

Pregnancy during the COVID Pandemic

University of Toronto OBGYN QIPS COVID-19 in Pregnancy Webinar

Wendy L. Whittle MD, PhD, FRCSC

Assistant Professor, University of Toronto

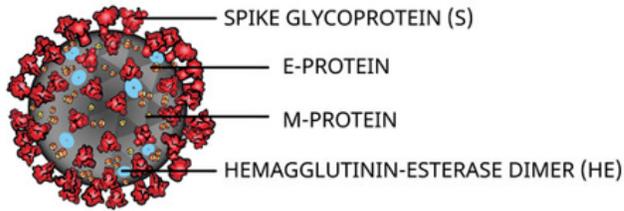
Department of Obstetrics & Gynecology

Sinai Health System (Mount Sinai Hospital)

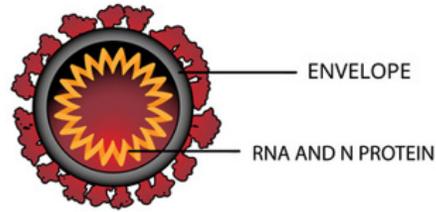


SEVERE ACUTE RESPIRATORY SYNDROME CORONAVIRUS 2 (SARS-COV-2)

SARS-COV-2 VIRION



CROSS-SECTION



FEVER



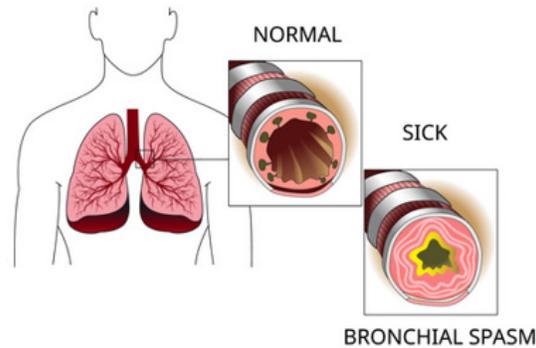
CHEST PAIN



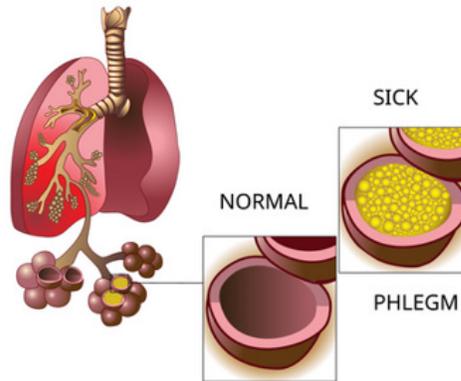
COUGH



RESPIRATORY FAILURE

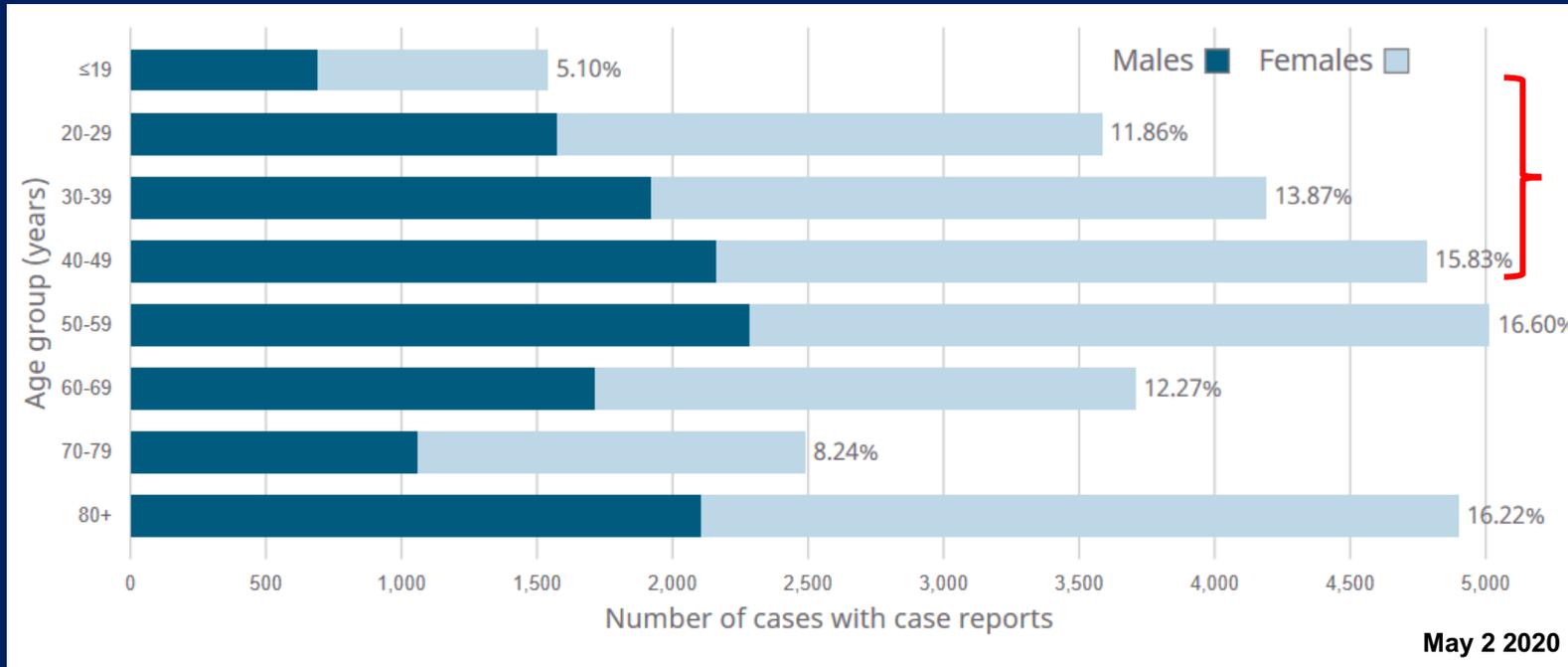


PNEUMONIA



? How does this apply to the pregnant population

Coronavirus in Pregnancy

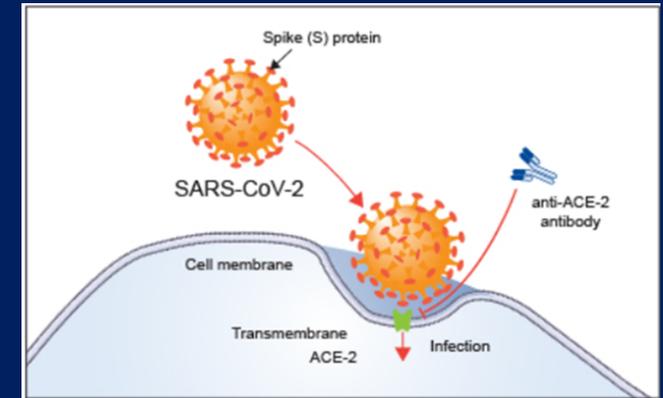


15-20% of COVID + are Reproductive Age Women

1. No difference in rate of infection in aged-match pregnant women
2. No difference in the symptom profile * temperature and cough most common
3. No difference in the spectrum of disease: 80-85% mild COVID infection
4. Same risk factors for moderate-severe disease: BMI, diabetes, hypertension, cardiac Dx

Fetal effects of COVID infection in pregnancy

- Reports of infection across all GA
 - majority of report > 34w
- Too early in experience to comment on:
 - a. teratogenicity
 - b. disruption of organ development &/or function
 - c. fetal growth
 - d. fetal wellbeing



IMPACT

Maternal respiratory illness
Maternal infection
Maternal critical illness

Hypoxemia
Inflammation
MSOF

Direct viral effect

↓
ACE-2 found at human
maternal-fetal interface
& fetal organs

Obstetrical effects of COVID infection in pregnancy

n= 33 studies with 385 pregnancies reported



- All deliveries were women with active infection
- Range of GA at birth: 30-41w
- **15.2%** Preterm birth: Indicated by maternal status
Spontaneous
Indicated by fetal status
- **7.8%** Low birth weight
- **69.4%** C/Section **30.6%** Vaginal birth
- **3** reported cases of IUFD (associated co-morbidity)



Maternal effects of COVID infection in pregnancy

1 Mild Cases

The clinical symptoms are mild and no pneumonia manifestations can be found in imaging.

