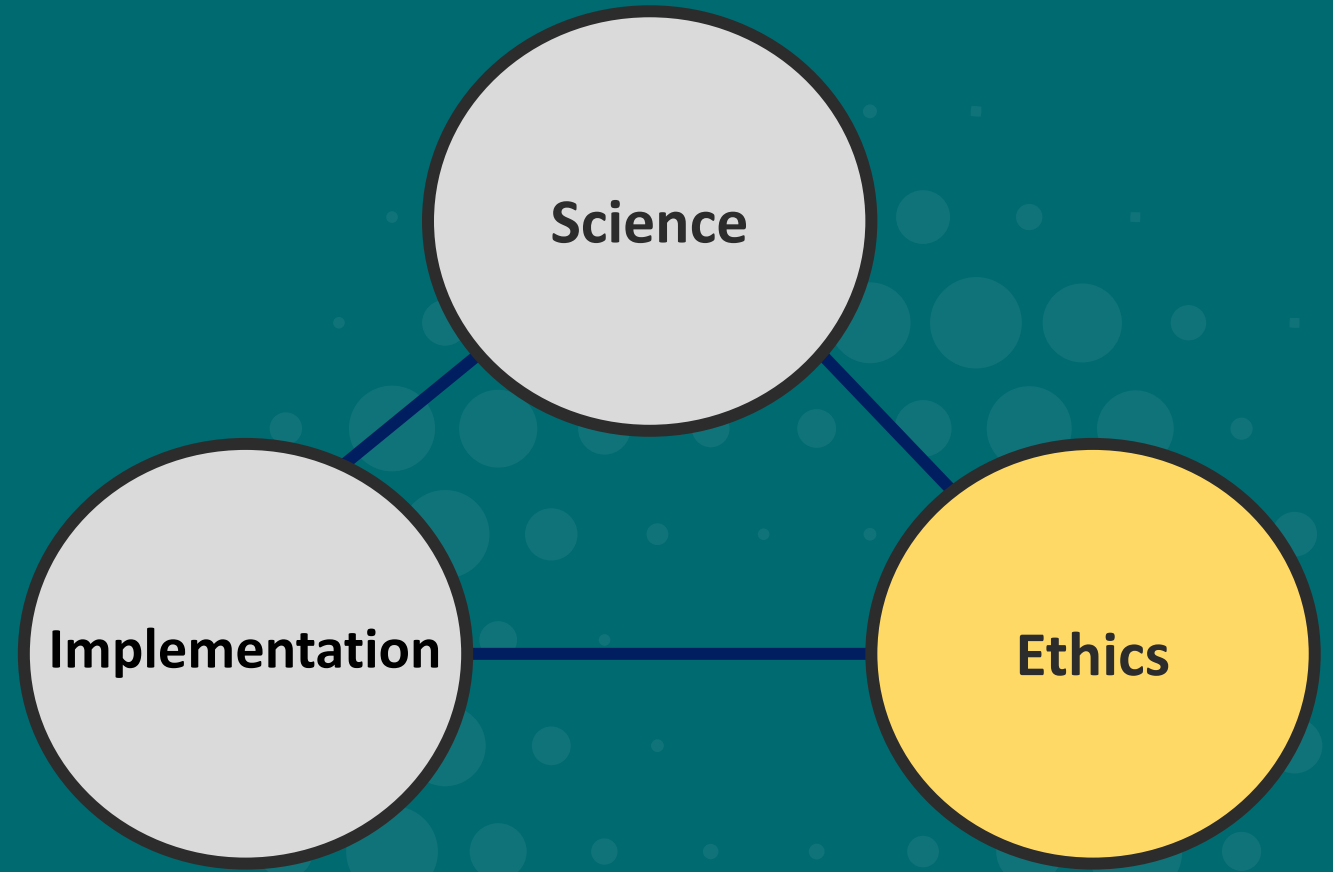
1. The Harris Poll <https://www.axios.com/who-gets-coronavirus-vaccine-first-4ff87ff8-39d7-49d6-8d25-fa2307119235.html>. 2. AP-NORC Center for Public Affairs Research. Many remain doubtful about getting COVID-19 vaccine. December 2020. <https://apnorc.org/projects/many-remain-doubtful-about-getting-covid-19-vaccine>. 3. ABC/IPSOS poll. December 14, 2020. <https://www.ipsos.com/en-us/news-polls/abc-news-coronavirus-poll>.

