Safety and Efficacy of COVID-19 Vaccines in the Dialysis Population

January 7, 2021

This webinar is presented in partnership by the following members of the kidney community:

[Logos of various organizations]
Welcome & Opening Remarks

ALAN KLIGER, MD

Disclosures

Employer: Metabolism Associates, New Haven
Consultancy Agreements: ASN; National Institutes of Diabetes, Digestive Diseases and the Kidney
Honoraria: several universities and medical schools, professional organizations - honoraria for lectures, seminars, webinars
Scientific Advisor or Membership: Qualidigm (Quality Improvement Organization)
Other Interests/Relationships: Renal Physicians Association; American Society of Nephrology
1. Is it safe for dialysis patients to receive this vaccine (and how do we know)?

2. Will dialysis patients mount a vigorous antibody response?

3. Will the vaccine protect dialysis patients with possibly suppressed immune systems as well as it protects others?

4. What should we be telling our patients about the facts we know and don’t know?

5. What can we do to help both patients and staff feel comfortable with this vaccine?
Disclosures

Employer: CDC, HHS, US government

COVID-19 Vaccine Recommendations

Kathleen Dooling, MD, MPH

January 7, 2020
Objectives

• Vaccine Recommendations
  • Pfizer-BioNTech
  • Moderna
• Clinical considerations for use
• Anaphylaxis
• Allocation
• Considerations for implementation
• Summary & What’s on the Horizon

ACIP recommendations for mRNA COVID-19 vaccines
Messenger RNA vaccines

- Provides instruction directly to the immune system (Spike protein)
- Efficiently creates specific immune memory
- mRNA can neither interact with nor integrate into DNA

Source: [https://www.fda.gov/media/144583/download](https://www.fda.gov/media/144583/download)

ACIP recommendations for use of COVID-19 vaccines

- Use of mRNA COVID-19 vaccines under FDA’s Emergency Use Authorization
  - December 12, 2020: Pfizer-BioNTech
  - December 19, 2020: Moderna

Source: [https://www.cdc.gov/mmwr/volumes/69/wr/mm6950e2.htm?s_cid=mm6950e2_w](https://www.cdc.gov/mmwr/volumes/69/wr/mm6950e2.htm?s_cid=mm6950e2_w)
[https://www.cdc.gov/mmwr/volumes/69/wr/mm695152e1.htm?s_cid=mm695152e1_w](https://www.cdc.gov/mmwr/volumes/69/wr/mm695152e1.htm?s_cid=mm695152e1_w)
mRNA COVID-19 vaccines

• Two mRNA COVID-19 vaccines authorized under Emergency Use
  • Pfizer-BioNTech
  • Moderna

• Both products demonstrate vaccine efficacy >90%
  • Efficacy demonstrated across age groups, racial and ethnic groups

• Vaccine safety profile of both products acceptable
  • Imbalance of Bell’s Palsy but still within expected range
  • Local and systemic reactogenicity, particularly after second dose

Dosing and administration

• Authorized age groups:
  • Pfizer-BioNTech: ≥ 16 years
  • Moderna: ≥ 18 years

• Administration: two-dose series administered intramuscularly
  • Pfizer-BioNTech: three weeks apart
  • Moderna: four weeks apart

• mRNA vaccines are not interchangeable with each other or other COVID-19 vaccines
  • Either vaccine series may be used; ACIP does not state a product preference

• mRNA vaccines should be administered alone, with a minimum interval of 14 days before or after administration with any other vaccines
Dosing and administration

• Persons should not be prospectively scheduled to receive the second dose earlier than recommended (Pfizer-BioNTech = 3 weeks, Moderna = 4 weeks)
  • Second doses administered within a “grace period” of ≤4 days from the recommended date are considered valid
  • There is no maximum interval between the first and second dose for either vaccine.

• If minimum intervals (between COVID-19 doses or between COVID-19 and other vaccines) are violated, still consider the COVID-19 dose VALID
  • COVID-19 vaccine supply is constrained
  • We don’t have data on 3 doses of COVID-19 or doses given with shorter inter-dose intervals

Persons with a history of SARS-CoV-2 infection

• Vaccination should be offered to persons regardless of history of prior symptomatic or asymptomatic SARS-CoV-2 infection
  – Data from clinical trials suggest vaccination safe in these persons

• Viral or serologic testing for acute or prior infection, respectively, is not recommended for the purpose of vaccine decision-making
Persons with known **current** SARS-CoV-2 infection

- Vaccination should be deferred until recovery from acute illness (if person had symptoms) *and criteria* have been met to discontinue isolation
- No minimal interval between infection and vaccination
- However, **current evidence** suggests reinfection uncommon in the 90 days after initial infection, and thus persons with documented acute infection in the preceding 90 days may defer vaccination until the end of this period, if desired


Persons with a **known** SARS-CoV-2 exposure

- **Residing in the Community:**
  - Defer vaccination until **quarantine period** has ended to avoid exposing healthcare personnel (HCP) or other persons during vaccination visit

- **Residents of congregate healthcare settings (e.g., long-term care facilities):**
  - May be vaccinated, as likely would not result in additional exposures. HCP are already in close contact with residents and should employ appropriate **infection prevention and control procedures**

- **Residents of congregate settings (e.g., correctional facilities, homeless shelters):**
  - May be vaccinated, in order to avoid delays and missed opportunities for vaccination
  - Where feasible, precautions should be taken to limit mixing of these individuals with other residents or non-essential staff

**Persons with underlying medical conditions**

- Vaccine may be administered to persons with underlying medical conditions who have no contraindications to vaccination.

