EtR Framework:
Pfizer-BioNTech COVID-19 vaccine in adolescents aged 12-15 years

Sara Oliver, MD, MSPH
ACIP Meeting
May 12, 2021
Evidence to Recommendations Framework
Evidence to Recommendations (EtR) Framework

- Structure to describe information considered in moving from evidence to ACIP vaccine recommendations

- Provide transparency around the impact of additional factors on deliberations when considering a recommendation
Evidence to Recommendations (EtR) Framework

Policy Question

- Should vaccination with Pfizer-BioNTech COVID-19 vaccine (2-doses, IM) be recommended for persons 12-15 years of age under an Emergency Use Authorization?
## Evidence to Recommendations (EtR) Framework

### PICO Question

<table>
<thead>
<tr>
<th>Population</th>
<th>Persons aged 12-15 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intervention</td>
<td>Pfizer-BioNTech COVID-19 vaccine (BNT162b2)</td>
</tr>
<tr>
<td>Comparison</td>
<td>No Vaccine</td>
</tr>
<tr>
<td><strong>Outcomes</strong></td>
<td>Symptomatic laboratory-confirmed COVID-19 Hospitalization due to COVID-19 Multisystem inflammatory syndrome in children (MIS-C) SARS-CoV-2 seroconversion to a non-spike protein Asymptomatic SARS-CoV-2 infection Serious Adverse Events Reactogenicity grade ≥3</td>
</tr>
</tbody>
</table>
## Evidence to Recommendations (EtR) Framework

<table>
<thead>
<tr>
<th>EtR Domain</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Health Problem</td>
<td>• Is the problem of public health importance?</td>
</tr>
<tr>
<td>Benefits and Harms</td>
<td>• How substantial are the desirable anticipated effects? • How substantial are the undesirable anticipated effects? • Do the desirable effects outweigh the undesirable effects?</td>
</tr>
<tr>
<td>Values</td>
<td>• Does the target population feel the desirable effects are large relative to the undesirable effects? • Is there important variability in how patients value the outcome?</td>
</tr>
<tr>
<td>Acceptability</td>
<td>• Is the intervention acceptable to key stakeholders?</td>
</tr>
<tr>
<td>Feasibility</td>
<td>• Is the intervention feasible to implement?</td>
</tr>
<tr>
<td>Resource Use</td>
<td>• Is the intervention a reasonable and efficient allocation of resources?</td>
</tr>
<tr>
<td>Equity</td>
<td>• What would be the impact of the intervention on health equity?</td>
</tr>
</tbody>
</table>
## Evidence to Recommendations (EtR) Framework

<table>
<thead>
<tr>
<th>EtR Domain</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Health Problem</td>
<td>• Is the problem of public health importance?</td>
</tr>
<tr>
<td>Benefits and Harms</td>
<td>• How substantial are the desirable anticipated effects?</td>
</tr>
<tr>
<td></td>
<td>• How substantial are the undesirable anticipated effects?</td>
</tr>
<tr>
<td></td>
<td>• Do the desirable effects outweigh the undesirable effects?</td>
</tr>
<tr>
<td>Values</td>
<td>• Does the target population feel the desirable effects are large relative to the undesirable effects?</td>
</tr>
<tr>
<td></td>
<td>• Is there important variability in how patients value the outcome?</td>
</tr>
<tr>
<td>Acceptability</td>
<td>• Is the intervention acceptable to key stakeholders?</td>
</tr>
<tr>
<td>Feasibility</td>
<td>• Is the intervention feasible to implement?</td>
</tr>
<tr>
<td>Resource Use</td>
<td>• Is the intervention a reasonable and efficient allocation of resources?</td>
</tr>
<tr>
<td>Equity</td>
<td>• What would be the impact of the intervention on health equity?</td>
</tr>
</tbody>
</table>

"The intervention" = Pfizer-BioNTech COVID-19 vaccine, given to adolescents aged 12–15 years
"The problem" = COVID-19 among adolescents aged 12–15 years
EtR Domain: Public Health Problem
Public Health Problem

Is COVID-19 disease among adolescents aged 12–15 years of public health importance?

- Are the consequences of COVID-19 serious?
- Is COVID-19 urgent?
- Are a large number of adolescents affected by COVID-19?
- Are there populations disproportionally affected by COVID-19?

○ No  ○ Probably no  ○ Probably yes  ○ Yes  ○ Varies  ○ Don’t know
Public Health Problem:
Review of the available evidence

- COVID-19 incidence and burden estimates
- COVID-19 associated hospitalization rates
- COVID-19 associated mortality
- Multisystem Inflammatory Syndrome in Children (MIS-C)
- Transmission
Trends in Number of COVID-19 Cases in the US

January 22, 2020 – May 3, 2021

TOTAL CASES
32,267,958

+32,460 New Cases

https://covid.cdc.gov/covid-data-tracker/#trends_dailytrendscases
Trends in Number of COVID-19 Cases among Adolescents 12-17 Years of Age

March 1, 2020 – April 30, 2021

>1.5 million cases among adolescents 12-17 years of age

https://covid.cdc.gov/covid-data-tracker/#demographicsovertime
Proportion of Total COVID-19 Cases by Age Group — United States, March 1, 2020–April 30, 2021

As more adults vaccinated, adolescents aged 12-17 years of age make up a greater proportion of total cases: 9% of cases reported in April 2021.

https://covid.cdc.gov/covid-data-tracker/#demographicsovertime
Once adjusting for underreporting, 22.2 million SARS-CoV-2 infection in children and adolescents 5-17 years of age.