2 Moderate Cases

Patients have symptoms such as fever and respiratory tract symptoms, etc. and pneumonia manifestations can be seen in imaging.

3 Severe Cases

Adults who meet any of the following criteria: respiratory rate ≥ 30 breaths/min; oxygen saturation $\leq 93\%$ at a rest state; arterial partial pressure of oxygen (PaO_2)/oxygen concentration (FiO_2) ≤ 300 mmHg. Patients with $> 50\%$ lesions progression within 24 to 48 hours in lung imaging should be treated as severe cases.

4 Critical Cases

Meeting any of the following criteria: occurrence of respiratory failure requiring mechanical ventilation; presence of shock; other organ failure that requires monitoring and treatment in the ICU.

Critical cases are further divided into early, middle and late stages according to the oxygenation index and compliance of respiratory system.

- Early stage: $100 \text{ mmHg} < \text{oxygenation index} \leq 150 \text{ mmHg}$; compliance of respiratory system $\geq 30 \text{ mL} / \text{cmH}_2\text{O}$; without organ failure other than the lungs. The patient has a great chance of recovery through active antiviral, anti-cytokine storm, and supportive treatment.

- Middle stage: $60 \text{ mmHg} < \text{oxygenation index} \leq 100 \text{ mmHg}$; $30 \text{ mL/cmH}_2\text{O} >$ compliance of respiratory system $\geq 15 \text{ mL/cmH}_2\text{O}$; may be complicated by other mild or moderate dysfunction of other organs.

- Late stage: oxygenation index $\leq 60 \text{ mmHg}$; compliance of respiratory system $< 15 \text{ mL/cmH}_2\text{O}$; diffuse consolidation of both lungs that requires the use of ECMO; or failure of other vital organs. The mortality risk is significantly increased.

