OPTUMHealth Education

NRS Nursing Educational Series

COVID in Pregnancy

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Your Presenter

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Disclosure Information

- None

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Objectives

- Identify risk factors for severe COVID disease in pregnant women
- Discuss how COVID affects pregnancy
- Describe how maternal COVID vaccination affects neonate

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Case Study

- **24yo G2P1001 at 33 4/7 weeks gestation**
- **C/o fevers, cough, mild SOB, sore throat, malaise, HA yesterday, now resolved**
  - CXR negative, COVID-19 positive
  - T 102.4 HR 104-128 RR 18-30 BP 130-155/76-95 SpO2 97-100%
  - HD #3 Cesarean section
  - POD #9 transferred to a higher level of care for ECMO
  - ECMO for 8 weeks
  - Developed large pneumatoceles and pulmonary fibrosis
  - Discharged to LTAC after 3 months

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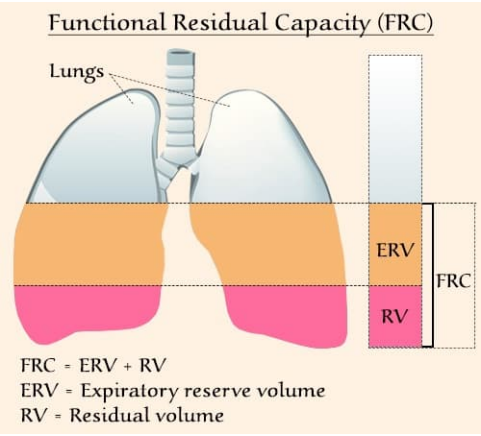
Maternal Physiology and COVID-19

- Immune changes
- Increased tidal volume, functional
- Decreased ability to
- clear secretions
- Hypercoagulable



https://blog.mass.gov/publichealth/the-importance-of-immunizations/covid-19-and-pregnancy-in-massachusetts/

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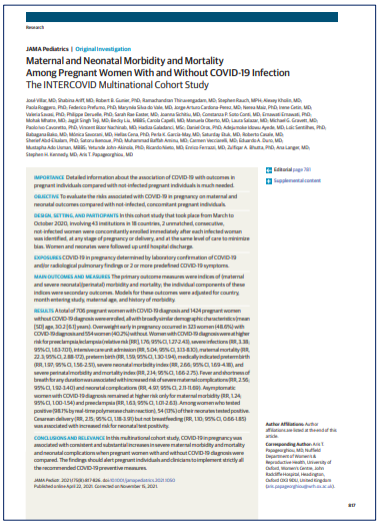
How does COVID Affect Pregnancy?

Maternal and Neonatal Morbidity and Mortality Among Pregnant Women With and Without COVID-19 Infection
The INTERCOVID Multinational Cohort Study

- Prospective, longitudinal, observational study
- 43 hospitals, 18 countries
- 706 women enrolled
- 18 years and older
- Diagnosis of COVID at any stage during pregnancy
- Matched to 1424 controls



Research

JAMA Pediatrics | Original Investigation

Maternal and Neonatal Morbidity and Mortality Among Pregnant Women With and Without COVID-19 Infection
The INTERCOVID Multinational Cohort Study

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IMPORTANCE Detailed information about the association of COVID-19 with outcomes in pregnant individuals compared with not-infected pregnant individuals is much needed.

OBJECTIVE To evaluate the risks associated with COVID-19 in pregnancy on maternal and neonatal outcomes compared with not-infected, concomitant pregnant individuals.

DESIGN, SETTING, AND PARTICIPANTS In this cohort study that took place from March to October 2020, involving 43 institutions in 18 countries, 2 unmatched, consecutive, not-infected women were concomitantly enrolled immediately after each infected woman was identified, at any stage of pregnancy or delivery, and at the same level of care to minimize bias. Women and neonates were followed up until hospital discharge.