U.S. Census Bureau, Population Division, 2020 Demographic Analysis (December 2020 release)
Estimated Rates of COVID-19 Disease Outcomes per 100,000 population, by Age Group — United States, February 2020–March 2021

High rates of infections and symptomatic illness in children 5-17 years of age. Proportion of symptomatic patients hospitalized lower among children.
Cumulative Rates of COVID-19-Associated Hospitalizations by Select Age Groups — COVID-NET, Mar 1, 2020–Mar 27, 2021

Cumulative Rates of COVID-19-Associated Hospitalizations by Select Age Groups — COVID-NET, Mar 1, 2020–Mar 27, 2021

Three-week Moving Average Rate of Hospitalization by Select Age Groups —COVID-NET, Dec 27, 2020–April 17, 2021
Cumulative 2009 H1N1 Influenza- and COVID-19-Associated Hospitalization among Adolescents 12-17 years by MMWR week — FluSurv-NET and COVID-NET

*The 2009-2010 H1N1 pandemic season, includes data from MMWR week 15-39 of the 2008-2009 season*
Cumulative Influenza- and COVID-19-Associated Hospitalizations Rates among Adolescents 12-17 years by MMWR week —FluSurv-NET and COVID-NET

Note: Influenza season begins at MMWR week 40, cumulative rates over a shorter period of time

*The 2009-2010, H1N1 pandemic season, includes data from MMWR week 15-39 of the 2008-2009 season
Hospitalized Children 12–17 Years (n=772) —COVID-NET, Mar 2020–Jan 2021

<table>
<thead>
<tr>
<th>Category</th>
<th>N</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age (years) – median (IQR)</strong></td>
<td>15</td>
<td>(14-17)</td>
</tr>
<tr>
<td><strong>Sex – Male</strong></td>
<td>369</td>
<td>(48)</td>
</tr>
<tr>
<td><strong>Race/ethnicity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hispanic</td>
<td>249</td>
<td>(32)</td>
</tr>
<tr>
<td>non-Hispanic Black</td>
<td>238</td>
<td>(31)</td>
</tr>
<tr>
<td>non-Hispanic White</td>
<td>202</td>
<td>(26)</td>
</tr>
<tr>
<td>non-Hispanic Other</td>
<td>83</td>
<td>(11)</td>
</tr>
<tr>
<td><strong>Severe disease§</strong></td>
<td>239</td>
<td>(31)</td>
</tr>
<tr>
<td><strong>≥1 underlying condition</strong></td>
<td>471</td>
<td>(61)</td>
</tr>
</tbody>
</table>

§Requiring intensive care unit admission or mechanical ventilation
*BMI (kg/m²) ≥95th percentile for age and sex based on CDC growth charts, ICD-10 codes for obesity, or obesity selected on case report form
†Includes gastrointestinal or liver disease; renal disease; rheumatologic, autoimmune, inflammatory conditions; abnormality of the airway.

Hospitalized Children 12–17 Years (n=772) —COVID-NET, Mar 2020–Jan 2021

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years) – median (IQR)</td>
<td>15</td>
<td>(14-17)</td>
</tr>
<tr>
<td>Sex – Male</td>
<td>369</td>
<td>(48)</td>
</tr>
<tr>
<td>Race/ethnicity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hispanic</td>
<td>249</td>
<td>(32)</td>
</tr>
<tr>
<td>non-Hispanic Black</td>
<td>238</td>
<td>(31)</td>
</tr>
<tr>
<td>non-Hispanic White</td>
<td>202</td>
<td>(26)</td>
</tr>
<tr>
<td>non-Hispanic Other</td>
<td>83</td>
<td>(11)</td>
</tr>
<tr>
<td>Severe disease§</td>
<td>239</td>
<td>(31)</td>
</tr>
<tr>
<td>≥1 underlying condition</td>
<td>471</td>
<td>(61)</td>
</tr>
</tbody>
</table>

§Requiring intensive care unit admission or mechanical ventilation
*BMI (kg/m²) ≥95th percentile for age and sex based on CDC growth charts, ICD-10 codes for obesity, or obesity selected on case report form
†Includes gastrointestinal or liver disease; renal disease; rheumatologic, autoimmune, inflammatory conditions; abnormality of the airway.


61% of hospitalized adolescents with COVID-19 had an underlying medical condition.