- Clinical trials demonstrate similar safety and efficacy profiles in persons with underlying medical conditions, including those that place them at increased risk for severe COVID-19, compared to persons without comorbidities.


**Immunocompromised persons**

- Persons with HIV infection, other immunocompromising conditions, or who take immunosuppressive medications or therapies might be at increased risk for severe COVID-19.

- Data not currently available to establish safety and efficacy of vaccine in these groups.

- These individuals may still receive COVID-19 vaccine unless otherwise contraindicated.

- Individuals should be counseled about:
  - Unknown vaccine safety and efficacy profiles in immunocompromised persons
  - Potential for reduced immune responses
  - Need to continue to follow all current guidance to protect themselves against COVID-19.

Pregnant women

- COVID-19 and pregnancy
  - Increased risk of severe illness (ICU admission, mechanical ventilation and death)
  - Might be an increased risk of adverse pregnancy outcomes, such as preterm birth

- There are limited data on the safety of COVID-19 vaccines in pregnant women
  - Limited animal developmental and reproductive toxicity (DART) data
  - Studies in humans are ongoing and more planned

- If a woman is part of a group (e.g., healthcare personnel) who is recommended to receive a COVID-19 vaccine and is pregnant, she may choose to be vaccinated.

Considerations for vaccination:
- Level of COVID-19 community transmission (risk of acquisition)
- Personal risk of contracting COVID-19 (by occupation or other activities)
- Risks of COVID-19 to her and potential risks to the fetus
- Efficacy of the vaccine
- Known side effects of the vaccine
- Lack of data about the vaccine during pregnancy
Post-Vaccination Symptoms - Reactogenicity

- Before vaccination, providers should counsel vaccine recipients about expected local and systemic post-vaccination symptoms.
- Depending on vaccine product, age group, and dose:
  - **80-89%** of clinical trial participants reported ≥1 local reaction (e.g., pain or swelling at injection site; swollen lymph nodes on same side as vaccinated arm).
  - **55-83%** of clinical trial participants reported ≥1 systemic reaction (e.g., fever, fatigue, muscle aches, headache, chills).
  - Most are mild-moderate in severity, occur within first 3 days of vaccination, and resolve within 1-2 days of onset.
  - More frequent and severe following the second dose and among younger age groups.

Infection prevention and control recommendations for persons with post-vaccination symptoms

- Healthcare personnel
- Long-term care facility residents

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https://www.cdc.gov/vaccines/covid-19/info-by-product/pfizer/reactogenicity.html
https://www.cdc.gov/vaccines/covid-19/info-by-product/moderna/reactogenicity.html

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Contraindications and Precautions

Contraindications to either of the mRNA COVID-19 vaccines:

- Severe allergic reaction (e.g., anaphylaxis) after a previous dose of an mRNA COVID-19 vaccine or to any of its components
- Immediate allergic reaction of any severity to a previous dose of an mRNA COVID-19 vaccine or any of its components (including polyethylene glycol [PEG])*
- Immediate allergic reaction of any severity to polysorbate (due to potential cross-reactive hypersensitivity with the vaccine ingredient PEG)*

Persons with an immediate allergic reaction to the first dose of an mRNA vaccine should not receive additional doses of either of the mRNA COVID-19 vaccines

* These persons should not receive mRNA COVID-19 vaccination at this time unless they have been evaluated by an allergist-immunologist and it is determined that the person can safely receive the vaccine (e.g., under observation, in a setting with advanced medical care available).
Precautions to mRNA COVID-19 vaccines

Pfizer-BioNTech and Moderna COVID-19 vaccines

- Any immediate allergic reaction to any other vaccine or injectable therapy (i.e., intramuscular, intravenous, or subcutaneous vaccines or therapies not related to a component of mRNA COVID-19 vaccines or polysorbate)

- Unknown risks of developing a severe allergic reaction should be balanced against the benefits of vaccination

- Deferral of vaccination and/or consultation with an allergist-immunologist may be considered

Ingredients* included in mRNA COVID-19 vaccines

<table>
<thead>
<tr>
<th>Description</th>
<th>Pfizer-BioNTech</th>
<th>Moderna</th>
</tr>
</thead>
<tbody>
<tr>
<td>mRNA</td>
<td>nucleoside-modified mRNA encoding the viral spike (S) glycoprotein of SARS-CoV-2</td>
<td>nucleoside-modified mRNA encoding the viral spike (S) glycoprotein of SARS-CoV-2</td>
</tr>
<tr>
<td>Lipids</td>
<td>2[(polyethylene glycol)-2000]-N,N-ditetradecylacetamide</td>
<td>PEG2000-DMG: 1,2-dimyrystoyl-rac-glycerol, methoxypolyethylene glycol</td>
</tr>
<tr>
<td></td>
<td>1,2-distearoyl-sn-glycero-3-phosphocholine</td>
<td>1,2-distearoyl-sn-glycero-3-phosphocholine</td>
</tr>
<tr>
<td></td>
<td>cholesterol</td>
<td>cholesterol</td>
</tr>
<tr>
<td></td>
<td>(4-hydroxybutyl)azanediy]bis(hexane-6,1-diyl)bis(2-hexyldecanoate)</td>
<td>SM-102: heptadecan-9-yl 8-[(2-hydroxyethyl) (6-oxo-6-(undecyloxy) hexyl) amino) octanoate</td>
</tr>
<tr>
<td>Salts, sugars, buffers</td>
<td>potassium chloride</td>
<td>Tromethamine</td>
</tr>
<tr>
<td></td>
<td>monobasic potassium phosphate</td>
<td>Tromethamine hydrochloride</td>
</tr>
<tr>
<td></td>
<td>sodium chloride</td>
<td>Acetic acid</td>
</tr>
<tr>
<td></td>
<td>dibasic sodium phosphate dihydrate</td>
<td>Sodium acetate</td>
</tr>
<tr>
<td></td>
<td>sucrose</td>
<td>sucrose</td>
</tr>
</tbody>
</table>