EXPOSURES COVID-19 in pregnancy determined by laboratory confirmation of COVID-19 and/or radiological pulmonary findings or 2 or more predefined COVID-19 symptoms.

MAIN OUTCOMES AND MEASURES The primary outcome measures were indices of (maternal and severe neonatal (perinatal) morbidity and mortality; the individual components of these indices were secondary outcomes. Models for these outcomes were adjusted for country, month entering study, maternal age, and history of morbidity.

RESULTS A total of 706 pregnant women with COVID-19 diagnosis and 1424 pregnant women without COVID-19 diagnosis were enrolled, all with broadly similar demographic characteristics (mean [SD] age, 30.2 [6.1] years). Overweight early in pregnancy occurred in 323 women (48.6%) with COVID-19 diagnosis and 554 women (40.2%) without. Women with COVID-19 diagnosis were at higher risk for preeclampsia/eclampsia (relative risk [RR], 1.76; 95% CI, 1.27-2.43), severe infections (RR, 3.38; 95% CI, 1.63-7.01), intensive care unit admission (RR, 5.04; 95% CI, 3.13-8.10), maternal mortality (RR, 22.5; 95% CI, 2.88-175.2), preterm birth (RR, 1.59; 95% CI, 1.30-1.94), medically indicated preterm birth (RR, 1.97; 95% CI, 1.56-2.51), severe neonatal morbidity index (RR, 2.66; 95% CI, 1.69-4.18), and severe perinatal morbidity and mortality index (RR, 2.14; 95% CI, 1.66-2.75). Fever and shortness of breath for any duration was associated with increased risk of severe maternal complications (RR, 2.56; 95% CI, 1.92-3.42) and neonatal complications (RR, 4.01; 95% CI, 2.71-5.88). Asymptomatic women with COVID-19 diagnosis remained at higher risk only for maternal morbidity (RR, 1.24; 95% CI, 1.00-1.54) and preeclampsia (RR, 1.63; 95% CI, 1.05-2.63). Among women who tested positive (98.7% by real-time polymerase chain reaction), 54 (13%) of their neonates tested positive. Cesarean delivery (OR, 2.15; 95% CI, 1.18-3.91) but not breastfeeding (OR, 1.10; 95% CI, 0.66-1.85) was associated with increased risk for neonatal test positivity.

CONCLUSIONS AND RELEVANCE In this multinational cohort study, COVID-19 in pregnancy was associated with consistent and substantial increases in severe maternal morbidity and mortality and neonatal complications when pregnant women with and without COVID-19 diagnosis were compared. The findings should alert pregnant individuals and clinicians to implement strictly all the recommended COVID-19 preventive measures.

JAMA Pediatr. 2021;175(8):817-826. doi:10.1001/jamapediatrics.2021.1050
Published online April 20, 2021. Corrected on November 15, 2021.

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Supplemental content

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How Does COVID Affect Pregnancy?

Women with COVID

- Higher rates of PIH,
- Higher rates of infections requiring antibiotics,
- Higher ICU admissions
- Higher rate of preterm birth
- 11 deaths
- “Overweight" women at highest risk

Women without COVID

- 1 death from preexisting cancer

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How Does COVID Affect Pregnancy?

Effects on Neonate

- No increased positivity rate with breast feeding
- Higher rate of preterm delivery, low birth rate
- 12% of infants with COVID + moms at delivery also tested positive—so low rate of vertical transmission

Limitations—COVID "negative" women (ie. case controls) did NOT have negative COVID tests

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How Does COVID Affect Pregnancy?