# Feasibility

## Adults with high-risk medical conditions

- *Challenges:* determining eligibility & very large group
- Healthcare homes, such as physician offices or pharmacies, could be better suited to verifying underlying medical conditions
- Population surveys report 68% - 84% of respondents supported prioritization of early allocation of COVID-19 vaccine supply to persons who are high risk because of medical problems<sup>1-3</sup>

# Ethics



## Older Adults

### Ethical Principle

Age 75+ years (21M)

Age 65-74 Years (32M)

### Maximize benefits and minimize harms

Reduces morbidity and mortality in persons with **highest** burden of COVID-19 hospitalization and death

Reduces morbidity and mortality in persons with **high** burden of COVID-19 hospitalization and death

### Promote justice

- Will require focused outreach to those who experience barriers to access healthcare
- Persons living in multi-generational households may have greater risk of exposure

### Mitigate Health inequities

- Racial and ethnic minority groups under-represented among adults  $\geq 65$
- Racial and ethnic minority persons  $\geq 65$  disproportionate COVID-19 related hospitalization and death rates



# Essential Workers

## Ethical Principle

Frontline essential workers (~30 M) / Other essential workers (~57M)

### Maximize benefits and minimize harms

- Essential Workers are at high risk of exposure. Prevention of disease will reduce transmission
- Preserves services essential to the COVID-19 response and overall functioning of society. “Multiplier effect”

### Promote justice

- Workers unable to work from home
- High level of interaction with public or others in the workplace
- May be unable to control social distancing
- Frequently interact with others in the workplace

### Mitigate Health inequities

- Racial and ethnic minority groups disproportionately represented in many essential industries
- ~1/4 of essential workers live in low-income families

**Persons 16-64 with high-risk  
medical conditions  
(>110 Million)**

**Ethical Principle**

**Maximize benefits and  
minimize harms**

Reduces morbidity and mortality in persons with **moderate to high** burden of COVID-19 associated hospitalization and death

**Promote justice**

Will require focused outreach to those with limited or no access to healthcare

**Mitigate Health  
inequities**

- Increased prevalence of some medical conditions in race/ethnic minority groups & persons in rural areas
- Diagnosis of medical conditions requires access to healthcare

# Summary of Work Group Considerations



# Summary: Work Group considerations

- Scientific, implementation and ethical considerations support inclusion of groups in Phase 1b and 1c as a balance of prevention of morbidity and mortality and preservation of societal functions
- 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, if supply exceeds demand
- 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, as soon as possible**

# Proposed Phase 1 & 2 allocation, December 2020

| Phase | Groups recommended for vaccination   | Number of persons in each group (millions) | Number of unique* persons in each group (millions) | Total* (millions) |
|-------|--|--|--|-------------------|
| 1a    | Health care personnel  | 21   | 21   | 24                |
|       | Long-term care facility residents  | 3  | 3  |                   |
| 1b    | Frontline essential workers  | 30   | 30   | 49                |
|       | Persons aged 75 years and older  | 21   | 19   |                   |
| 1c    | Persons aged 65-74 years   | 32   | 28   | 129               |
|       | Persons aged 16-64 years with high-risk conditions                                     | 110  | 81   |                   |
|       | Essential workers not recommended in Phase 1b  | 57   | 20   |                   |
| 2     | All people aged 16 years and older not in Phase 1, who are recommended for vaccination |  |  |                   |