*As reported in the prescribing information
Observation period following vaccination

- Vaccine providers should observe patients after vaccination to monitor for the occurrence of immediate adverse reactions:

  **Persons with a history of anaphylaxis (due to any cause)**
  - 30 minutes

  **All other persons**
  - 15 minutes

Additional tools to identify persons with contraindications and precautions to vaccination

**Interim considerations:**

Preparing for the potential management of anaphylaxis at COVID-19 vaccination sites

https://www.cdc.gov/vaccines/covid-19/info-by-product/pfizer/anaphylaxis-management.html
Recommended medications and supplies for the management of anaphylaxis at COVID-19 vaccination sites

<table>
<thead>
<tr>
<th>Should be available at all sites</th>
<th>Include at sites where feasible</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epinephrine prefilled syringe or autoinjector*</td>
<td>Pulse oximeter</td>
</tr>
<tr>
<td>H1 antihistamine (e.g., diphenhydramine)†</td>
<td>Oxygen</td>
</tr>
<tr>
<td>Blood pressure cuff</td>
<td>Bronchodilator (e.g., albuterol)</td>
</tr>
<tr>
<td>Stethoscope</td>
<td>H2 antihistamine (e.g., famotidine, cimetidine)</td>
</tr>
<tr>
<td>Timing device to assess pulse</td>
<td>Intravenous fluids</td>
</tr>
<tr>
<td></td>
<td>Intubation kit</td>
</tr>
<tr>
<td></td>
<td>Adult-sized pocket mask with one-way valve (also known as cardiopulmonary resuscitation (CPR) mask)</td>
</tr>
</tbody>
</table>

*COVID-19 vaccination sites should have at least 5 doses of epinephrine on hand at any given time.
†Antihistamines may be given as adjunctive treatment and should not be used as initial or sole treatment for anaphylaxis. Additionally, caution should be used if oral medications are administered to persons with impending airway obstruction.

https://www.cdc.gov/vaccines/covid-19/info-by-product/pfizer/anaphylaxis-management.html

Key messages

Preparing for the potential management of anaphylaxis at COVID-19 vaccination sites

Early recognition of anaphylaxis symptoms

Prompt treatment with epinephrine

Activation of emergency medical services

https://www.cdc.gov/vaccines/covid-19/info-by-product/pfizer/anaphylaxis-management.html
Anaphylaxis in persons following Pfizer-BioNTech COVID-19 vaccines

- Cases of anaphylaxis have been reported (as of Dec 14-23/2020, following Pfizer-BioNTech COVID-19 vaccination)
  - 21 confirmed cases in U.S.
  - 1.89M doses administered (11.1 cases of anaphylaxis per million doses)

- History & Onset:
  - 17 cases in persons with a documented history of allergies or allergic reactions, 7 of whom had a history of anaphylaxis
  - Median interval from vaccine receipt to symptom onset was 13 minutes (range = 2–150m)

- Disposition:
  - Among 20 persons with follow-up information available, all had recovered

Source: https://www.cdc.gov/mmwr/volumes/70/wr/mm7002e1.htm?s_cid=mm7002e1_w

Your role

- Recognize, respond, and report anaphylaxis following COVID-19 vaccination to VAERS ✓
- Report adverse events to VAERS in accordance with FDA EUA reporting requirements and CDC guidance ✓
- Participate in CDC’s v-safe program yourself when you get vaccinated and encourage patients to participate in v-safe ✓
- Communicate with patients on vaccine safety ✓
ACIP recommendations for Vaccine allocation/prioritization

ACIP recommendations for use of COVID-19 vaccines

- Phased allocation of COVID-19 vaccines
**COVID-19 vaccination phases**

16-64 years with high-risk medical conditions (>110M)

16-64 years Without high-risk medical conditions (<86M)

65-74 years (32M)

75+ years (21M)

**Phased allocation: Balancing Goals**

<table>
<thead>
<tr>
<th>Phased Allocation</th>
<th>Prevention of Morbidity &amp; Mortality</th>
<th>Preservation of Societal Functioning</th>
</tr>
</thead>
<tbody>
<tr>
<td>1a</td>
<td>LTCF residents</td>
<td>Health care personnel</td>
</tr>
<tr>
<td>1b</td>
<td>Persons 75 years and older</td>
<td>Frontline Essential Workers</td>
</tr>
<tr>
<td>1c</td>
<td>Persons 65-74 years Persons 16-64 with high-risk medical conditions</td>
<td>Other Essential Workers</td>
</tr>
</tbody>
</table>

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

## 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

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## Conditions associated with severe COVID-19

- CDC has identified a list of conditions that make an individual at increased risk of severe disease.
- The list is not exhaustive and only includes conditions with sufficient evidence to draw conclusions.
- High-risk medical conditions may include other individuals based on consultation with a healthcare provider about personal risk factors.

