COVID-19: FOCUS ON VACCINES FOR PREVENTION

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The information presented here is the most up-to-date, data-driven and evidence-based science to help school districts make important decisions regarding face-to-face instruction.

Duke University and its partners will not make decisions nor will they advise specific action.
Format

Thank you for joining us this evening!

- We will take questions from the comments section in YouTube and will supplement our presentations with some of your questions.
- Questions that are not answered during the webinar will be collated and may be combined with other questions and will be addressed in a “Frequently Asked Questions” document or future webinars.
- Webinar slides and videos are available at our website: https://abcsciencecollaborative.org/
Disclosures

- Dr. Smith is a site investigator for the adult and pediatric Pfizer COVID vaccine trials being conducted at Duke. Duke has received funds from Pfizer to support this trial.
- Dr. Weber is a consultant for Pfizer, Merck, PDI, Germitec and Dynavax
COVID-19 VACCINE DEVELOPMENT

Coronavirus Vaccine Tracker

By Carl Zimmer, Jonathan Corum and Sui-Lee Wee  Updated March 12, 2021

- Phases:
  - Phase 1: 42 Vaccines testing safety and dosage
  - Phase 2: 32 Vaccines in expanded safety trials
  - Phase 3: 22 Vaccines in large-scale efficacy tests
  - Authorized: 6 Vaccines in early or limited use
  - Approved: 6 Vaccines approved for full use
  - Abandoned: 4 Vaccines abandoned after trials

STRATEGIES BEING EXPLORED FOR COVID-19 VACCINES

HOW mRNA VACCINES WORK

HOW ADENOVIRUS VACCINES WORK

## COVID-19 Vaccine Side-By-Side

<table>
<thead>
<tr>
<th></th>
<th>Pfizer/BioNTech</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type</strong></td>
<td>mRNA (virus genetic code)</td>
</tr>
<tr>
<td><strong>Antigen</strong></td>
<td>Spike protein, 30 µg</td>
</tr>
<tr>
<td><strong>Doses</strong></td>
<td>Two injections, 21 days apart</td>
</tr>
<tr>
<td><strong>Study participants</strong></td>
<td>~43,000</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td>≥16 years</td>
</tr>
<tr>
<td><strong>Effectiveness</strong></td>
<td>~95% against symptomatic COVID-19</td>
</tr>
<tr>
<td><strong>Safety</strong></td>
<td>Grade 3 AEs ≥2%: fatigue, 3.8% headache, 2%</td>
</tr>
<tr>
<td><strong>Short-Term Storage</strong></td>
<td>2o to 8o C up to 5 days, or Room temperature up to 2 hours</td>
</tr>
<tr>
<td><strong>Administration Route</strong></td>
<td>Intramuscular (IM)</td>
</tr>
</tbody>
</table>

Unknowns at present time: 1) Duration of protection; 2) Ability to prevent asymptomatic infection and infectiousness; 3) Effectiveness in immunocompromised persons; 4) Long-term safety


Moderna EUA Fact Sheet: [https://www.modernatx.com/covid19vaccine-eua/eua-fact-sheet-providers.pdf](https://www.modernatx.com/covid19vaccine-eua/eua-fact-sheet-providers.pdf)

There have been intentional efforts to recruit volunteers from historically marginalized populations.
Vaccine effectiveness in real life

• Data from Israel 12/20/20-2/1/21
• More than a million people
• Vaccine effectiveness at days 14 through 20 after the first dose
  – Prevent any infection—46%
  – Prevent symptomatic COVID-19—57%
  – Prevent death—72%
• Vaccine effectiveness 7 or more days after the second dose
  – Prevent any infection—92%
  – Prevent symptomatic Covid-19—94%
  – Prevent death—100%
• Vaccine worked well across all age groups
• Slightly less effectiveness in people with multiple comorbidities

Dagan N, et al. NEJM, 24 February 2021
VACCINE SAFETY
Pre-licensure studies

- Safety is a critical part of pre-licensure vaccine trials
- Rates of adverse events compared between study subjects who received vaccine as compared to placebo
- mRNA vaccines (Pfizer, Moderna)
  - Mild to moderate side effects common but severe side-effects rare
  - Usually occur 1-3 days after vaccination and last 1-3 days; more common after 2\textsuperscript{nd} dose
- Johnson and Johnson vaccine
  - Moderate to severe side effects very uncommon
Post-licensure vaccine safety