Percentage of Hospitalized Persons Aged 12–17 Years

- Obesity*
- Asthma
- Developmental delay
- Diabetes mellitus (type 1 or 2)
- Immunosuppressed conditions
- Blood disorders
- Neurologic disorders
- Cardiovascular disease
- Chronic lung disease
- Feeding tube dependence
- Chronic metabolic disease
- Other condition†
Trends in Number of COVID-19 Deaths in the US

January 22, 2020 – May 3, 2021

TOTAL DEATHS
574,679

+404 New Deaths

https://covid.cdc.gov/covid-data-tracker/#trends_dailytrendscases
COVID-19 Deaths by Age Group, NCHS
—January 1, 2020–April 30, 2021

Adolescents 12–17 years:

127 COVID-19 deaths
1.3% of all deaths among adolescents

Multisystem Inflammatory Syndrome in Children (MIS-C)

- Severe hyperinflammatory syndrome occurring 2-6 weeks after acute SARS-CoV-2 infection, resulting in a wide range of manifestations and complications
  - 60-70% of patients are admitted to intensive care, 1-2% die\(^1,2\)

- \textbf{3,742 MIS-C cases} have been reported to national surveillance as of May 3, 2021\(^3\)
  - Median age of 9, with 21% (804) of cases occurred in adolescents 12-17 years
  - 63% of reported cases have occurred in children who are Hispanic/Latino or Black, Non-Hispanic
  - Estimated incidence of 1 to 8.5 MIS-C cases per million person-months

Severity of Multisystem Inflammatory Syndrome in Children (MIS-C) by Age


Reference: MIS-C patients aged 0–5 years of age
Adolescents and Transmission of SARS-CoV-2

- Some studies observed similar infection rates between children and adults, while others found lower infection rates among children compared with adults\textsuperscript{1,2}

- Adolescents may be more likely to be infected than younger children (<10 years)
  - Supported by contact tracing, test positivity, and population-based seroprevalence data\textsuperscript{2}

- Secondary transmission from adolescents can and does occur
  - While SARS-CoV-2 transmission among students relatively rare, several studies suggest transmission more likely within high school than elementary school settings\textsuperscript{3,4}

Adolescents and Transmission of SARS-CoV-2

- Outbreak investigations have demonstrated efficient transmission among children, adolescents, and young adults, including transmission to older household members.
Adolescents and Transmission of SARS-CoV-2

Adults living in a household with a child engaged in full-time in-person school had an increase in odds of reporting COVID-19 like illness, loss of taste/smell, or positive SARS-CoV-2 test within previous 14 days.

COVID-19-related outcomes compared to households with children not attending in-person school (reference), prior to adjustment for mitigation efforts.
Public Health Problem:
Summary of the available evidence

Adolescents 12–17 years of age are at risk of severe illness from COVID-19

- Over 1.5 million reported cases and >13,000 hospitalizations to date
  - Hospitalization rate higher than 2009-10 H1N1 pandemic
- Clinical presentation of MIS-C more severe in adolescents than in younger children

COVID-19 in adolescents may also indirectly impact others' health

- Adolescents contribute to transmission in households and communities
  - Including older vulnerable populations
- Adolescents represent an increasing proportion of recent COVID-19 cases
Is COVID-19 disease among adolescents aged 12–15 years of public health importance?

- No
- Probably no
- Probably yes
- Yes
- Varies
- Don’t know
EtR Domain: Benefits and Harms
Benefits and Harms

How substantial are the desirable anticipated effects?

• How substantial are the anticipated effect for each main outcome for which there is a desirable effect?

○ Minimal
○ Small
○ Moderate
○ Large
○ Varies
○ Don’t know
Benefits and Harms

How substantial are the undesirable anticipated effects?

• How substantial are the anticipated effect for each main outcome for which there is a undesirable effect?

○ Minimal
○ Small
○ Moderate
○ Large
○ Varies
○ Don’t know
Benefits and Harms

Do the desirable effects outweigh the undesirable effects?

• What is the balance between the desirable effects relative to the undesirable effects?

- Favors intervention (Pfizer-BioNTech COVID-19 vaccine)
- Favors comparison (no vaccine)
- Favors both
- Favors neither
- Unclear
Benefits and Harms:  
Summary of the Available Evidence: Benefits

- The clinical trial for the Pfizer-BioNTech COVID-19 vaccine demonstrated efficacy against symptomatic, laboratory-confirmed COVID-19. The efficacy was **100%**

*High certainty of evidence*
Benefits and Harms:
Summary of the Available Evidence: Benefits

- The geometric mean ratio (GMR) for antibodies in 12–15-year-olds compared with 16–25-year-olds was 1.76 (95% CI: 1.47, 2.10), and **met the noninferiority criteria**

- No hospitalizations due to COVID-19 or cases of MIC-C were reported by any trial participants
Benefits and Harms:
Summary of the Available Evidence: Harms

- Serious adverse events (SAE) were reported in a higher proportion of recipients of vaccine versus placebo (0.4% vs 0.2%) based on 5 SAEs in the vaccine group and 2 in the placebo group

  *Very low certainty of evidence*

- Severe reactions were more common in vaccine recipients; a grade ≥3 reaction was reported by 10.7% of vaccinated versus 1.9% of placebo group

  *High certainty of evidence*
Benefits and Harms:
Summary of the Available Evidence: Harms

- **No deaths** were reported among any trial participants

- Local reactions within 7 days occurred in **91%** vaccine recipients
  - Pain at the injection site most common

- Systemic reactions within 7 days occurred in **91%** vaccine recipients
  - Fatigue and headache most common

- Most symptoms resolved in 1-2 days
Benefits and Harms:
Summary of the Available Evidence: Harms

- No cases of anaphylaxis reported in the adolescent (12-15 years of age) study participants