- Obesity
- Severe Obesity
- Type 2 diabetes
- COPD
- Heart Condition
- Chronic kidney disease
- Cancer
- Immunocompromised state from solid Organ transplant
- Sickle cell disease
- Pregnancy
- Smoker (current or history)

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Example of Phase 1 & Phase 2 COVID-19 vaccine roll-out

Summary & what’s on the horizon

January 7, 2021
**Public health recommendations for vaccinated persons**

- Protection from vaccine is not immediate; vaccine is a 2-dose series and will take 1 to 2 weeks following the second dose to be considered fully vaccinated
- No vaccine is 100% effective
- Given the currently limited information on how well the vaccine may reduce asymptomatic infection or transmission; and how long protection lasts, vaccinated persons should continue to follow all current guidance to protect themselves and others, including:
  - Wearing a mask
  - Staying at least 6 feet away from others
  - Avoiding crowds
  - Washing hands often
  - Following CDC travel guidance
  - Following quarantine guidance after an exposure to someone with COVID-19
  - Following any applicable workplace or school guidance


**Summary**

- 2 mRNA vaccines currently authorized for use in U.S.
  - >90% VE
  - Moderate self-limited reactogenicity
  - Higher than expected anaphylaxis—vaccination sites must be ready to manage
- Phased allocation of vaccine is necessary while demand > supply
  - Equitable and fair
  - Use all doses in a timely way
- Next few months
  - Increased production of mRNA vaccines
  - Viral vector vaccines (Janssen and AstraZeneca)
Resources

MMWRs
Pfizer-BioNTech: https://www.cdc.gov/mmwr/volumes/69/wr/mm6950e2.htm?s_cid=mm6950e2_w
Moderna: https://www.cdc.gov/mmwr/volumes/69/wr/mm695152e1.htm?s_cid=mm695152e1_w
Vaccine Allocation: https://www.cdc.gov/mmwr/volumes/69/wr/mm69152e1.htm
https://www.cdc.gov/mmwr/volumes/69/wr/mm695152e2.htm?s_cid=mm695152e2_w

CDC considerations

Vaccine Safety
VAERS: http://vaers.hhs.gov

Other CDC resources
Vaccine tracker: https://covid.cdc.gov/covid-data-tracker
For Healthcare Professionals: https://www.cdc.gov/vaccines/covid-19/hcp/index.html
Engaging in Effective COVID-19 Vaccine Conversations https://www.cdc.gov/vaccines/covid-19/hcp/engaging-patients.htm

Questions?
Modernma: Efficacy post ONLY 1 dose

<table>
<thead>
<tr>
<th>First COVID-19 Occurrence</th>
<th>Vaccine Group</th>
<th>Placebo Group</th>
<th>VE (%) (95% CI)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>After dose 1</td>
<td>N=996</td>
<td>N=1079</td>
<td></td>
</tr>
<tr>
<td>Case n (%)</td>
<td>7/996 (87.5%)</td>
<td>39/1079 (96.7%)</td>
<td>80.2% (55.2%, 92.5%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>After dose 1 to 14 days after dose 1</td>
<td>5/996 (38.0%)</td>
<td>11/1079 (41.1%)</td>
<td>50.8% (-53.6%, 86.6%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;14 days after dose 1**</td>
<td>2/983 (87.2%)</td>
<td>28/1059 (96.2%)</td>
<td>92.1% (68.8%, 99.1%)</td>
</tr>
</tbody>
</table>

Surveillance time in person years for given endpoint across all participants within each group at risk for the endpoint.

* VE is calculated as 1-ratio of incidence rates (mRNA-1273/Placebo). The 95% CI of VE is calculated using the exact method conditional upon the total number of cases, adjusting for person-years.

** Participants who were not at risk (cases or censored at prior time period) are excluded from this analysis.

Based on interim analysis: November 7, 2020 efficacy data cutoff.

Moderna FDA VRBPAC Briefing Document: https://www.fda.gov/media/144434/download

January 7, 2021
Pfizer: efficacy post dose 1

Table 13. Primary Efficacy Endpoint – All-Available Efficacy Population

<table>
<thead>
<tr>
<th>Efficacy Endpoint</th>
<th>BNT162b2 N=21669 Cases n1&lt;sup&gt;a&lt;/sup&gt; Surveillance Time&lt;sup&gt;c&lt;/sup&gt; (n²&lt;sup&gt;b&lt;/sup&gt;)</th>
<th>Placebo N=21666 Cases n1&lt;sup&gt;a&lt;/sup&gt; Surveillance Time&lt;sup&gt;c&lt;/sup&gt; (n²&lt;sup&gt;b&lt;/sup&gt;)</th>
<th>Vaccine Efficacy % (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>First COVID-19 occurrence after Dose 1 – Dose 1</td>
<td>4.015 (21314)</td>
<td>3.982 (21298)</td>
<td>82.0</td>
</tr>
<tr>
<td>After Dose 1 to before Dose 2</td>
<td>39</td>
<td>82</td>
<td>52.4 (29.5, 66.4)</td>
</tr>
<tr>
<td>Dose 2 to 7 days after Dose 2</td>
<td>2</td>
<td>21</td>
<td>90.5 (61, 98.9)</td>
</tr>
<tr>
<td>≥7 Days after Dose 2</td>
<td>9</td>
<td>172</td>
<td>94.8 (89.8, 97.6)</td>
</tr>
</tbody>
</table>

<sup>a</sup>N = number of participants in the specified group.
<sup>b</sup>n1 = Total number of participants meeting the endpoint definition.
<sup>c</sup>Total surveillance time is 1000 person-years for the given endpoint across all participants within each group at risk for the endpoint. Time period for COVID-19 case accrual is from 7 or 14 days after Dose 2 to the end of the surveillance period depending on specified endpoint.
<sup>d</sup>n2 = Number of participants at risk for the endpoint.
<sup>e</sup>Credible interval for VE was calculated using a beta-binomial model with prior beta (0.700102, 1) adjusted for surveillance time.
<sup>f</sup>Confidence interval (CI) for VE is derived based on the Clopper and Pearson method adjusted to the surveillance time.