CDC data on stillbirths (Mar 2020 thru Sept 2021)

Morbidity and Mortality Weekly Report. 2021;70(47):1640-1645

- Stillbirth rate in women hospitalized for delivery
- 1,249,634 deliveries at 736 hospitals
- 8,154 stillbirths were documented, affecting 0.64% and 1.26% of deliveries without COVID-19 and with COVID-19, respectively
  - Relative risk 1.90
- During delta wave (July-September 2021) the relative risk jumped to 4.04
- Among deliveries with COVID-19, chronic hypertension, multiple-gestation pregnancy, adverse cardiac event/outcome, placental abruption, sepsis, shock, acute respiratory distress syndrome, mechanical ventilation, and ICU admission were associated with a higher prevalence of stillbirth

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Mississippi series from MMWR

- 1637 cases of COVID during pregnancy
  - 15 deaths (defined as death during pregnancy or within 90 days of end of pregnancy)
  - 15 Admitted to ICU
  - 14 Invasive mechanical ventilation
  - 7 Emergency cesarean delivery
  - 3 Died during pregnancy
  - 2 Died after live birth

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Mississippi series cont'd

- Underlying medical conditions
  - Obesity 10
  - Hypertension
  - Diabetes (preexisting or gestational) 4
  - Cancer 2
  - HIV with pneumocystis pneumonia 1
- COVID-19 vaccination status, no. (%)
  - Fully vaccinated 0
  - Partially vaccinated 1
  - Unvaccinated** 14

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Maternal COVID: Generalities

- Infection more likely to be asymptomatic than in nonpregnant women of reproductive age
- Symptoms are similar, often more mild
- COVID-related transaminitis and thrombocytopenia
  - may be confused with HELLP syndrome
    - (acute hypertension is NOT seen with COVID)
- Increased risk of ventilatory support and death compared with nonpregnant women
  - (although several studies have found no difference)

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Maternal COVID: Generalities

- Risk factors for severe disease:
  - Age
  - Obesity
  - Preexisting comorbidities (esp HTN and DM)
  - Unvaccinated
  - Late second and third trimesters
  - Women from minority groups
- CDC data in lab-confirmed COVID infections- pregnant women had a higher rate of:
  - ICU admissions, invasive ventilation, ECMO & death

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Transplacental passage of antibodies to fetus

Research letter published online at Jama.com on February 7, 2022

- Enrolled 77 women who received vaccination 21-32 weeks gestation, and 12 women infected 25-32 weeks gestation.
- Maternal blood and cord blood collected at delivery show higher levels of antibodies in infants born to vaccinated mothers
- The difference persisted at 6 months of life although only 28 of the vaccinated and 12 of the unvaccinated babies were tested.

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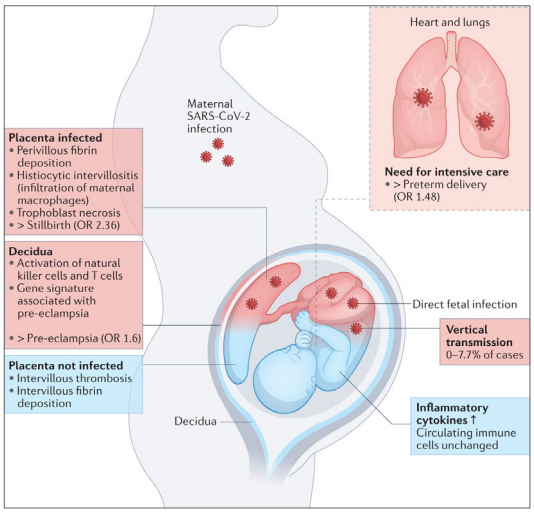
COVID and Placenta

- Placenta acts as a barrier to transmission of viruses to fetus
- Viral particles have been found on fetal surface of placenta, and within the placenta



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COVID and Placenta

- Placental pathologic changes are similar to those seen in pregnancies complicated by eclampsia/preeclampsia
- Placentas from women with active COVID at time of delivery show inflammation and areas of infarction

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Pregnancy and Newborn Outcomes

- Delta associated with more severe disease
- Risk of vertical transmission is unclear
  - Possible routes of transmission—hematogenous (most common), ascending
- No increased risk of miscarriage or congenital anomalies
- Data on preterm birth risk and cesarean birth are unclear and may be limited to patients with severe disease and/or comorbidities.
- Increased rates of hypertensive disorders of pregnancy