- No cases of Bell’s Palsy or facial paralysis reported in adolescents

- Among adolescents 12-15 years of age, 7 (0.6%) in the vaccine group had lymphadenopathy, compared to 1 (0.1%) participant in the placebo group
  - Most lymphadenopathy was local (arm or neck region), occurred on the same side as vaccination, and was reported within 2-10 days
<table>
<thead>
<tr>
<th>Outcome</th>
<th>Importance</th>
<th>Design (# of studies)</th>
<th>Findings</th>
<th>Evidence type</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Benefits</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Symptomatic lab-confirmed COVID-19</td>
<td>Critical</td>
<td>RCT (1)</td>
<td>Pfizer-BioNTech COVID-19 vaccine is effective in preventing symptomatic COVID-19</td>
<td>1</td>
</tr>
<tr>
<td>Hospitalization due to COVID-19</td>
<td>Important</td>
<td>No studies</td>
<td>Data not available from any studies</td>
<td>ND</td>
</tr>
<tr>
<td>Multisystem inflammatory syndrome in children (MIS-C)</td>
<td>Important</td>
<td>No studies</td>
<td>Data not available from any studies</td>
<td>ND</td>
</tr>
<tr>
<td>SARS-CoV-2 seroconversion</td>
<td>Important</td>
<td>No studies</td>
<td>Data not available from any studies</td>
<td>ND</td>
</tr>
<tr>
<td>Asymptomatic SARS-CoV-2 infection</td>
<td>Important</td>
<td>No studies</td>
<td>Data not available from any studies</td>
<td>ND</td>
</tr>
<tr>
<td><strong>Harms</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Serious adverse events</td>
<td>Critical</td>
<td>RCT (1)</td>
<td>5 SAEs among vaccinated and 2 among unvaccinated; certainty in the estimate was very low. No SAEs were judged to be related to vaccination.</td>
<td>4</td>
</tr>
<tr>
<td>Reactogenicity</td>
<td>Important</td>
<td>RCT (1)</td>
<td>Severe reactions were more common in vaccinated; any grade ≥3 reaction was reported by 10.7% of vaccinated vs. 1.9% of placebo group</td>
<td>1</td>
</tr>
</tbody>
</table>

Evidence type: 1=high; 2=moderate; 3=low; 4=very low; ND, no data.
Benefits and Harms

How substantial are the desirable anticipated effects?

- How substantial are the anticipated effect for each main outcome for which there is a desirable effect?

○ Minimal  ○ Small  ○ Moderate  ○ Large  ○ Varies  ○ Don’t know
Benefits and Harms

How substantial are the undesirable anticipated effects?

- How substantial are the anticipated effect for each main outcome for which there is an undesirable effect?

○ Minimal
○ Small
○ Moderate
○ Large
○ Varies
○ Don’t know
Benefits and Harms

Do the desirable effects outweigh the undesirable effects?

- What is the balance between the desirable effects relative to the undesirable effects?

<table>
<thead>
<tr>
<th>Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>Favors intervention (Pfizer-BioNTech COVID-19 vaccine)</td>
</tr>
<tr>
<td>Favors comparison (no vaccine)</td>
</tr>
<tr>
<td>Favors both</td>
</tr>
<tr>
<td>Favors neither</td>
</tr>
<tr>
<td>Unclear</td>
</tr>
</tbody>
</table>
EtR Domain: Values
Values

Criteria 1: Does the target population feel that the desirable effects are large relative to undesirable effects?

• How does the target population view the balance of desirable versus undesirable effects?
• Would patients/caregivers feel that the benefits outweigh the harms and burden?
• Does the population appreciate and value the Pfizer-BioNTech COVID-19 vaccine?

○ Minimal  ○ Small  ○ Moderate  ○ Large  ○ Varies  ○ Don’t know
Values

Criteria 2: Is there important uncertainty about, or variability in, how much people value the main outcomes?

• How much do individuals value each outcome in relation to the other outcomes?
• Is there evidence to support those value judgements?
• Is there evidence that the variability is large enough to lead to different decisions?

- Important uncertainty or variability
- Probably important uncertainty or variability
- Probably not important uncertainty or variability
- No important uncertainty or variability
- No known undesirable outcomes
Values:
Review of the Available Evidence

- Review of scientific literature, news media, and reports
  - Pubmed: (COVID-19 OR coronavirus OR SARS-CoV-2) AND (vaccin* OR immunization) AND (survey OR questionnaire OR poll) AND (adolescent OR child* OR parent*)
  - Societal Experts Action Network COVID-19 Survey Archive

- Limited to surveys conducted since authorization of COVID-19 vaccines (December 2020)
Positive COVID-19 Vaccination Intention among Adults†

*Surveys with multiple time points are shown with the same color bubble for each time point. Surveys with only one time point are shown in gray.