Pfizer FDA VRBPAC Briefing: https://www.fda.gov/media/144245/download

January 7, 2021

COVID-19 Clinical Trials and Allocation Priorities

T. ALP IKIZLER, MD

ASN

January 7, 2021
Disclosures

**Employer:** Vanderbilt University Medical Center  
**Consultancy Agreements:** Fresenius-Kabi, Corvidia, Nestle, ISN, Abbott Renal Care  
**Honoraria:** Fresenius-Kabi, ISN, Abbott Renal Care, Nestle  
**Scientific Advisor or Membership:** Fresenius-Kabi, Kidney international

Current Numbers in COVID Vaccine Research

- Number of registered Vaccine Trials: **236**  
- Number of EUA Approved Vaccines in US (+EU): **2 (+1)**  
- Number of ongoing Phase III trials: **12**  
- Number of ongoing Phase II trials: **3**  
- Number of ongoing Phase I/II trials: **11**  
- Number of ongoing Phase I trials: **13**  
- Number of registered Preclinical Vaccines: **195**

Source: Milken Institute
**BNT162b2 mRNA Covid-19 Vaccine**

- **Participants:**
  - Total: 44,820
  - Dose 1: 37,086
  - Dose 2: 30,420
  - Effective: 95%

- **Timeline:**
  - Phase 1/2:
    - First participants enrolled: May 2020
    - Final analysis: December 2020
  - Phase 3:
    - Enrollment: July 2020
    - Final analysis: November 2020

**mRNA-1273 SARS-CoV-2 Vaccine**

- **Participants:**
  - Total: 30,420
  - Dose 1: 28,207
  - Dose 2: 28,207
  - Effective: 94.5%

- **Timeline:**
  - First participants enrolled: July 2020
  - Final analysis: October 2020

**Vaccines**

- **BNT162b2**
  - Efficacy: 95%
  - Dose: 2 doses, 3 weeks apart
  - Storage: Freezer storage only at -94°F (-70°C)

- **mRNA-1273**
  - Efficacy: 94.5%
  - Dose: 2 doses, 4 weeks apart
  - Storage: 30 days with refrigeration, 6 months at -4°F (-20°C)
Vaccine Trial Primary and Secondary End Points

**BNT162b2 mRNA Covid-19 Vaccine**

- **The primary end point:**
  - The efficacy of BNT162b2 against confirmed Covid-19 with onset at least 7 days after the second dose in participants who had been without (or with) serologic or virologic evidence of SARS-CoV-2 infection up to 7 days after the second dose.

- **Major secondary end point**
  - The efficacy of BNT162b2 against severe Covid-19.

**mRNA-1273 SARS-CoV-2 Vaccine**

- **The primary end point:**
  - The efficacy of the mRNA-1273 vaccine in preventing a 1st occurrence of symptomatic Covid-19 with onset at least 14 days after the 2nd injection in the per-protocol population, among participants who were seronegative at baseline.

- **Major secondary end points:**
  - The efficacy of mRNA-1273 in the prevention of severe Covid-19
  - The efficacy of the vaccine at preventing Covid-19 after a single dose
### BNT162b2 mRNA Covid-19 Vaccine

<table>
<thead>
<tr>
<th>Efficacy End-Point</th>
<th>BNT162b2 (N=21,669)</th>
<th>Placebo (N=21,686)</th>
<th>VE (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of participants</td>
<td>39</td>
<td>82</td>
<td>52.4 (29.5-68.4)</td>
</tr>
<tr>
<td>COVID-19 occurrence</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>After dose 1 to before dose 2</td>
<td>39</td>
<td>82</td>
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</tr>
<tr>
<td>After dose 1</td>
<td>50</td>
<td>275</td>
<td>82.0 (75.6-88.9)</td>
</tr>
</tbody>
</table>

### mRNA-1273 SARS-CoV-2 Vaccine

<table>
<thead>
<tr>
<th>COVID-19 Onset</th>
<th>mRNA-1273 (N=14,550)</th>
<th>Placebo (N=14,598)</th>
<th>No. of participants</th>
<th>No. of participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Randomization 14 days after dose 1</td>
<td>5</td>
<td>11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14 Days after dose 1 to before dose 2</td>
<td>2</td>
<td>35</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14 days after dose 1</td>
<td>5</td>
<td>11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dose 2 to 14 days after dose 2</td>
<td>0</td>
<td>19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Starting 14 days after dose 2</td>
<td>12</td>
<td>204</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total (any time after randomization)</td>
<td>19</td>
<td>269</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Subgroups in Relation to Dialysis Population

#### BNT162b2 mRNA Covid-19 Vaccine

<table>
<thead>
<tr>
<th>Subgroup</th>
<th>BNT162b2 (N=13,172)</th>
<th>Placebo (N=14,320)</th>
<th>Vaccine Efficacy, % (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>8</td>
<td>36</td>
<td>52.4 (29.5-68.4)</td>
</tr>
<tr>
<td>Age group</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;67 yr</td>
<td>5</td>
<td>120</td>
<td>94.8 (90.1-97.7)</td>
</tr>
<tr>
<td>≥ 67 yr</td>
<td>3</td>
<td>40</td>
<td>96.4 (93.4-98.3)</td>
</tr>
</tbody>
</table>