Upper respiratory infection

* Most common

Pneumonia
Increasing signs
of respiratory
distress

* Link to pre-existing
co-morbidity

Respiratory Failure
Septic Shock
MSOF



Moderate & Severe COVID infection in pregnancy

Cardiomyopathy

Viral induced

- global hypokinesia
- decreased L ejection fraction

Mortality

2 cases

Attributed to ARDS

- ? Developing country impact
- + Social media reports



Pre-eclampsia

2 cases

“Mimic” or Co-morbidity

Transaminitis

↑ LDH

Thrombopenia

↑ CR

Overlapping symptoms

Use: PCR, Urate +/- PLGF

Coagulopathy

2 cases

↑ d-dimer

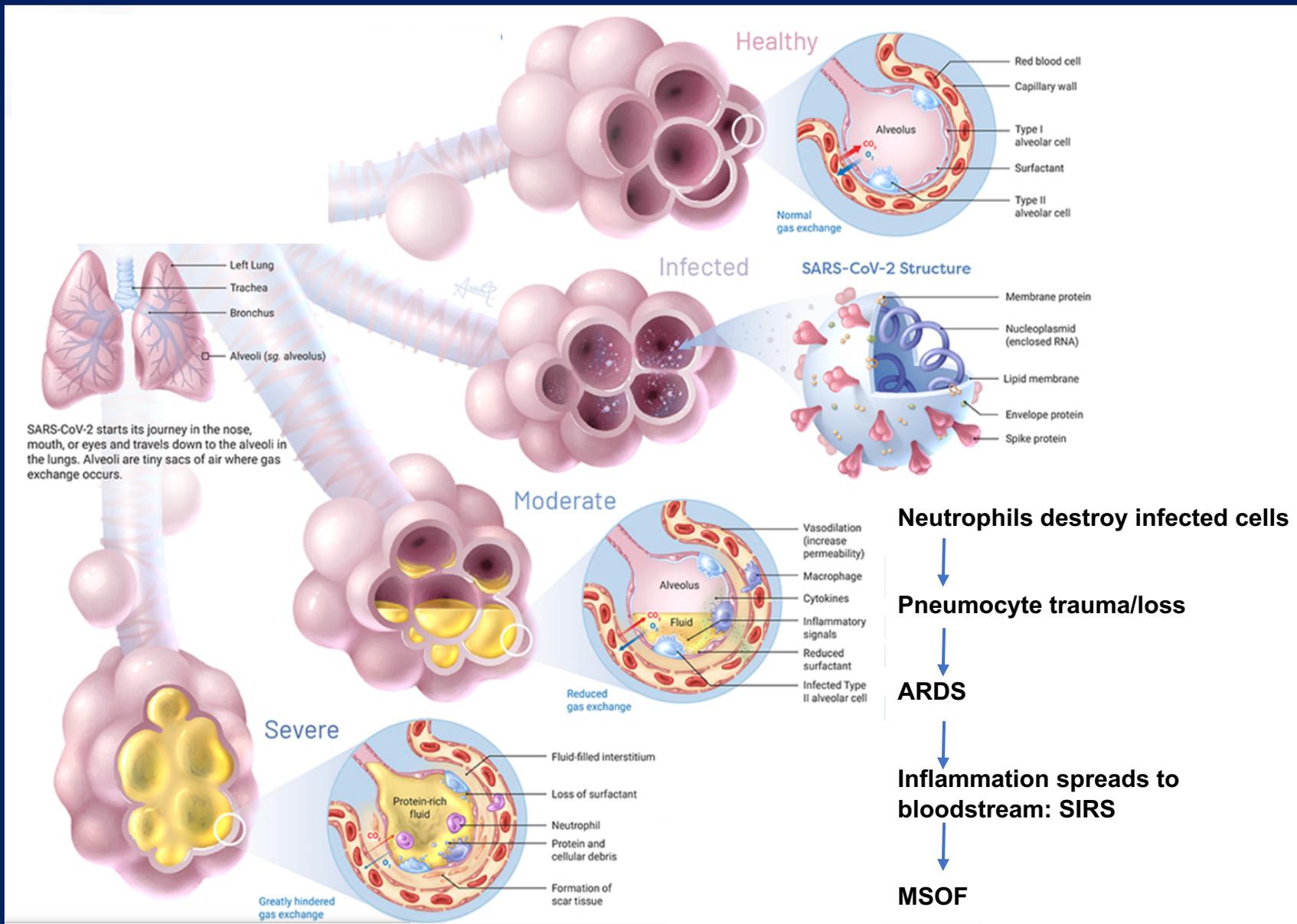
↓ fibrinogen

↑ PTT

- Sepsis activation of coagulation & fibrinolytic cascades
- Effect: thrombotic or hemorrhagic
- No report of PE



COVID Pneumonia



COVID-19 binds to type II pneumocyte

Uses cellular machinery to replicate

Ruptures host cell and releases virus to the alveolus

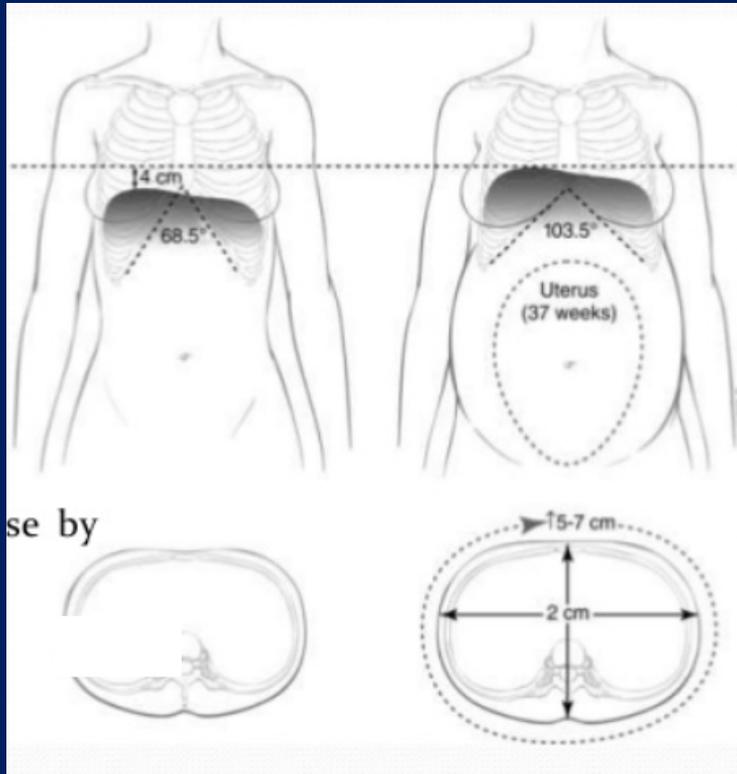
- Immune response triggered
- Virus attacks neighboring type II cells
- Virus present in respiratory droplets/secretions

