Just the Facts- COVID-19 and Maternal & Infant Health

Tosin Goje, MD, MSCR, FACOG
Associate Professor OB/GYN and Reproductive Biology

Cleveland Clinic
SARS-CoV-2

- Coronaviruses are single stranded non-segmented RNA viruses
- Causes severe respiratory illness along with other complications including cardiac, hematological, and neurological complications
Physiology

- Pregnant women are more susceptible to microbial infections
- Down regulation of pro-inflammatory cells alter the physiological milieu
  - Shift in the inflammatory cell cascade contributes to overall infectious morbidity

Hospitalized pregnant vs. non-pregnant

- 5.4 x more likely to be hospitalized
- 1.5 x more likely to be admitted to ICU
- 1.7 x more likely to receive ventilation

• Black or Hispanic disproportionately affected by SARS-CoV-2
SARS-CoV-2 infection and COVID-19 vaccination rates in pregnant women in Scotland
Data on the association between COVID-19 in pregnancy and stillbirth are emerging.
Hospitalized pregnant women with COVID-19 can have severe illness

About half of hospitalized pregnant women with COVID-19 had symptoms

Some hospitalized pregnant women who had symptoms had severe outcomes, including:
- ICU admission
- Mechanical ventilation
- Death

Slow the spread and protect yourself from COVID-19 during pregnancy

- Wear a mask when out in public
- Stay 6 feet apart
- Wash hands
- Continue receiving prenatal care

COVID-19-Associated Hospitalization Surveillance Network (COVID-NET) among 13 states
Vaccine Safety Datalink (VSD) surveillance of COVID-19 hospitalizations among eight healthcare centers

CDC.GOV
Underlying Conditions

COVID-19 ASSOCIATED HOSPITALIZATION RELATED TO UNDERLYING MEDICAL CONDITIONS

FACTORS THAT INCREASE COMMUNITY SPREAD AND INDIVIDUAL RISK

CROWDED SITUATIONS
CLOSE / PHYSICAL CONTACT
ENCLOSED SPACE
DURATION OF EXPOSURE

RISK FOR HOSPITALIZATION IF YOU HAVE ANY OF THESE CONDITIONS AND GET COVID-19 COMPARED TO PEOPLE WITHOUT THE CONDITION(S).

- Asthma 1.5x
- Hypertension 3x
- Obesity (BMI ≥ 30) 3x
- Diabetes 3x
- Chronic Kidney Disease 4x
- Severe Obesity (BMI ≥ 40) 4.5x
- 2 Conditions* 4.5x
- 3 or More Conditions* 5x

*Conditions include asthma, obesity, diabetes, chronic kidney disease, severe obesity, coronary artery disease, history of stroke and COPD.

Data has shown that racial and ethnic minority groups with the referenced conditions are at even higher risk for severe COVID-19 illness. Race and ethnicity are risk markers for other underlying conditions that impact health — including socioeconomic status, access to health care, and increased exposure to the virus due to occupation (e.g., frontline, essential, and critical infrastructure workers).

ACTIONS TO REDUCE RISK OF COVID-19

- WEARING A MASK
- SOCIAL DISTANCING (6 FT GOAL)
- HAND HYGIENE
- CLEANING AND DISINFECTION

ALTHOUGH RISK GENERALLY INCREASES WITH AGE, ALL INDIVIDUALS SHOULD ROUTINELY TAKE ACTIONS TO REDUCE RISK OF INFECTION AND AVOID ACTIVITIES THAT INCREASE COMMUNITY SPREAD.

Source: Ko JY, Danielson ML, Town M et al. 2020.
Underlying Conditions

Increased risk severe COVID illness

- Cancer
- Chronic kidney disease
- Chronic obstructive pulmonary disease
- Down Syndrome
- Heart conditions, such as heart failure, coronary artery disease, or cardiomyopathies
- Immunocompromised state (weakened immune system) from solid organ transplant
- Obesity BMI >= 30 kg/m2
- Pregnancy
- Sickle cell disease
- Smoking
- Type 2 diabetes mellitus

Possibly increased risk

- Asthma (moderate-to-severe)
- Cerebrovascular disease
- Cystic fibrosis
- Hypertension or high blood pressure
- Neurologic conditions, such as dementia
- Liver disease
- Overweight (BMI > 25 kg/m2)
- Pulmonary fibrosis (having damaged or scarred lung tissues)
- Thalassemia (a type of blood disorder)
- Type 1 diabetes mellitus
• The adjusted risk for stillbirth was higher in deliveries with COVID-19 compared with deliveries without COVID-19
  - COVID-19 documented at delivery was associated with increased risk for stillbirth, with a stronger association during the period of Delta variant predominance

• MMWR/Nov 26, 2021
COVID-19 Vaccine during Pregnancy: Preterm, or SGA (Dec15-2020-July 2021)

• CDC recommends vaccination for women who are pregnant, recently pregnant and lactating, who are trying to get pregnant now, or who might become pregnant in the future

• COVID-19 vaccination during pregnancy was not associated with preterm birth or small for gestational age at birth (SGA)

• MMWR/January 7,2022
Women Societies agree with CDC

• COVID-19 vaccines strongly recommended for pregnant and lactating individuals

• They do not increase risk of infertility, 1\textsuperscript{st} or 2\textsuperscript{nd} tri miscarriage, stillbirth or congenital anomalies
Fig. 4. Cellular mechanism of immune activation. Reproduced from Ghaffari et al., 2020. [57] (1) The SARS-CoV-2 virus enters the host cell via interaction between viral spike and host cell receptor, angiotensin-converting enzyme 2 (ACE2) receptor. (2,3) Cellular replication and release from the host cell proceed. Evidence will be specified and discussed.
mRNA vaccine is not a live vaccine but teaches our cells to make harmless piece of a "spike protein" which is found on the surface of the "RONA virus".