• The COVID vaccine trials have been large, with about 45,000 participants in the Pfizer and Johnson and Johnson trials and 30,000 in the Moderna trial
• However, once a vaccine is approved for use in the population vaccine safety assessments continue. This is important to:
  – Identify rare side effects that occur in 1 per 100,000 or more individuals. Such rare events would not have been found in trials that “only” included 75,000 people
  – Identify side effects that may occur in individuals who were excluded from the trials. For instance, the following groups were excluded from initial trials:
    • People with previous COVID infection
    • Pregnant women
Post-licensure vaccine safety

- There are several long-standing post-licensure mechanisms:
  - Vaccine Adverse Event Reporting System (VAERS)
  - Vaccine Safety Datalink (VSD)
  - Clinical Immunization Safety Assessment (CISA)
VAERS

- www.vaers.hhs.gov

- A passive surveillance system that allows anyone (health care providers, patients or their families) to report unexpected signs or symptoms after vaccine receipt

- VAERS functions as an “early warning system”

- Importantly, there is no comparison group, only patients who received a vaccine and had an adverse event are included. Therefore, VAERS data are hypothesis generating, meaning that they can be used to design other more rigorous studies to explore causation

- VAERS data DO NOT imply causation in and of themselves
VSD

• One way to conduct a more epidemiologically rigorous vaccine safety study involves the Vaccine Safety Datalink (VSD)
• VSD is a partnership between the CDC and several geographically diverse managed care organization. VSD includes clinical data for nearly 10 million individuals each year
• VSD data are updated weekly and allow for a better understanding of causation by comparing rates of an adverse event of concern among individuals who received a vaccine as compared to those who did not

## COVID-19 VACCINES: SAFETY MONITORING, VACCINE SAFETY DATALINK

<table>
<thead>
<tr>
<th>VSD RCA outcomes for COVID-19 vaccines</th>
<th>Concurrent comparator</th>
<th>Risk interval</th>
<th>Events in vaccinated</th>
<th>Events in unvaccinated</th>
<th>Signal (Y/N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute disseminated encephalomyelitis</td>
<td>Unvaccinated</td>
<td>1-21 days</td>
<td>0</td>
<td>0</td>
<td>N</td>
</tr>
<tr>
<td>Acute myocardial infarction</td>
<td>Unvaccinated</td>
<td>1-21 days</td>
<td>1</td>
<td>179</td>
<td>N</td>
</tr>
<tr>
<td>Acute respiratory distress syndrome</td>
<td>Unvaccinated</td>
<td>1-21 days</td>
<td>0</td>
<td>4</td>
<td>N</td>
</tr>
<tr>
<td>Anaphylaxis</td>
<td>Unvaccinated</td>
<td>0-1 days</td>
<td>0</td>
<td>8</td>
<td>N</td>
</tr>
<tr>
<td>Appendicitis</td>
<td>Unvaccinated</td>
<td>1-21 days</td>
<td>5</td>
<td>267</td>
<td>N</td>
</tr>
<tr>
<td>Bell's palsy</td>
<td>Unvaccinated</td>
<td>1-21 days</td>
<td>4</td>
<td>358</td>
<td>N</td>
</tr>
<tr>
<td>Convulsions / seizures</td>
<td>Unvaccinated</td>
<td>1-21 days</td>
<td>0</td>
<td>39</td>
<td>N</td>
</tr>
<tr>
<td>Disseminated intravascular coagulation</td>
<td>Unvaccinated</td>
<td>1-21 days</td>
<td>0</td>
<td>14</td>
<td>N</td>
</tr>
<tr>
<td>Encephalitis / myelitis / encephalomyelitis</td>
<td>Unvaccinated</td>
<td>1-21 days</td>
<td>0</td>
<td>6</td>
<td>N</td>
</tr>
<tr>
<td>Guillain-Barré syndrome</td>
<td>Unvaccinated</td>
<td>1-21 days</td>
<td>0</td>
<td>4</td>
<td>N</td>
</tr>
<tr>
<td>Thrombotic thrombocytopenic purpura</td>
<td>Unvaccinated</td>
<td>1-21 days</td>
<td>0</td>
<td>4</td>
<td>N</td>
</tr>
<tr>
<td>Immune thrombocytopenia</td>
<td>Unvaccinated</td>
<td>1-21 days</td>
<td>0</td>
<td>21</td>
<td>N</td>
</tr>
<tr>
<td>Kawasaki disease</td>
<td>Unvaccinated</td>
<td>1-21 days</td>
<td>0</td>
<td>1</td>
<td>N</td>
</tr>
<tr>
<td>MIS-C and MIS-A</td>
<td>Unvaccinated</td>
<td>NA</td>
<td>0</td>
<td>NA</td>
<td>N</td>
</tr>
<tr>
<td>Myocarditis / pericarditis</td>
<td>Unvaccinated</td>
<td>1-21 days</td>
<td>0</td>
<td>12</td>
<td>N</td>
</tr>
<tr>
<td>Narcolepsy and cataplexy</td>
<td>Unvaccinated</td>
<td>N/A</td>
<td>0</td>
<td>8</td>
<td>N</td>
</tr>
<tr>
<td>Stroke, hemorrhagic</td>
<td>Unvaccinated</td>
<td>1-21 days</td>
<td>1</td>
<td>85</td>
<td>N</td>
</tr>
<tr>
<td>Stroke, ischemic</td>
<td>Unvaccinated</td>
<td>1-21 days</td>
<td>0</td>
<td>197</td>
<td>N</td>
</tr>
<tr>
<td>Transverse myelitis</td>
<td>Unvaccinated</td>
<td>1-21 days</td>
<td>0</td>
<td>0</td>
<td>N</td>
</tr>
<tr>
<td>Venous thromboembolism</td>
<td>Unvaccinated</td>
<td>1-21 days</td>
<td>3</td>
<td>408</td>
<td>N</td>
</tr>
<tr>
<td>Pulmonary embolism (subset of VTE)</td>
<td>Unvaccinated</td>
<td>1-21 days</td>
<td>0</td>
<td>132</td>
<td>N</td>
</tr>
</tbody>
</table>

