ICU Management of COVID in Pregnancy


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Overview

Very little data!

Not an overview of COVID management

- Risk to the fetus, in a critically ill mother
- COVID critical illness in pregnancy
- Mechanical ventilation in pregnancy

Risks to the fetus of a maternal ICU stay

- Hypoxia
- Hypercapnia
- Radiology
- Drug therapy
- Premature delivery

Risks to the fetus of a maternal ICU stay

- Hypoxia
- Hypercapnia

Fetal oxygenation – **O_2 x Hgb x Blood flow**
- guidelines suggest SpO_2 > 94% (?)
- ensure C.O: left lateral positioning
- avoid hyperoxygenation

Carbon dioxide – low CO_2 decreases uterine blood flow
decr fetal cerebral blood flow
high CO_2 – moderate well tolerated
- case reports of >100 mmHg

- Radiology
- Drug therapy

Hyperoxygenation
- Raghuraman et al, 2018 Obstet Gynecol 129:676
- McHugh et al, ACOG 2019, 220(4):397.e1-397.e8

- Premature delivery

CO_2
- *Ritchie et al, Am J Obstet Gynecol; 1980;136:386*
- *Fraser et al. J Obstet Gynaecol Can 2008;30:312*
- *Elsayegh et al, J Intensive Care Med 2008; 23:396*
- *Tomimatsu et al. J. Obstet. Gynaecol. Res 2013; 39, 1–6*

Risks to the fetus of a maternal ICU stay

- Hypoxia
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X-ray risks: *Carcinogenic (leukemia)*
Teratogenesis
Neurological development
} Depends on gestation > 50 – 100 mGy

Chest X-ray	0.01 mGy
Chest CT	0.05 -.0.2 mGy
Abdominal CT	10 – 50 mGy

Risks to the fetus of a maternal ICU stay

- Hypoxia
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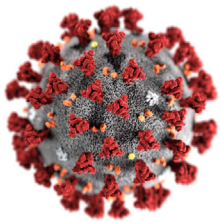
Drug therapy:
- **inotropes** - all decrease uterine blood flow!
  - use usual: norepinephrine
    phenylephrine -data post epidural

-**Sedation & analgesia**: little data, minimize drugs
We use fentanyl ± propofol ± NMB
Warn neonatologist if delivery!

- **Other drugs** – don't avoid anything necessary for mother
Dexa/beta-methasone cross the placenta, other steroids not



COVID Respiratory failure in Pregnancy

COVID Respiratory failure in Pregnancy

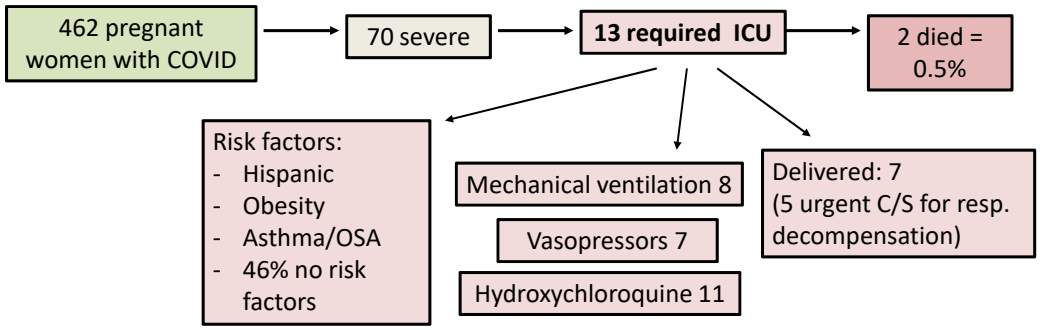
- Systematic review (Hee Kim et al, AJOG Aug 6, 2020)

15 reports of pregnant women with COVID-19 in ICU

85 ICU cases: 11 died = 12.9% case fatality
(but 7 from one Iranian report)
Excluding these = 5.3%

COVID Respiratory failure in Pregnancy

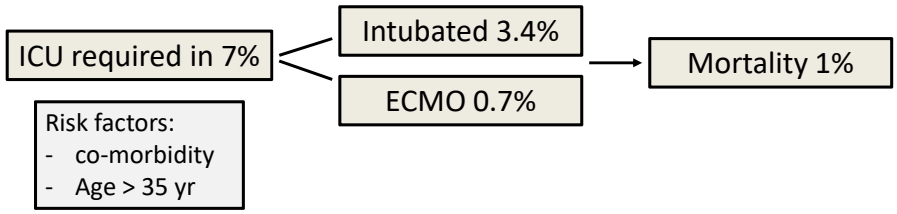
- Systematic review from New York (Blitz et al, AJOG June 15, 2020)



COVID Respiratory failure in Pregnancy

- Systematic review (Khalil et al, Lancet E-Clinical Med, July 3 2020)

17 studies (2567 pregnant women with COVID-19)



Mechanical ventilator support in pregnancy

Non-invasive Ventilation

- Advantages
  - avoids the upper airway
  - avoids sedation
- Concerns
  - nasal congestion
  - reduced lower esophageal sphincter tone
  - aspiration

AGMP!

Useful for shorter-term ventilator support: COVID?