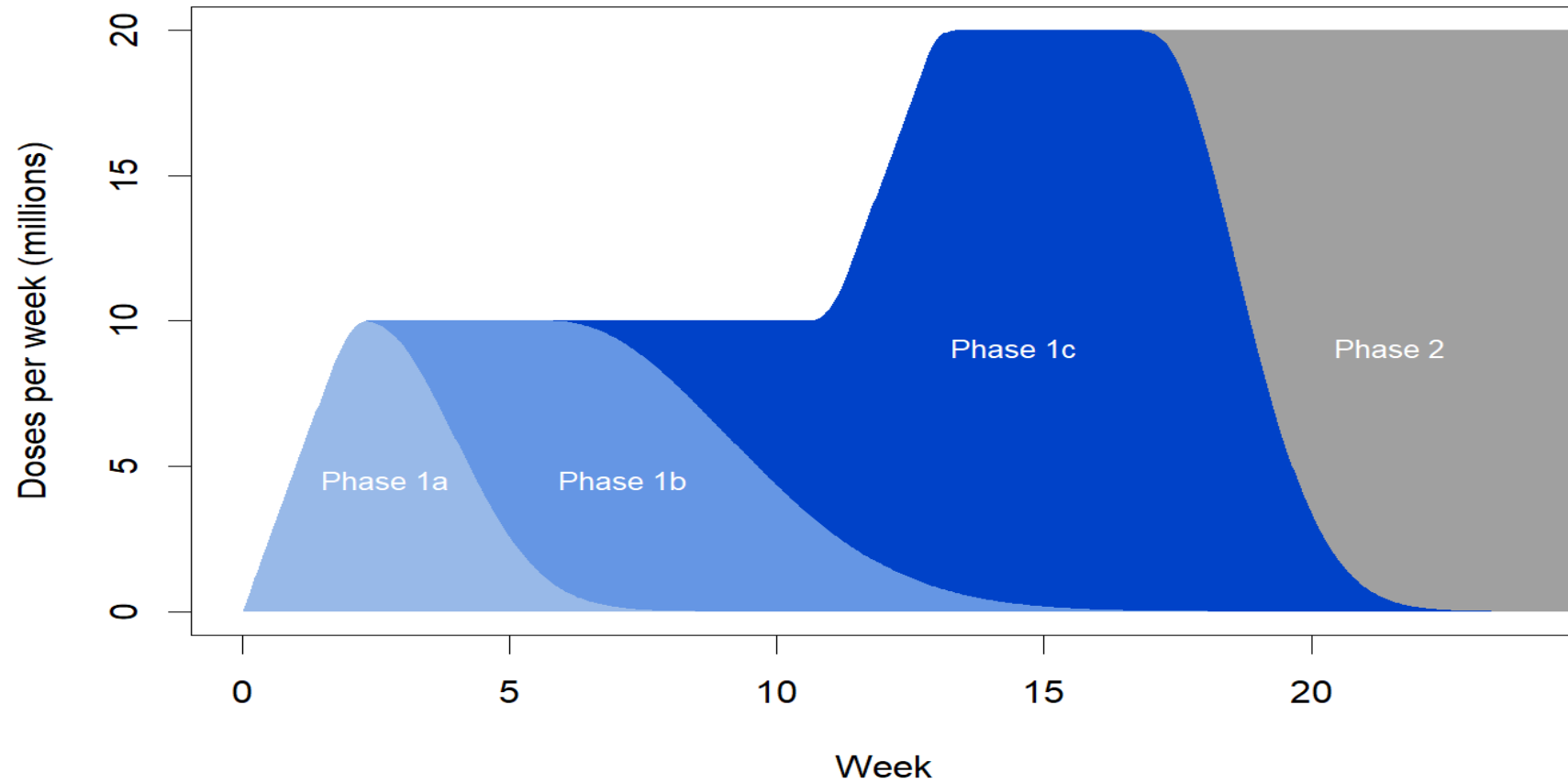
\*Accounts for persons recommended in prior phases or overlap within a phase