#### mRNA-1273 SARS-CoV-2 Vaccine

<table>
<thead>
<tr>
<th>Subgroup</th>
<th>mRNA-1273 (N=8,773)</th>
<th>Placebo (N=9,238)</th>
<th>Vaccine Efficacy, % (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>8</td>
<td>36</td>
<td>52.4 (29.5-68.4)</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
</tr>
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<td>120</td>
<td>94.8 (90.1-97.7)</td>
</tr>
<tr>
<td>≥ 65 yrs</td>
<td>3</td>
<td>40</td>
<td>96.4 (93.4-98.3)</td>
</tr>
<tr>
<td>Race and ethnicity group</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>45</td>
<td>432</td>
<td>96.4 (93.4-98.3)</td>
</tr>
<tr>
<td>Nonwhite</td>
<td>14</td>
<td>20</td>
<td>93.8 (89.7-96.7)</td>
</tr>
<tr>
<td>Household history</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asymptomatic</td>
<td>45</td>
<td>432</td>
<td>96.4 (93.4-98.3)</td>
</tr>
<tr>
<td>Symptomatic</td>
<td>15</td>
<td>12</td>
<td>93.8 (89.7-96.7)</td>
</tr>
</tbody>
</table>
Safety data

BNT162b2 mRNA Covid-19 Vaccine
- Local Reactogenicity (8183 participants)
  - Pain up to 83% in vaccine arm (vs 14%)
  - Severe pain in < 1%; More in younger
  - Very few swelling or redness (< 7%)
- Systemic Reactogenicity
  - Fatigue: 59% vs 33%
  - Headache: 52% vs 34%
  - Fever: 16% vs 1%; More after 1st dose.
- No Grade 4 adverse event

mRNA-1273 SARS-CoV-2 Vaccine
- Local Reactogenicity
  - Pain in 88.6% in vaccine arm (vs 18.8%)
  - Lasted 2.6 to 3.2 days
  - Very few swelling or redness
- Systemic Reactogenicity
  - More after 2nd dose
  - Fatigue: about 65% vs 35%
  - Headache: about 60% vs 30%
  - Fever: up to 20%
- No Grade 4 adverse event

Pending questions regarding vaccines
- Changing efficacy with inclusion of high-risk individuals
- Efficacy with single dose (vs double dose)
- Lack of data in patients with kidney disease
  - Side effect profile in dialysis patients
  - 256 subjects with renal disease in BNT162b2 trial
- Immune response in dialysis patients
Pending questions regarding vaccines

- Changing efficacy with inclusion of high-risk individuals
- Efficacy with single dose (vs double dose)
- Lack of data in patients with kidney disease
  - Side effect profile in dialysis patients
  - 256 subjects with renal disease in BNT162b2 trial
- Immune response in dialysis patients
- Operational issues regarding access to vaccines
Phase 1c: Adults of any age with the following conditions are at increased risk of severe illness from the virus that causes COVID-19

- Cancer
- Chronic kidney disease
- **COPD (chronic obstructive pulmonary disease)**
  - 6% of US population
- Down Syndrome
- Heart conditions, such as heart failure, coronary artery disease, or cardiomyopathies
- Immunocompromised state (weakened immune system) from solid organ transplant
- **Obesity and Severe Obesity: BMI > 30 kg/m²**
  - 40% of US population
- Pregnancy
- Sickle cell disease
- **Smoking**
  - 14% of US population
- Type 2 diabetes mellitus
Initiatives to Include Dialysis Patients in High-Risk Categories

- ASN Statement 12-22-2020
- ASN Kidney News Article 12-2020
- ASN collaborated with Operation Warp Speed’s Project SPEED to increase access to COVID-19 mAB therapeutics for dialysis centers (Dec 2020)
- ASN collaborated with National Kidney Foundation urging HHS Secretary Azar prioritize CKD & ESRD patients in COVID-19 testing and vaccination strategy (May 2020)
- Disseminated vaccine-related resources through ASN’s COVID-19 and NTDS webpage
- Kidney Health Initiative published two statements encouraging vaccine developers include kidney patients in clinical trials (May, Sept 2020)

Adults of any age with the following conditions might be at an increased risk for COVID-19:

- Asthma (moderate-to-severe)
- Cerebrovascular disease (affects blood vessels and blood supply to the brain)
- Cystic fibrosis
- Hypertension or high blood pressure
- Immunocompromised state (weakened immune system) from blood or bone marrow transplant, immune deficiencies, HIV, use of corticosteroids, or use of other immune weakening medicines
- Neurologic conditions, such as dementia
- Liver disease
- **Overweight (BMI > 25 kg/m², but < 30 kg/m²)**
  - 71.6% of US population
- Pulmonary fibrosis (having damaged or scarred lung tissues)
- Thalassemia (a type of blood disorder)
- Type 1 diabetes mellitus
Opportunities to increase chances of vaccine allocation for dialysis patients

- Identify patients who are older than 75 years of age
  - USRDS data: 162K dialysis patients are > 75
- Start unit-based vaccine surveys for patients and logistics
  - Assess the immediate need and determine how to obtain vaccine
- Continue advocacy for higher risk allocation vs less risky conditions
  - Societies and Foundations
  - Physician and dialysis staff education (and vaccination)
- Advocate for vaccine studies
  - Phase II/III or Phase 4 for safety and efficacy
  - Novavax (NCT04611802) to include individuals with CKD

Implications for the Dialysis Population

BRIGITTE SCHILLER, MD, FACP, FASN
Disclosures

Employer: Satellite Healthcare
Speakers Bureau: Astra Zeneca
Scientific Advisor or Membership: Quanta

---

**VACCINE NAME:** BNT162b2  
**EFFICACY:** 95%  
**DOSE:** 2 doses, 3 weeks apart  
**TYPE:** Muscle injection  
**STORAGE:** Freezer storage only at -94°F (-70°C)

**VACCINE NAME:** mRNA-1273  
**EFFICACY:** 94.5%  
**DOSE:** 2 doses, 4 weeks apart  
**TYPE:** Muscle injection  
**STORAGE:** 30 days with refrigeration, 6 months at -4°F (-20°C)
Implementation