Endotracheal intubation in pregnancy

Failed intubation 8x more common than non-pregnant patient

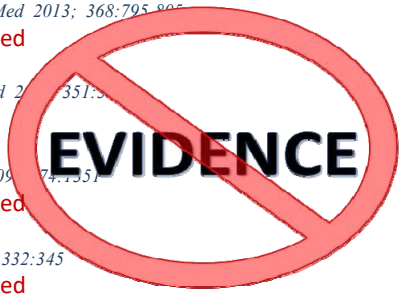
Affected by

anatomical changes
aspiration risk
weight gain
reduced oxygen reserve
preeclampsia

Munnur et al, Crit Care Med, 2005, 33:S259

Evidence-based Mechanical ventilation

- ARDSnet trial (Vt 6 ml/kg) *N Engl J Med 2000; 342:1301-1308*
  - pregnant patients excluded
- Oscillate (HFO) trial *N Engl J Med 2013; 368:795-805*
  - pregnant patients not mentioned
- High v. low PEEP *N Engl J Med 2004; 351:327*
  - pregnant patients excluded
- Cesar (ECMO trial) *Lancet 2009; 374:1351*
  - pregnant patients not mentioned
- Weaning trial *N Engl J Med 1995; 332:345*
  - pregnant patients not mentioned
- ICU sedation trial *JAMA 2012; 308:1985*
  - pregnant patients not mentioned



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Less Conventional interventions

- **Nitric oxide**
  - Conventional use for hypoxemia/pulm hypertension previous reported
  - Case series in COVID, use of intermittent high dose (160-200ppm)

Fakhr et al. Obstet Gynecol 2020; Aug 26 (online)

- **ECMO**
  - Australian case-series during H1N1

Nair et al, Intensive Care Med. 2011;37:648-54.
ANZICS. BMJ. 2010 Mar 18;340:c1279

- **Prone positioning**
  - case reports & arterial flow studies suggest safe

Kenn et al. In J Obstet Anesth 2009; 18:268
Nakai et al. Acta Obstet Gynecol Scan 1998; 77:967
Tolcher et al, Obstet Gynecol 2020; 136(2): 259-261

  - Feasible, comfortable

Dennis et al. BMC Preg Childbirth 2018; 18:445
Tolcher et al, Obstet Gynecol 2020; 136(2): 259-261

Prone positioning in pregnancy

YouTube

Video 1 Prone positioning in awake pregnant patient. Created by Mary Catherine Tolcher, MD, MSc, and Jennifer R. McKinney, MD, MPH. Used with permission.

Video 2 Prone positioning in intubated pregnant patient Created by Mary Catherine Tolcher, MD, MSc, and Jennife R. McKinney, MD, MPH. Used with permission.

Tolcher et al, Obstet Gynecol 2020; 136(2): 259-261

Delivery of the fetus

- Given the physiological changes, it may be considered that delivery of the pregnant women with respiratory failure is beneficial to the mother

Delivery of the fetus

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- **Delivery for respiratory compromise in COVID**-19
  - *Report from New York*
  - 12 patients requiring "respiratory support" (mainly O_2)
  - 6 underwent preterm C-S for maternal respiratory distress
    - Gestation 31 – 36 weeks
    - Only 1 was ventilated: subsequent ventilation: 19 days
    - Among non-intubated: some improved, none got worse

McLaren RA, et al. Am J Obstet Gynecol 2020; 223:451-453

Delivery of the fetus

- Given the physiological changes, it may be considered that delivery of the pregnant women with respiratory failure is beneficial to the mother
- NOT always an improvement:
  - Small oxygenation improvement
  - Little change in compliance or PEEP requirement

Tomlinson MW, et al. Obstet Gynecol. 1998; 91:108-11.
Lapinsky et al, Int J Obstet Anaesth 2015;24:323-8

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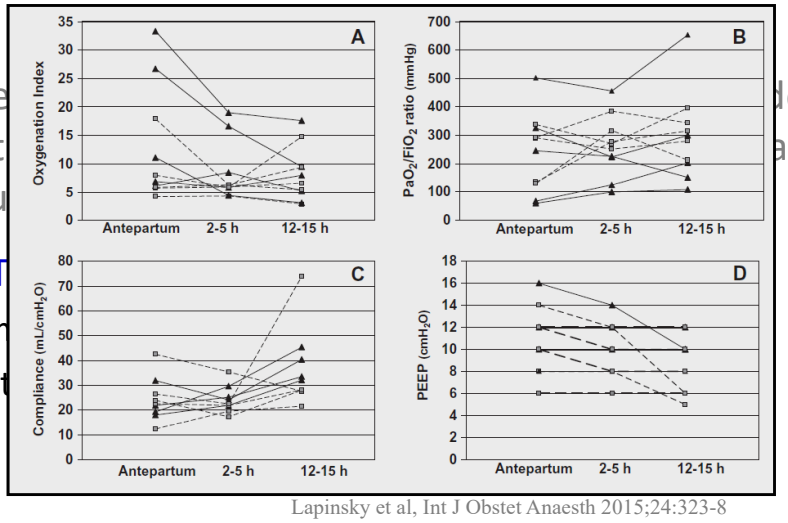

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Mabie WC, et al. Am J Obstet Gynecol 1992; 167:950-7

- Delivery:
  - If fetus is viable and at risk due to maternal hypoxia
  - May or may not improve maternal condition
  - C-section may be a significant physiological stress!

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