*Positive vaccine intentions includes persons reporting definitely, probably, or somewhat likely to get vaccinated themselves. Some surveys also included persons who already received vaccine.
Values:
Surveys of Parents (intent to have children vaccinated)

- Among parents surveyed, **46-60%** plan to get their children vaccinated\(^1\)\(^-\)\(^4\)

- Reasons for not vaccinating\(^2\):
  - not sure it will be safe (59%)
  - Vaccine developed too quickly (59%)
  - don’t trust info being published about the vaccine (48%)
  - won’t trust right away (44%)
  - don’t have enough info (43%)

- Parents reported similar or slightly lower intent to vaccinate their children compared to intent to vaccinate themselves\(^3\)\(^,\)\(^4\)

---

1. Axios/Ipsos April 2-5; Axios/Ipsos April 16-19; Calarco and Anderson preprint; WebMD March 2021.
2. National Parents Union Survey January 2021
4. Parents Together March 2021 Survey
Values:
Surveys of Parents (intent to have children vaccinated)

- Intent to vaccinate children differed by parent's gender, age & income status
- Fathers were more willing to vaccinate their children than mothers
- Older mothers were more willing to vaccinate their children than younger mothers
- Higher income households were more likely to report intent to vaccinate
- Lower income households twice as likely to say “not sure” about vaccinating their children compared to higher income households

Simonson preprint; Calarco and Anderson preprint; National Parents Union Survey January 2021; Parents Together March 2021 Survey
Values: Parents' Intent for Children to Receive COVID-19 Vaccine Varies by Race/Ethnicity

**National Parents Union, Jan 2021 (n=1001)**
- Black: 55%
- Hispanic: 64%
- White: 58%
- Asian: 70%

**Parents Together, Mar 2021 (n=971)**
- Black: 39%
- Hispanic: 53%
- White: 65%
- Asian: 75%

*Positive vaccine intentions includes persons reporting definitely or probably likely to get their child vaccinated.*
Values: Surveys of Adolescents and Parents Intent to get vaccine/have children vaccinated

Adolescents 13-17 years
(n=839)

51% definitely/probably will get vaccinated

Parents of Adolescents 12-17 years
(n=766)

55% definitely/probably will get adolescent vaccinated

- Definitely will
- Probably will
- Not sure
- Probably not
- Definitely not

CDC/U Iowa Survey of Parents and Adolescents, April 2021
Intent to vaccinate adolescents among the combined sample varied:

- Higher for male than female adolescents (57% vs. 50%)
- Higher for adolescents whose parents had at least a four-year degree (66%) vs. parents with less education (48%-50%)
- Higher in Northeast (64%) and West (60%) vs. Midwest (47%) and South (49%)

No differences in intent for adolescent COVID-19 vaccination by respondent race/ethnicity
Values: Surveys of Adolescents and Parents Concern for COVID-19 or vaccines

Level: 1 = not concerned; 2 = slightly concerned; 3 = somewhat concerned; 4 = very concerned

CDC/U Iowa Survey of Parents and Adolescents, April 2021
Values:
Summary of the Available Evidence

- About **half** of parents say they are likely to get their adolescent vaccinated
- Intent to vaccinate adolescents differed by parents' gender, race, and income
- Intent to vaccinate adolescents similar or slightly lower than parental intent to get vaccinated
- Limited information available on adolescent intent to be vaccinated
Values

Criteria 1:
Does the target population feel that the desirable effects are large relative to undesirable effects?
• How does the target population view the balance of desirable versus undesirable effects?
• Would patients/caregivers feel that the benefits outweigh the harms and burden?
• Does the population appreciate and value the Pfizer-BioNTech COVID-19 vaccine?

○ Minimal  ○ Small  ○ Moderate  ○ Large  ○ Varies  ○ Don’t know
Values

Criteria 2:
Is there important uncertainty about, or variability in, how much people value the main outcomes?

• How much do individuals value each outcome in relation to the other outcomes?
• Is there evidence to support those value judgements?
• Is there evidence that the variability is large enough to lead to different decisions?

- Important uncertainty or variability
- Probably important uncertainty or variability
- Probably not important uncertainty or variability
- No important uncertainty or variability
- No known undesirable outcomes
EtR Domain: Acceptability
Acceptability

Is the Pfizer/BioNTech COVID-19 vaccine acceptable to key stakeholders?

- Are there key stakeholders that would not accept the distribution of benefits and harms?
- Are there key stakeholders that would not accept the undesirable effects in the short term for the desirable effects (benefits) in the future?

○ No    ○ Probably no    ○ Probably yes    ○ Yes    ○ Varies    ○ Don’t know
### Acceptability: Jurisdictional approach to administer COVID-19 vaccine

- **April 10th pulse of jurisdictional immunization programs on implementation planning for adolescents**

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Description</th>
<th>Example</th>
<th>%Share of jurisdictions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Multi-pronged approach</strong></td>
<td>• Using a combination of the three below approaches, often staged over time.</td>
<td><strong>Region 8 jurisdiction:</strong> &quot;Believe a hybrid model will be needed by utilizing enrolled providers and other pending outreach activities.&quot;</td>
<td>46%</td>
</tr>
<tr>
<td><strong>Existing provider network</strong></td>
<td>• Reaching adolescents through existing enrolled provider network, including mass vax and public health sites.</td>
<td><strong>Region 1 jurisdiction:</strong> &quot;Plan to encourage in all existing channels including mass vaccination clinics, retail pharmacy partners, and some local health dept clinics.&quot;</td>
<td>28%</td>
</tr>
<tr>
<td><strong>Pediatric providers and PCPs</strong></td>
<td>• Emphasis on reaching population through activation of new pediatric providers and family doctors.</td>
<td><strong>Region 4 jurisdiction:</strong> &quot;Actively recruiting for additional pediatricians to join the COVID enrollment. Sent out notification to bring on additional providers.&quot;</td>
<td>15%</td>
</tr>
<tr>
<td><strong>School-based clinics</strong></td>
<td>• Preparing school-based clinics and events to reach population through temporary PODs.</td>
<td><strong>Region 4 jurisdiction:</strong> &quot;Received interest from schools with successful teacher vaccination clinics …will use grant funds to support these.&quot;</td>
<td>11%</td>
</tr>
</tbody>
</table>