- Logistic issues
  - Limited availability of vaccine
  - Distribution of vaccine across the US
  - Storage of the vaccine
    - Pfizer – requires -70° freezer for storage, but un-reconstituted vaccine stable for 5 days at 2-8°C
- Emotional/belief challenge
  - Acceptance of vaccination
- Clinical issues
  - Data in CKD-ESRD limited or non-existent
  - Rare cases of anaphylaxis
  - Limited data on Ab or cellular immune-response and duration of immunogenicity

Limited Availability of Vaccine

- Healthcare personnel
- Workers in essential and critical industries
- People at high risk for severe COVID-19 illness due to underlying medical conditions
- People 65 years and older
Limited Availability of Vaccine

- Healthcare personnel
- Workers in essential and critical industries
- People at high risk for severe COVID-19 illness due to underlying medical conditions
- People 65 years and older
- Cancer
- Chronic kidney disease
- COPD (chronic obstructive pulmonary disease)
- Heart conditions, such as heart failure, coronary artery disease, or cardiomyopathies
- Immunocompromised state (weakened immune system) from solid organ transplant
- Obesity (body mass index [BMI] of 30 kg/m² or higher but < 40 kg/m²)
- Severe Obesity (BMI ≥ 40 kg/m)
- Pregnancy
- Sickle cell disease
- Smoking
- Type 2 diabetes mellitus


<table>
<thead>
<tr>
<th>Phase</th>
<th>Groups recommended to receive COVID-19 vaccine</th>
<th>No. (millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1a</td>
<td>Health care personnel</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>Long-term care facility residents</td>
<td>3</td>
</tr>
<tr>
<td>1b</td>
<td>Frontline essential workers¹</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>Persons aged ≥75 years</td>
<td>21</td>
</tr>
<tr>
<td>1c</td>
<td>Persons aged 65–74 years</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>Persons aged 16–64 years² with high-risk medical conditions</td>
<td>110</td>
</tr>
<tr>
<td></td>
<td>Essential workers³ not recommended for vaccination in Phase 1b</td>
<td>57</td>
</tr>
<tr>
<td>2</td>
<td>All persons aged &gt;16 years² not previously recommended for vaccination</td>
<td>All remaining</td>
</tr>
</tbody>
</table>

- Employees in dialysis centers 1a
- Patients undergoing dialysis 1c

MMWR, Dooling K et al, Dec 22, 2020
Data are limited in patients with CKD
No data in patients with kidney transplant


DISTRIBUTION OF VACCINE

Depends where you live in the US?
Which state? Which county?
Covid-19 Vaccinations in the US

Jan 2nd, 2021

https://covid.cdc.gov/covid-data-tracker/#vaccinations

Overall US COVID-19 Vaccine Distribution and Administration

<table>
<thead>
<tr>
<th>Total Doses Distributed</th>
<th>Total Number of People Initiating Vaccination (1st Dose Received)</th>
</tr>
</thead>
<tbody>
<tr>
<td>13,071,925</td>
<td>4,225,756</td>
</tr>
</tbody>
</table>

CDC | Updated: Jan 02 2021 As of 9:00am ET

Federal Pharmacy Partnership for Long-Term Care Program (Subset of Overall Numbers)

<table>
<thead>
<tr>
<th>Doses Distributed for Use in Long-Term Care Facilities</th>
<th>Number of People Initiating Vaccination (1st Dose Received) in Long-Term Care Facilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,217,025</td>
<td>282,740</td>
</tr>
</tbody>
</table>

CDC | Updated: Jan 02 2021 As of 9:00am ET

Total Number of People Initiating Vaccination per 100,000

- Total Number of People Initiating Vaccination (1st Dose Received) Reported to the CDC by State/Territory and for Selected Federal Entities per 100,000

https://covid.cdc.gov/covid-data-tracker/#vaccinations
VACCINATION ACCEPTANCE

Vaccination: Emotional/Belief Challenge

Continuum of Vaccine Acceptance

refuse all | refuse but unsure | delay/refuse some | accept but unsure | accept all

https://bioscope.ucdavis.edu/2020/01/16/science-communication-for-the-middle-ground/

Majority of Americans now say they would get a vaccine for the coronavirus

% of U.S. adults who say if a vaccine to prevent COVID-19 were available today, they...

<table>
<thead>
<tr>
<th>Month</th>
<th>Definite</th>
<th>Probability</th>
<th>Would get the vaccine</th>
<th>Would NOT get the vaccine</th>
</tr>
</thead>
<tbody>
<tr>
<td>May '20</td>
<td>69</td>
<td>23</td>
<td>81%</td>
<td>19%</td>
</tr>
<tr>
<td>Sept '20</td>
<td>63</td>
<td>30</td>
<td>90%</td>
<td>10%</td>
</tr>
<tr>
<td>Nov '20</td>
<td>59</td>
<td>40</td>
<td>82%</td>
<td>18%</td>
</tr>
<tr>
<td>Feb '21</td>
<td>66</td>
<td>21</td>
<td>59%</td>
<td>41%</td>
</tr>
<tr>
<td>May '21</td>
<td>49</td>
<td>99</td>
<td>49%</td>
<td>51%</td>
</tr>
</tbody>
</table>

% among this group who say once others start getting a coronavirus vaccine and there is more information...

Pretty certain would not get vaccine: 53%

Pretty certain would get vaccine: 40%

Possible would get vaccine: 6%

No answer: 1%

Note: Respondents who did not give an answer are not shown.

Source: Survey conducted May 18-20, 2021.

"Need to Get a COVID-19 Vaccine? How to 50% or More" in Research and Development, Pew Research Center
Reasons for not getting vaccinated?