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Pregnancy and Newborn Outcomes

- Data on stillbirth due to COVID is unclear although suggest an increased risk, especially with the delta variant
- Maternal infection after 20 weeks increased the risk of adverse outcomes

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Pregnancy and Newborn Outcomes

- Over 95% of infants born to + moms are uninfected

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Pregnancy and Newborn Outcomes

- Neonatal morbidity largely related to preterm birth
- No increased risk of early neonatal death
- Maternal inflammation from COVID may increase the risk of neuropsychiatric disorders in children

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Care of the Asymptomatic Infected Patient

- Self-monitor for development of symptoms
- Continue routine care for asymptomatic patients
- Timing and route of delivery per obstetric indications

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Care of the Symptomatic Infected Patient

- Assess for risk factors
- General guidelines for hospitalization
  - SpO2 <94% on room air
  - RR >30
  - Lung infiltrates >50%
- Chest X-ray and CT are safe in pregnancy

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Care of the Symptomatic Infected Patient

Treatment guidelines (hospitalized)

- Maintain SpO2 > 95%
- Prone or semi-prone position whenever possible
- Displace uterus off aorta
- Use of antiviral medications, monoclonal antibodies
- Limited pregnancy data
- Consider based on severity of disease
- VTE prophylaxis
- Routine monitoring of fetus and uterus
- Consider delivery for worsening maternal condition, esp if GA >32 weeks

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Care of the Symptomatic Infected Patient

Treatment guidelines (hospitalized)

- Intubate and mechanically ventilate
- ECMO if needed

CDC. Characteristics and Maternal and Birth Outcomes of Hospitalized Pregnant Women with Laboratory-Confirmed COVID-19 — COVID-NET, 13 States, March 1–August 22, 2020 | MMWR (cdc.gov)

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Care of the Symptomatic Infected Patient

Home care

- As per nonpregnant patients
- Limit duration of use of NSAIDS
- Consider COVID-specific treatment if mom is at high risk for progression to severe disease

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Care of the Symptomatic Infected Patient

Home care

- When to call provider:
  - Worsening dyspnea
  - RR >24, HR >100
  - Unremitting fever
  - Inability to tolerate PO
  - Persistent pleuritic chest pain
  - Confusion
  - Contractions, bleeding, decreased fetal movement

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Intrapartum and Postpartum Care of the Infected Patient

- VTE prophylaxis until ppd #10
- Breast-feeding- uncertain mode of transmission

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Vaccination in Pregnancy

- Does vaccination DURING pregnancy adversely affect the pregnancy?
- Ontario population-based study
- Vaccinated women
  - Older
  - More affluent
- No differences in adverse outcomes

https://www.uchicagomedicine.org/forefront/coronavirus-disease-covid-19/mrna-covid-19-vaccine-pregnancy-breastfeeding

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- **From MMWR Feb 28, 2022—Effectiveness of Maternal Vaccination with mRNA COVID-19 Vaccine During Pregnancy Against COVID-19–Associated Hospitalization in Infants Aged <6 Months — 17 States, July 2021–January 2022**
  - 20 pediatric hospitals from July 2021 through Jan 2022.
  - 379 hospitalized infants <6 months of age
    - 176 WITH COVID or COVID symptoms AND +PCR. 16% maternal vaccination rate.
    - 203 with or without symptoms AND –PCR. 32% maternal vaccination rate.

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Maternal Vaccination—Does it Protect the Neonate?

- 15% case infants went to ICU—maternal vax rate 12%
- Case infants more likely to be black or Hispanic
- Conclusions
  - Vaccination later in pregnancy seems to be more effective
  - Small sample size
  - Vaccination status based on recollection for several mothers
  - No information on confounding factors such as maternal infection or behaviors during pregnancy.

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Maternal Vaccination—What do we KNOW?