Source: Jurisdiction data call survey – 05/03/21-05/06/21, n=46.
Acceptability: Provider willingness to administer COVID-19 vaccine

- October-December 2020 Survey: family physicians, pediatricians, and internal medicine physicians very willing to administer COVID-19 vaccine in their practices
  - 97% of providers were willing to administer COVID-19 vaccine
  - Largest perceived barrier to vaccination was parent/patient concern about safety of COVID-19 vaccine

Acceptability: Comfort with adolescent receiving COVID-19 vaccine at each site
CDC/U Iowa Survey of Parents and Adolescents, April 2021
Acceptability: Summary of the available evidence

- Most jurisdictions utilizing a variety of implementation strategies to vaccinate adolescents
- Nearly all primary care providers surveyed are willing to provide COVID-19 vaccines to their patients
- Adolescents and their parents report greatest comfort with receiving COVID-19 vaccine at their primary care providers' offices
Is Pfizer/BioNTech COVID-19 vaccine acceptable to key stakeholders?

- Are there key stakeholders that would not accept the distribution of benefits and harms?
- Are there key stakeholders that would not accept the undesirable effects in the short term for the desirable effects (benefits) in the future?

- No
- Probably no
- Probably yes
- Yes
- Varies
- Don’t know
EtR Domain: Feasibility
Feasibility

Is the Pfizer/BioNTech COVID-19 vaccine feasible to implement among adolescents aged 12–15 years?

• Is the Pfizer-BioNTech COVID-19 vaccine program sustainable?
• Are there barriers that are likely to limit the feasibility of implementing the Pfizer-BioNTech COVID-19 vaccine or require considerations when implementing it?
• Is access to Pfizer-BioNTech COVID-19 vaccine an important concern?

○ No  ○ Probably no  ○ Probably yes  ○ Yes  ○ Varies  ○ Don’t know
Implementation objectives

- Promote adolescent vaccination as quickly and equitably as possible through a multi-pronged approach

- Jurisdictions and providers currently vaccinating adolescents 16-17 years

- Leverage current COVID-19 vaccination infrastructure to adapt over time:
  - Early summer sprint (May-June)
  - Increase access (June-July)
  - Back-to-school campaign (July-September)
Stepwise approach to increasing vaccine access for adolescents

1. Augment existing infrastructure for vaccination
2. Strategically add providers that can reach adolescents
3. Apply school-focused strategies to ensure vaccination opportunities

May | June | July | August | September
Augment existing public health infrastructure and add new channels to vaccinate adolescents

<table>
<thead>
<tr>
<th>Category</th>
<th>Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary care providers serving adolescents</td>
<td>Utilize primary care as trusted providers to notify, schedule, and vaccinate their patients, including managing routine immunizations, particularly as students return to school</td>
</tr>
<tr>
<td>Pharmacies and HRSA sites¹</td>
<td>Leverage broad pharmacy footprint and HRSA sites to administer COVID-19 vaccine to adolescents rapidly, as with adults</td>
</tr>
<tr>
<td>School-based vaccination</td>
<td>Partner with Federally Qualified Health Centers, pharmacies, public health, and adolescent provider networks to hold targeted programs at schools to ensure equity and coverage, particularly as students return</td>
</tr>
</tbody>
</table>

¹. Health Resources and Services Administration (HRSA) sites including: Federally Qualified Health Centers (FQHCs), Rural Health Clinics, Community Health Centers
Feasibility: Additional considerations

- Current cold-chain storage requirements and package sizes could limit the availability of the Pfizer-BioNTech COVID-19 vaccine.

- Allocation/prioritization of Pfizer-BioNTech for adolescents 12-17 years

- Consent/assent
  - No federal, legal requirement for caregiver consent for COVID-19 vaccination or any other vaccination. However, COVID-19 vaccine must be administered according to applicable state and territorial vaccination laws, including those related to consent.
Feasibility

Is the Pfizer/BioNTech COVID-19 vaccine feasible to implement among adolescents aged 12–15 years?

• Is the Pfizer-BioNTech COVID-19 vaccine program sustainable?
• Are there barriers that are likely to limit the feasibility of implementing the Pfizer-BioNTech COVID-19 vaccine or require considerations when implementing it?
• Is access to Pfizer-BioNTech COVID-19 vaccine an important concern?

○ No  ○ Probably no  ○ Probably yes  ○ Yes  ○ Varies  ○ Don’t know
EtR Domain: Resource Use
Resource Use

Is the Pfizer/BioNTech COVID-19 vaccine, given to adolescents aged 12–15 years, a reasonable and efficient allocation of resources?

- What is the cost-effectiveness of the Pfizer-BioNTech COVID-19 vaccine?
- How does the cost-effectiveness of the Pfizer-BioNTech COVID-19 vaccine change in response to changes in context, assumptions, etc?