• Denial/Lack of Knowledge
  • I don’t need it - I am not getting sick
  • Misunderstanding of the importance of herd immunity to end the pandemic
• Trust and Transparency
  • Historical events - Tuskegee
  • It will inject a location transmitter into the body
• Fears about Pharma
  • It will change your DNA
  • It can’t be safe – it was developed too fast
  • Adverse events including anaphylaxis

EDUCATION – Purpose and Context

• Leadership – facts, evidence, data
  • Most doctors agree that the benefits of the vaccine for people with chronic kidney disease at any stage, those on dialysis, and kidney transplant recipients are much greater than the risk of serious disease or complications from COVID-19. Talk to your doctor or other healthcare professional about getting a COVID-19 vaccine. (NKF Website)
• Listening to the concerns/beliefs
  • Relatable, confident and empathetic response
• Traditional and alternative communication
  • CDC, Professional Societies, Social Media
Main side effect of COVID-19 Vaccination: A glimmer of hope

I’M NOT THROWING AWAY MY SHOT

THIS IS OUR SHOT!
Vaccination P and P

- Vaccination order from the nephrologist
  - Provide recipient with the “Fact Sheet for Recipients and Caregivers” prior to vaccination
  - Patients should not receive any other vaccines 14 days prior to vaccination until 14 days after second dose.
  - Contraindications to the vaccination:
    - Severe allergic reaction (e.g. anaphylaxis, difficulty breathing, swelling of the face or neck or other event requiring hospitalization) to a previous dose of COVID-19 vaccine or a component of the vaccine
    - Severe allergic reaction to other injectable medication
    - Moderate to severe acute illness
    - COVID positive for a period of 90 days after diagnosis
**Vaccination P and P**

- Center HD patients get the vaccine during the treatment. Home Dialysis patients during the monthly visits.
  - Vaccine administration at least 30 minutes prior to leaving the center
- Center HD Patients
  - Monitor and document any potential systemic reactions or adverse responses for 30 minutes post vaccination. Perform vital signs check
  - Heparin prescription unchanged
- Review medication on crash cart and review acute management with all staff
  - Epi Pen 0.3mg
  - IV Benadryl 25mg
  - Solumedrol 125mg IV
  - PO Acetaminophen 650 mg after vaccine administration and advise continue 650 mg TID for up to 48 hours.
    - Patients with underlying liver disease
- It is mandatory to report any adverse event using the Vaccine Adverse Event Reporting System (VAERS) [https://vaers.hhs.gov/reportevent.html](https://vaers.hhs.gov/reportevent.html), within 24 hours of occurrence.
Neutralizing antibodies bind spike protein, prevent recognition of ACE2 receptor and/or viral fusion

Image from: https://www.prosci-inc.com/ace2-antibodies/

Guo et al. Military Medical Research (2020) 7:11

Immunogenicity in ESRD:
Natural Antibody Response to SARS-CoV-2 infection occurs in HD Patients

A  
\[ P < 0.001 \]  
(\text{linear trend})

B  
\[ P < 0.001 \]  
(\text{linear trend})

Labriola et al CJASN, Nov 2020
Monitoring Ab response in Patients with ESRD

- Opportunity to collect data prior to vaccination
  - Immediate AB response
  - Long term immunogenicity

"Now is the time...for us to care selflessly about one another."

"As we get well into the year, with a combination of vaccines and proper adherence to public health measures, we can end this thing and crush it."

Anthony Fauci, MD

Thank you
Patient Perspective

ROBERT COATIE

Disclosures

Employer:
Consultancy Agreements:
Ownership Interest:
Research Funding:
Honoraria:
Patents and Inventions:
Scientific Advisor or Membership:
Speakers Bureau:
Other Interests/Relationships:
Roundtable

JEFFREY SILBERZWEIG, MD - FACILITATOR

Disclosures

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Consultancy Agreements: Kaneka Pharma, Bayer Pharmaceuticals, Alkahest Biotech
Scientific Advisor or Membership: American Society of Nephrology: COVID-19 Response Team, Emergency Partnership Initiative
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BRIGITTE SCHILLER, MD, FASN

NANCY COLOBONG SMITH, MN, ARNP, CNN

Roundtable Participant Disclosures

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Employer: CDC, HHS, US government

Elizabeth Fortune:
Employer: Self-employed/nonprofit

Jeffrey Hymes, MD:
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Honoraria: InterWell Board of Directors Compensation
Scientific Advisor or Membership: Nephroceuticals
Other Interests/Relationships: KCP

Richard Knight, MBA:
Employer: American Association of Kidney Patients; Bowie State University
Ownership Interest:
Honoraria: Johns Hopkins Center for Health Equity; Personalized Medicine Coalition; American Kidney Fund; Northwestern University
Scientific Advisor or Membership: NIDDK Advisory Council; SRTR Visiting Committee; Scientific Advisory Board for the “Rescuing Kidney at Risk of Discard” project
Speakers’ Bureau: AAKP
Other Interests/Relationships: AAKP – President; Quality Insights Patient Advisory Committee – Member; NRAA/ESRD Forum Health Information Technology Project – Member; NIDDK – Health Information Technology Workgroup; Bowie State University Board of Advisors; SRTR Visiting Committee

Nancy Colobong Smith, MN, ARNP, CNN:
Employer: University of Washington Medical Center
Consultancy Agreements: Kidney Research Institute
Other Interests/Relationships: National Director, ANNA; Board of Directors, ESRD Network 16 (Northwest Renal Network)
Roundtable Discussion

Please send questions to the panelists using the questions panel on your screen.

Closing Remarks

ALAN KLIGER, MD