Fluid accumulates in alveolus

- dilutes surfactant

Decrease Gas exchange & Increase WOB

COVID Pneumonia in pregnancy



- Less lung volume
 - Increased secretions
 - Increased minute ventilation
 - Increased O₂ consumption
- * Altered cellular immunity

Predispose to maternal deterioration

Reported Cases:
 4% admitted to ICU
 1.6% mech ventilation
 1 case ECMO

Arterial blood gas measurement	1st trimester	3rd trimester	Nonpregnant
pH	7.42–7.46	7.43	7.4
PaO ₂ (mm Hg)	105–106	101–106	93
PaCO ₂ (mm Hg)	28–29	26–30	37
Serum HCO ₃ (mEq/L)	18	17	23

COVID Pneumonia management in pregnancy

Start oxygen therapy if O2 sat < 94%

Patient in prone position

Avoid nebulized treatments

Oxygen delivery:

Nasal Cannula (regular): 1-6 L/min

High Flow Nasal Cannula: 50-60 L/min

Non invasive positive pressure: ** AGMP therefore not used

Endotracheal Intubation

Include RT / Anesthesia for airway management

Fluid management:

Conservative strategy associated with decreased duration of mech vent

Aim: negative daily balance 0.5-1.0L

Encourage PO fluid; TKVO

Avoid maintenance fluid

If positive balance & resp symptoms: consider furosemide Rx

Antibiotics:

NO INDICATION

if suspect CAP: azithromycin and ceftriaxone

Anti viral / Immune modulator:

No indication

Research ONLY



Management of pregnancy with COVID infection

MILD disease: DOES NOT require hospitalization

- self-isolation at home
- supportive therapy: acetaminophen, hydration
- education: warning signs
- medical / obstetrical visits as necessary: use of PPE & isolated clinic space
- post recovery: not infectious
follow up for fetal growth/ well being
no special precautions for delivery

Regardless of GA

Indications for hospitalization:

- Shortness of breath (unable to walk across room, speak full sentence)
- Cough with blood
- Chest pain
- S/S dehydration
- Decreased level of consciousness
- Oxygen saturation < 94%
- CXR consistent with pneumonia (ground glass opacities)

Illness assessment
Consideration of co-morbidity



Surveillance & warning signs

- Vitals with O2 saturation q4h- if requiring oxygen support increase vitals to q hourly with 1:1 RN care

If requires: New use of oxygen support
 RR increases despite normal O2 saturation
 Increasing amount of oxygen to maintain saturation >94%

**WARNING SIGN OF RESPIRATORY DETERIORATION:
 COVID SPECIFIC**

Warning signs of ACUTE maternal deterioration:
 Increased O2 demands by 50% over 1-2h
 O2 sat < 94% despite O2 support
 >4.0L O2 by facemask

MEOWS: Maternal Early Obstetrical Warning Score

Physiological parameters	Normal values	Yellow alert	Red Alert
Respirator rate	10-20 breaths per minute	21-30 breaths per minute	< 10 or >30 breaths per minute
Oxygen saturation	96-100%		< 95 %
Temperature	36.0-37.4°C	35-36 or 37.5- 38°C	< 35 or > 38°C
Systolic blood pressure	100-139 mmHg	150 – 180 or 90 – 100 mmHg	>180 or < 90 mmHg
Diastolic blood pressure	50-89 mmHg	90–100 mmHg	>100 mmHg
Heart rate	50-99 beats per minute	100- 120 or 40 -50 beats per minute	>120 or < 40 beats per minute
Neurological response	Alert	Voice	Unresponsive, pain

Based on unique pregnancy physiology

ANY DETERIORATION

2 yellow or 1 red alert triggers MD evaluation



Principles for location of care

Location depends on the local facility:
Antenatal ward or L&D in level III centre
Medicine ward in community setting

If patient is admitted to ICU:
May consider transfer

- a. PREVIABLE gestation:
 - DOES NOT require transfer for OB reasons
 - May require transfer for MED reasons