- Preliminary results of VSD unvaccinated concurrent comparator analyses for COVID-19 vaccine safety
- No signals as of January 16
Clinical Immunization Safety Assessment (CISA)

A longstanding partnership between CDC and seven medical research centers that provides expert consultation and conducts clinical research on vaccine-associated health risks.

Dedicated CISA COVIDVax program launched December 2020.

Since December, there have been daily check-ins (7 days a week) to discuss emergent vaccine safety concerns from across the US.

Faculty in infectious diseases (including our ABCSC faculty), obstetrics, geriatrics, cardiology, neurology and allergy are part of the Duke CISA COVIDVax team.
Should I get a vaccine?

• In general, if you have the ability to receive vaccine you should
• Exceptions:
  – If you are currently sick with COVID, defer until no longer in isolation
  – If you are currently quarantined, defer until quarantine has ended
  – If you received monoclonal antibodies against COVID, defer vaccine 90 days
  – If you just received another vaccine, defer COVID vaccine for 14 days
Specific Populations

- Women who are pregnant or breastfeeding
  - No scientific reason to expect harm to mom or fetus
  - The American College of Obstetrics and Gynecology and Society for Maternal and Fetal Medicine, both state that vaccine should not be withheld from pregnant women; vaccine should be offered to lactating women similar to non-lactating women
  - No ill effects noted in pregnant women immunized to date
  - Vaccines during pregnancy also protect infants

- Immunocompromised individuals
  - Cannot get COVID from COVID vaccine

- People who had COVID

- Children
  - Pfizer: 12-15 year-old study closed, 6 mo – 11 yo started
  - Moderna: 12-18 yo study underway, 6 mo – 11 yo started
  - J&J: studies planned
Which vaccine should I get?

• In general, whichever is available
• EXCEPTIONS
  – J&J/Janssen indicated if:
    • You experienced anaphylaxis after dose 1 of an mRNA vaccine
    • You have a known allergy to polyethylene glycol
  – Moderna or Pfizer indicated if
    • You have a known allergy to polysorbate
CDC RECOMMENDATIONS FOR FULLY IMMUNIZED PERSONS

Fully vaccinated people can (does not apply to healthcare facilities, work places or schools):

• Visit with other fully vaccinated people indoors without wearing masks or physical distancing
• Visit with unvaccinated people from a single household who are at low risk for severe COVID-19 disease indoors without wearing masks or physical distancing
• Refrain from quarantine and testing following a known exposure if asymptomatic

For now, fully vaccinated people should continue to:

• Take precautions in public like wearing a well-fitted mask and physical distancing
• Avoid medium- and large-sized in-person gatherings

Fully immunized means “two-weeks” after 2nd dose (Pfizer, Moderna) or after single dose (Johnson & Johnson)

Thank you.