○ No  ○ Probably no  ○ Probably yes  ○ Yes  ○ Varies  ○ Don’t know
Resource Use: Review of the available evidence

- U.S. Government has purchased 600 million doses of mRNA vaccines\(^1\)
  - 300 million doses of Pfizer COVID-19 vaccine, delivered in regular increments through the end of July 2021
- Vaccine will be available at no cost
- No studies evaluated cost-effectiveness around the use of COVID-19 vaccines among adolescents
- Vaccinating adolescents may allow greater confidence in safe return to school
  - Reduced work/school absenteeism related to COVID-19 quarantine and isolation
  - Estimated that over time, school closures could have total economic loss as high as $15 trillion in the US\(^2\)


Resource Use: Work Group Interpretation

- Work Group concluded that cost-effectiveness may not be a primary driver for decision-making during a pandemic and for vaccine used under EUA
  - Will need to be reassessed for future recommendations

- Use of COVID-19 vaccines in as many populations as possible will be important to returning to pre-pandemic activities
  - Return to pre-pandemic activities likely have positive economic impact
Resource Use

Is the Pfizer/BioNTech COVID-19 vaccine among adolescents aged 12–15 years a reasonable and efficient allocation of resources?

• What is the cost-effectiveness of the Pfizer-BioNTech COVID-19 vaccine?
• How does the cost-effectiveness of the Pfizer-BioNTech COVID-19 vaccine change in response to changes in context, assumptions, etc?

Options:
- No
- Probably no
- Probably yes
- Yes
- Varies
- Don’t know
EtR Domain: Equity
Equity

What would be the impact of the Pfizer-BioNTech COVID-19 vaccine, given to adolescents aged 12–15 years, on health equity?

• Are there groups or settings that might be disadvantaged in relation to COVID-19 disease burden or receipt of the Pfizer-BioNTech COVID-19 vaccine?

• Are there considerations that should be made when implementing the Pfizer-BioNTech COVID-19 vaccine program to ensure that inequities are reduced whenever possible, and that they are not increased?

- Reduced
- Probably reduced
- Probably no impact
- Probably increased
- Increased
- Varies
- Don’t know
Equity: Review of the available evidence

- Identification of groups that might be disadvantaged in relation to COVID-19 disease burden or receipt of the Pfizer-BioNTech COVID-19 vaccine
  - PROGRESS-Plus Framework: Place of residence, race or ethnicity, gender or sex, socioeconomic status, disability, other

- Review of the scientific and gray literature

- Review of CDC COVID-19 response data and resources
  - CDC COVID Data Tracker & COVID-19-Associated Hospitalization Surveillance Network (COVID-NET)
  - National Center for Health Statistics
  - CDC Science Brief: Evidence used to update the list of underlying medical conditions that increase a person’s risk of severe illness from COVID-19

---

COVID-19: Which Adolescent Groups Could Be Disadvantaged?

- **Place of residence**
  - Living in rural/frontier areas
  - Justice-involved (incarcerated persons)
  - Living in congregate settings (long-term care facilities)
  - Experiencing homelessness

- **Racial and ethnic minority populations**
  - Black, Hispanic or Latino, and Alaskan Native/American Indian
  - Immigration status

- **Occupation**
  - Frontline workers or children of frontline workers

- **Gender/sex**
  - LGBTQ+

- **Socioeconomic status**
  - Poverty
  - High social vulnerability

- **Personal characteristics associated with discrimination**
  - With disabilities

- **Features of relationships**
  - Emancipated minors
  - Not enrolled in school

- **Substance use**
# Equity: Review of the available evidence

<table>
<thead>
<tr>
<th></th>
<th>Disproportionate COVID-19 morbidity and mortality</th>
<th>Barriers to healthcare</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Adolescents</td>
<td>Adults</td>
</tr>
<tr>
<td>Rural or frontier areas</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>Justice-involved</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>Congregate settings</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>Homelessness</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>Race/ethnicity</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Immigration status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occupation</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>Sexual and gender minorities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Socioeconomic status</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>Disabilities</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Substance use</td>
<td>√</td>
<td>√</td>
</tr>
</tbody>
</table>

✓ = Published peer-reviewed literature available
Equity:
Data on equitable provision of COVID-19 vaccine in adults

As of May 4, 2021, a lower percentage of Black and Hispanic/Latino adults were fully vaccinated compared with the percentage of these groups in overall population.

May see similar patterns in adolescents.

Equity:
Opportunities to increase equitable access to the Pfizer-BioNTech COVID-19 vaccine

- Pfizer-BioNTech COVID-19 vaccine characteristics
  - Submitted new data to FDA supporting stability of vaccine when stored for up to one month (31 days) at 2-8°C\(^1\)
  - Encourage strategies to efficiently utilize doses and support local redistribution, smaller tray sizes would improve access (e.g., smaller providers, rural areas)

- Need for 2-dose series
  - In adults, only 3% missed the second dose of a 2-dose series, but differences were seen by jurisdiction, race/ethnicity, and age\(^2\)

- Multipronged approach to improve access
  - Primary care providers serving adolescents, FQHCs, rural health clinics, community health centers, children’s hospitals, pharmacies, school-located vaccination clinics

---

What would be the impact of the Pfizer-BioNTech COVID-19 vaccine among adolescents aged 12–15 years on health equity?