- a. PRETERM VIABLE gestation & referral facility DOES NOT have neonatal facilities:
 - CONSIDERATION could be made for transfer given the inherent PTB risk
 - May require transfer for MED reasons



Preterm Delivery Considerations

- COVID-19 infection is **NOT** a direct indication for delivery
- Decision to deliver is **individualized** based on maternal & fetal status, GA

General principle of critical care in pregnancy: Delivery will not improve maternal status
Delivery MAY trigger deterioration

Questions:

1. Would delivery improve maternal vent status
2. Is there evidence of abnormal fetal status
3. Which is greater:
 - risk of prematurity
 - risk of intrauterine fetal demise
4. What level of fetal surveillance
 - none
 - NST / EFM
5. What abnormal surveillance to act on

Suggested indications for delivery with severe COVID:

- Intrauterine infection
- DIC
- Hepatic or renal failure
- Compromised CV function due to gravid uterus
- Compartment syndrome
- Maximum vent settings, ARDS
- Cardiac arrest
- Fetal demise
- GA of low morbidity / mortality



Antenatal considerations

Role for thromboprophylaxis:

- Any pregnant patient admitted to hospital for any indication is at risk for VTE
- In GIM population, use of enoxaparin decreased mortality in patients with COVID severe illness

Recommend: VTE prophylaxis for pregnant patients admitted with moderate to severe disease COVID
- duration depends on clinical scenario

Role for Celestone:

Corticosteroid Guidance for Pregnancy during COVID-19 Pandemic
Jennifer Jury McIntosh, DO, MD DOI [https://doi.org/ 10.1055/s-0040-1709684](https://doi.org/10.1055/s-0040-1709684).

Key Points

- Corticosteroid use is an important part of prematurity treatment because it provides benefit to the fetus.
- Corticosteroid use may be related with increased morbidity and mortality in novel coronavirus disease 2019 (COVID-19).
- Therefore, during the COVID-19 pandemic, an alteration in current corticosteroid practices is necessary to uniquely weigh the maternal risks and fetal benefits.

- lowest quality of evidence... authors opinion...
- leap from high dose/duration in ICU patient

Recommend: Use of celestone if risk of PTB



Role of NSAIDs

- NSAID use was suggested to worsen COVID illness
- Insufficient scientific evidence to routinely avoid NSAIDs in patients with COVID-19 (Health Canada)

ASA for PET prophylaxis/based on abnormal placentation:

- review the renal parameters (lytes and CR)
- if no evidence of impairment likely continue risk PET > risk of ASA
- if impaired, suspending ASA until recovery will likely not have a dramatic effect on PET/IUGR risk

Indomethacin for Tocolysis:

- Given that no one tocolytic has proven benefit over another ..
- May consider alternative choice, use clinical judgment



Intrapartum recommendations

- Regardless of GA and disease severity: **Recommend hospital birth**
- Regardless of GA: **CEFM based** on case reports of fetal compromise in women with COVID-19 diagnosis (8/18 – 44% incidence)
- **Maternal vital signs q 1-2h (HR, BP, RR, O2 sat) Oxygen to keep O2 sat >94%**
- **Hourly fluid status** to avoid fluid overload
- **No hydrotherapy** (risk of virus in feces? Infectious)
- **Encourage epidural anesthesia**: minimize risk for GA
- Limit # providers, vaginal exams
- **Fetal Scalp Electrode and Scalp lactate sampling** as per OB indications
- **Exclude Nitrous oxide** for pain management (potential aerosolization)
- **Emergent C/S for OB indications** not because of COVID diagnosis
- **Elective C/S should not be delayed** based on COVID diagnosis unless need for maternal stabilization.
- COVID diagnosis is **not an indication for IOL**; No delay an indication/urgent IOL unless need for maternal stabilization.
- **Second stage management**: Passive descent
 - If SOB, maternal exhaustion or increasing hypoxia: may use assisted vaginal birth to shorten the second stage
- Support **delayed cord clamping** (especially in PTB)
- For PPH, **restricted use of Hemabate (PGF2 α)**: risk of bronchoconstriction



Patient driven stem cell collection

What is your status at this point in time?