# Proposed Phase 1 & 2 allocation, December 2020

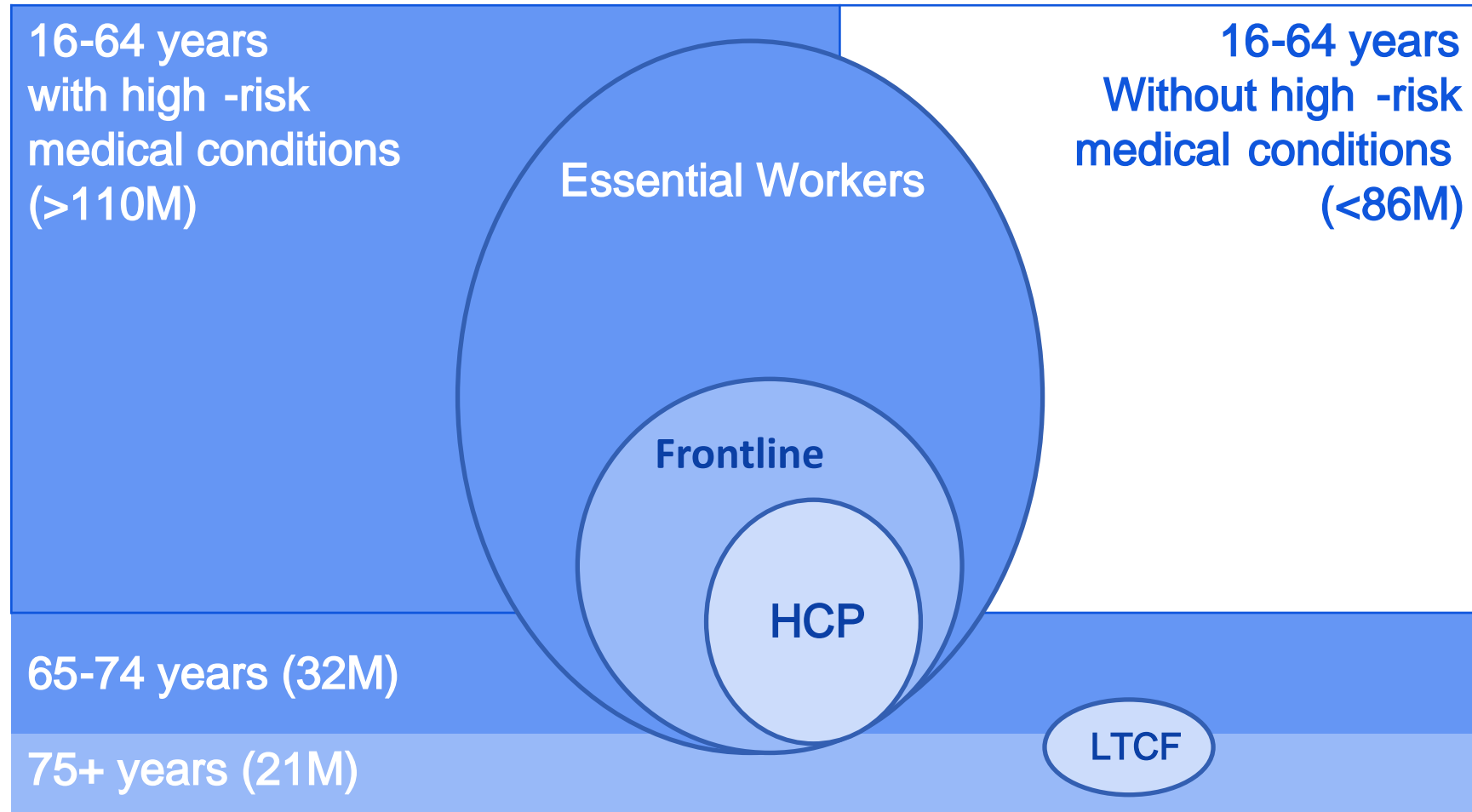
| Phase | Groups recommended for vaccination   | Number of persons in each group (millions) | Number of unique* persons in each group (millions) | Total* (millions) |
|-------|--|--|--|-------------------|
| 1a    | Health care personnel  | 21   | 21   | 24                |
|       | Long-term care facility residents  | 3  | 3  |                   |
| 1b    | Frontline essential workers  | 30   | 30   | 49                |
|       | Persons aged 75 years and older  | 21   | 19   |                   |
| 1c    | Persons aged 65-74 years   | 32   | 28   | 129               |
|       | Persons aged 16-64 years with high-risk conditions                                     | 110  | 81   |                   |
|       | Essential workers not recommended in Phase 1b  | 57   | 20   |                   |
| 2     | All people aged 16 years and older not in Phase 1, who are recommended for vaccination |  |  |                   |

\*Accounts for persons recommended in prior phases or overlap within a phase

# Example of Phase 1 & Phase 2 COVID-19 vaccination roll-out



# Proposed Phases of COVID-19 Vaccination



|  |          |  |          |  |          |  |         |
|--|----------|--|----------|--|----------|--|---------|
|  | Phase 1a |  | Phase 1b |  | Phase 1c |  | Phase 2 |
|--|----------|--|----------|--|----------|--|---------|

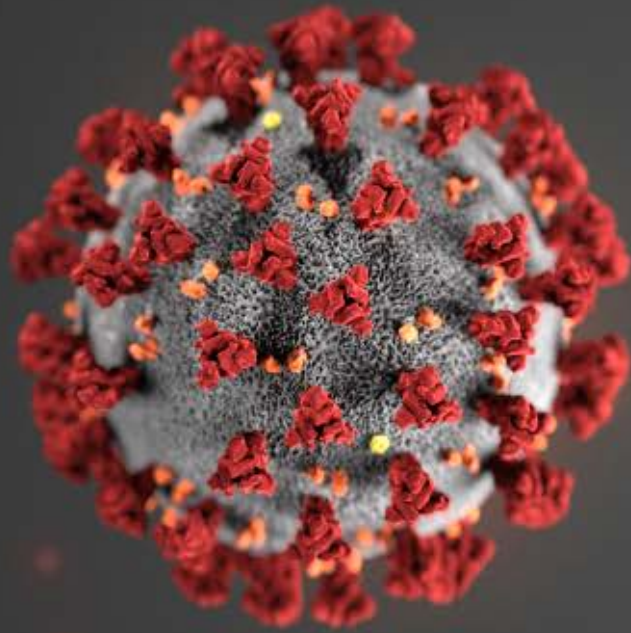


# ACIP Vote – Interim Recommendation

As an update to ACIP recommendations for vaccination in Phase 1a (health care personnel, and long-term care facility residents), if COVID-19 vaccine supply is limited, the following groups should be offered vaccination:

**Phase 1b:** persons aged  $\geq 75$  years and frontline essential workers

**Phase 1c:** persons aged 65–74 years, persons aged 16–64 years with high-risk medical conditions, and other essential workers



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