- Are there groups or settings that might be disadvantaged in relation to COVID-19 disease burden or receipt of the Pfizer-BioNTech COVID-19 vaccine?
- Are there considerations that should be made when implementing the Pfizer-BioNTech COVID-19 vaccine program to ensure that inequities are reduced whenever possible, and that they are not increased?

- Reduced
- Probably reduced
- Probably no impact
- Probably increased
- Increased
- Varies
- Don’t know
<table>
<thead>
<tr>
<th>EtR Domain</th>
<th>Question</th>
<th>Work Group Judgments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Health</td>
<td>Is COVID-19 disease among adolescents aged 12–15 years of public</td>
<td>Yes</td>
</tr>
<tr>
<td>Problem</td>
<td>health importance?</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Benefits and</td>
<td>How substantial are the desirable anticipated effects?</td>
<td>Large</td>
</tr>
<tr>
<td>Harms</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>How substantial are the undesirable anticipated effects?</td>
<td>Small</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Do the desirable effects outweigh the undesirable effects?</td>
<td>Favors Pfizer-BioNTech COVID-19 vaccine</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>What is the overall certainty of the evidence for the critical outcomes?</td>
<td>1 (high) for prevention of symptomatic COVID-19</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 (very low) for serious adverse events</td>
</tr>
<tr>
<td>Values</td>
<td>Does the target population feel the desirable effects are large relative</td>
<td>Varies</td>
</tr>
<tr>
<td></td>
<td>to the undesirable effects?</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Is there important variability in how patients value the outcomes?</td>
<td>Probably important variability</td>
</tr>
<tr>
<td>Acceptability</td>
<td>Is the Pfizer-BioNTech COVID-19 vaccine acceptable to key stakeholders?</td>
<td>Yes</td>
</tr>
<tr>
<td>Feasibility</td>
<td>Is the Pfizer-BioNTech COVID-19 vaccine feasible to implement among</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>adolescents aged 12–15 years?</td>
<td></td>
</tr>
<tr>
<td>Resource Use</td>
<td>Is the Pfizer-BioNTech COVID-19 vaccine, given to adolescents aged 12–</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>15 years a reasonable and efficient allocation of resources?</td>
<td></td>
</tr>
<tr>
<td>Equity</td>
<td>What would be the impact of the Pfizer-BioNTech COVID-19 vaccine, given</td>
<td>Probably increased</td>
</tr>
<tr>
<td></td>
<td>to adolescents aged 12–15 years on health equity?</td>
<td></td>
</tr>
<tr>
<td>Balance of consequences</td>
<td>Undesirable consequences clearly outweigh desirable consequences in most settings</td>
<td>Undesirable consequences probably outweigh desirable consequences in most settings</td>
</tr>
</tbody>
</table>

Summary: Work Group Interpretations

- Undesirable consequences clearly outweigh desirable consequences in most settings
- Undesirable consequences probably outweigh desirable consequences in most settings
- The balance between desirable and undesirable consequences is closely balanced or uncertain
- Desirable consequences probably outweigh undesirable consequences in most settings
- Desirable consequences clearly outweigh undesirable consequences in most settings
- There is insufficient evidence to determine the balance of consequences

Evidence to Recommendations Framework
| Balance of consequences | Undesirable consequences clearly outweigh desirable consequences in most settings | Undesirable consequences probably outweigh desirable consequences in most settings | The balance between desirable and undesirable consequences is closely balanced or uncertain | Desirable consequences probably outweigh undesirable consequences in most settings | There is insufficient evidence to determine the balance of consequences |

- undesirable consequences clearly outweigh desirable consequences in most settings
- undesirable consequences probably outweigh desirable consequences in most settings
- desirable consequences probably outweigh undesirable consequences in most settings
- desirable consequences clearly outweigh undesirable consequences in most settings
- there is insufficient evidence to determine the balance of consequences
### Evidence to Recommendations Framework

**Summary: Work Group Interpretations**

<table>
<thead>
<tr>
<th>Type of recommendation</th>
<th>We do not recommend the intervention</th>
<th>We recommend the intervention for individuals based on shared clinical decision-making</th>
<th>We recommend the intervention</th>
</tr>
</thead>
</table>


### Evidence to Recommendations Framework

**Summary: Work Group Interpretations**

<table>
<thead>
<tr>
<th>Type of recommendation</th>
<th>We do not recommend the intervention</th>
<th>We recommend the intervention for individuals based on shared clinical decision-making</th>
<th>We recommend the intervention</th>
</tr>
</thead>
</table>


Acknowledgements

- Kate Woodworth
- Megan Wallace
- Julia Gargano
- Jessica MacNeil
- Heather Scobie
- Amy Blain
- Danielle Moulia
- Mary Chamberland
- Steve Hadler
- Nicole Reisman
- Megan Lindley
- Jack Gersten
- Eddie Shanley

- Epi Task Force:
  - COVID-NET
  - DVD Enhanced Surveillance
  - Community Surveillance
  - Seroprevalence
- MIS-C unit
- Data, Analytics and Visualization Task Force
- Respiratory Viruses Branch