Benefits of vaccination:

- Decreased risk of infection
- Decreased risk of perinatal death
- Decreased hospitalization for babies up to six months of age
- CDC's V-Safe Vaccine Pregnancy Registry
  - Data on 827 completed pregnancies with no "obvious safety signal"
- CDC's Vaccine Adverse Event Reporting System
  - Data on 154 pregnancies. No excess in side effects or adverse events

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Maternal Vaccination—What do we KNOW?

Benefits of vaccination, cont'd:

- No increase in miscarriage rates
- Early vaccination provides most benefit for mom. Later in pregnancy provides more benefit for baby but the benefits do not outweigh risks to mom.
- Vaccination before pregnancy does not affect fertility.

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Maternal Vaccination—Cautionary Notes

A new examination of the data from the randomized clinical trials of COVID-19 vaccines

MRNA vaccines had no impact on all-cause mortality

Adeno-vector vaccines (Johnson and Johnson) reduced all-cause mortality by a relative risk of 0.37.

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Maternal Vaccination—Cautionary Notes cont'd

Increased emergency cardiovascular events among under-40 population in Israel during vaccine rollout and third COVID-19 wave

- examined the rates of calls to emergency services that were related to cardiac arrest and acute coronary syndrome
- Three time periods—Pre-COVID, Early COVID (before vaccination) and during vaccine rollout and third COVID wave

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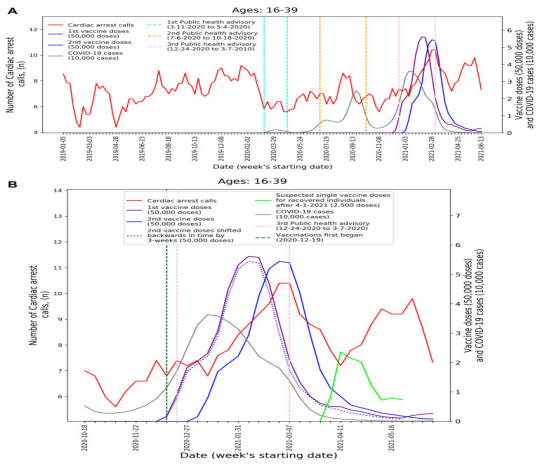
Maternal Vaccination—Cautionary Notes cont'd



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Maternal Vaccination—Final Thoughts

- Endemic phase of the pandemic
- Assess maternal risk factors
- Consider antibody testing prior to vaccination
- ?Selective vaccination for those with risk factors or in the absence of antibodies

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Question 1

- Which of the following statements about COVID 19 in pregnancy is true?

a. Pregnant women are more likely to have asymptomatic infections.

b. Maternal vaccination is most effective in transferring protection to the infant when given as early in pregnancy as possible.

c. New mothers with COVID should not breast feed their infants.

d. Vaccination should not be administered in the first trimester.

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Question 1

- Which of the following statements about COVID 19 in pregnancy is true?

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Question 2

- 2. The following are risk factors for severe disease in pregnant women

a. Obesity

b. Hypertension

c. Hypothyroidism

d. Both A and B

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Question 2

- 2. The following are risk factors for severe disease in pregnant women
  - a. Obesity
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  - c. Hypothyroidism
  - d. Both A and B

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Question 3

- 3. Hospitalization should be considered for the symptomatic patient who has:
  - a. A positive test
  - b. Mild shortness of breath that is not worsening
  - c. An unremitting fever
  - d. Infected family members

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Question 3

- 3. Hospitalization should be considered for the symptomatic patient who has:
  - a. A positive test
  - b. Mild shortness of breath that is not worsening
  - c. An unremitting fever
  - d. Infected family members

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Question 4

- 4. True or False: ECMO: It isn't just for babies anymore.
  - a. True
  - b. False

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Question 4

- 4. True or False: ECMO: It isn't just for babies anymore.
  - a. True
  - b. False

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Thank You.

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Any Questions

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