After making the protein, our cells display it on their surface, our immune system then recognize that it does not belong there and respond to get rid of it.

This is how the body is protected and this protection wanes over time.

When our immune system responds, antibodies are produced.

This is what is seen in vaccine & natural immunity when the real virus "spike protein" is seen by our immune system. Remember, not everyone’s immune system is strong. some have underlying condition or weakened immunity.
Vaccines

- Myths
- Facts
- Rumors
- Misinformation

Evidence-based information
How mRNA vaccines work

Carry genetic information to manufacture the spike protein of SARS-COV-2 (protein on virus surface)
Injected into muscle
Cells manufacture spike protein
Spike protein recognized by immune system
mRNA rapid degraded (within days), removed by lymphatic system and never enters nucleus or integrated into cell DNA
Given how mRNA vaccines act locally (at the site of injection) and are rapidly degraded and removed by lymphatic system, it is unlikely that the vaccine would reach and cross the placenta
### Side effects of vaccines

**Table 1. Mild Side Effects Among All Study Participants**

<table>
<thead>
<tr>
<th></th>
<th>Injection Site Reactions</th>
<th>Fatigue</th>
<th>Chills</th>
<th>Muscle Pain</th>
<th>Joint Pain</th>
<th>Headaches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderna</td>
<td>91.6%</td>
<td>68.5%</td>
<td>43.4%</td>
<td>59.6%</td>
<td>44.8%</td>
<td>63%</td>
</tr>
<tr>
<td>Pfizer-BioNTech</td>
<td>84.10%</td>
<td>62.90%</td>
<td>31.90%</td>
<td>38.30%</td>
<td>23.60%</td>
<td>55.10%</td>
</tr>
<tr>
<td>Janssen Biotech Inc.</td>
<td>48.6%</td>
<td>38.2%</td>
<td>N/A</td>
<td>33.2%</td>
<td>N/A</td>
<td>38.9%</td>
</tr>
</tbody>
</table>

*Fever was the least common side effect reported; see text above for data on frequency of fever*

Fertility: Myth vs. Facts

• Does not affect fertility in men or women
  - Multiple studies have looked at semen parameters in IVF clinics in men who received the mRNA vaccine and found no difference
  - Multiple studies have shown no increase in miscarriage, Low birth weight, PTB or poor obstetric history with vaccination
  • Although majority were vaccinated in 2nd and 3rd tri. Best time for vaccine is NOW!
Transfer of immunity via placenta and breastmilk

PROTECT YOUR BABY
Maternal-neonatal transfer of SARS-CoV-2 immunoglobulin G antibodies among parturient women treated with BNT162b2 messenger RNA vaccine during pregnancy

Cord and neonatal blood spot levels of antibodies were significantly higher in infants of vaccinated women than in those of women recovered from COVID-19
Benefits to Newborn

- Pregnant and lactating women elicited comparable vaccine induced humoral immune responses to non-pregnant controls, and generated higher antibody titers than those observed following SARS-CoV-2 infection in pregnancy.
- Vaccine-generated antibodies were present in umbilical cord blood and breastmilk after maternal vaccination.
Benefits to Newborn

• COVID-19 vaccination confers a robust humoral response in pregnant and lactating women and immune transfer to neonates via placenta and breastmilk.
Menstruation: Myth Vs Facts

- Women receiving one dose of a COVID-19 vaccine during a single menstrual cycle had an increase in cycle length of nearly one day, compared to unvaccinated women.
- The increase in cycle length - a longer time between bleeding - was not associated with any change in the number of days of menses (days of bleeding).
  - According to the authors, the increase they saw was well within the range of normal variability. They added that additional research is needed to

Boosters

• Observation of up to 6 months in the vaccinated with mRNA vaccine showed a decline in efficacy estimated at a rate of approx. 6% every 2 months, with 84% efficacy 4-6 months after the 2\textsuperscript{nd} dose.

- Administration of booster dose effectively recalls specific immune response of SARS-CoV-2 and increases serum antibody levels.
Boosters

• This response likely restores the initial and considerable levels of protection against infection, even for the more highly transmissible variants
Boosters

• Even among the un-boosted vaccinated group, protection against severe disease after initial vaccination regimen remain high
  • Preferred Boosters are mRNA vaccines
  • You can Mix and Match
Vaccine Breakthrough Infections

Less severe, but still contagious

Rates of COVID-19 Cases by Vaccination Status

- Unvaccinated
- Vaccinated
Bust the Myths

• Natural immunity is better
  - Vaccine is safer and more dependable. One study showed that people who recovered from COVID-19 and did not get vaccinated are more than 2 times more likely to get COVID again than those who recovered and got fully vaccinated
  
• Natural immunity depends on age, severity of illness, how remote the last infection
Cleveland Clinic

100 YEARS
EST. 1921

THE FUTURE OF HEALTHCARE
SINCE 1921