Inception is operating as an Essential Workplace under the designation of the Ontario Government. Inception continues to receive collected cord blood from all hospitals nationally, including sites where CBS and Hema Quebec typically collect for their donation programs.

Inception is following Health Canada guidelines that advise adopting a *“precautionary approach”* with regards to donor screening and as such we are introducing additional measures to identify patients who have been in contact with COVID-19 through our Risk Assessment Questionnaire. For every cord blood unit stored we also store an aliquot for future maternal blood testing in the event this is required by Health Canada at the time of a release.

There have been suggestions that collections occur outside of patient rooms - unclear as to why.

There is no plan to transition cord blood collections to outside of the patient room. Given the advice above from Health Canada, we are advising hospitals to maintain their normal processes with regards to cord blood collection. In terms of kit pick up, we are working closely with partner hospitals, given individual site restrictions, to ensure the kits are able to exit the hospital.

As per Inception™

At the patient discretion
Take sample for maternal COVID testing
Routine practice for collection



Postpartum considerations

COVID Care:

- Supportive care: oxygen, anti-pyrexia medication
- No relapse of symptoms was found after delivery
- Mild disease: no indication for extended PP stay: DC based on maternal & fetal status

Thromboprophylaxis:

- For mild disease: based on OB indications (SOGC 2014 guideline)
- Moderate to severe COVID disease: based on OB indication
if no OB indication: duration of hospitalization

NSAID for postpartum pain management:

- May consider alternative choice(s)



Pregnancy during COVID pandemic

1. Provision of routine OB care:

- key visits in person
- use of virtual visits
- “drive through” OB care
- pre-screening: prior to clinic, at clinic entry
- masking patient
- restricting support partner

2. Elective Delivery:

- no advantage to limit access to elective C/S
- limit IOL to medical /obstetrical indication

ARRIVE trial: prolong hospital exposure, ? Risk

3. Early Post Partum Discharge Programs (ERAS)

- low risk VB, ERCS
- healthy mother baby dyad
- organize for newborn screen & bilirubin > 24h
- virtual OB follow up



Pregnancy during COVID Pandemic

4. Limit Access to “Increased Risk Procedures”:

- * increased response time for a category one C/S
- * decreased access to anesthesia support

- Vaginal breech delivery
- TOLAC
- Trial of labor with vulnerable fetus: IUGR, aneuploidy
- Unmedicated labor

5. Management of PPRM

- consideration of IOL if > 34w GA
- consideration for outpatient surveillance



Fever in labor: ? Does this this patient a have COVID infection

Temperature **>37.8oC**

Give 500 cc fluid bolus (takes 30 min). **DO NOT GIVE ACETOMINOPHEN DURING THIS TIME**

Repeat temperature 30 min after bolus completed

If **still >37.8** (or any other symptoms)

Patient is now a PUI

NP swab for COVID

Initiate Droplet /Contact Precautions

- IF > 38°C ... initiate chorioamnionitis workup and treatment ... Blood cultures, Acetaminophen, Broad spectrum ABX

- After birth- Neonate also a PUI: perform NP swab

** Note: if using Misoprostil use for term IOL:

- 25-50 µg dose for IOL will not give maternal temperature

** Same action plan for Post partum fever



Termination pregnancy during COVID Pandemic

Patient is screened on admission (symptoms & maternal temperature)

Screen negative (asymptomatic).. Proceed with IOL



1st dose of misoprostil with Tyelenol (1g) po



Dose misoprostil q 4h
Dose Tyelenol q6h (standing)



If temp > 37.8oC:
Bolus 500cc over 30 min
Recheck temp 30 min after bolus complete
If remains >37.8oC... patient is now a PUI



NP swab & Droplet/Contact Precautions

Screen positive (symptomatic).. Patient is a PUI



NP Swab & Droplet / Contact Precaution



1st dose of misoprostil + Tyelenol (1g) po



Dose misoprostil q 4h
Dose Tyelenol q6h (standing, regardless of maternal temp)

- Pretreat 24-36h with **mifepristone** (significant decrease IOL time)
- Can substitute ASA (325mg) if allergy



Recognizing the unique aspects of COVID infection & Pregnancy:

- ? How can we identify a COVID positive patient
- ? How do we evaluate a COVID positive patient & decide on disposition & management
- ? How do we protect the Health Care Provider and Environment

