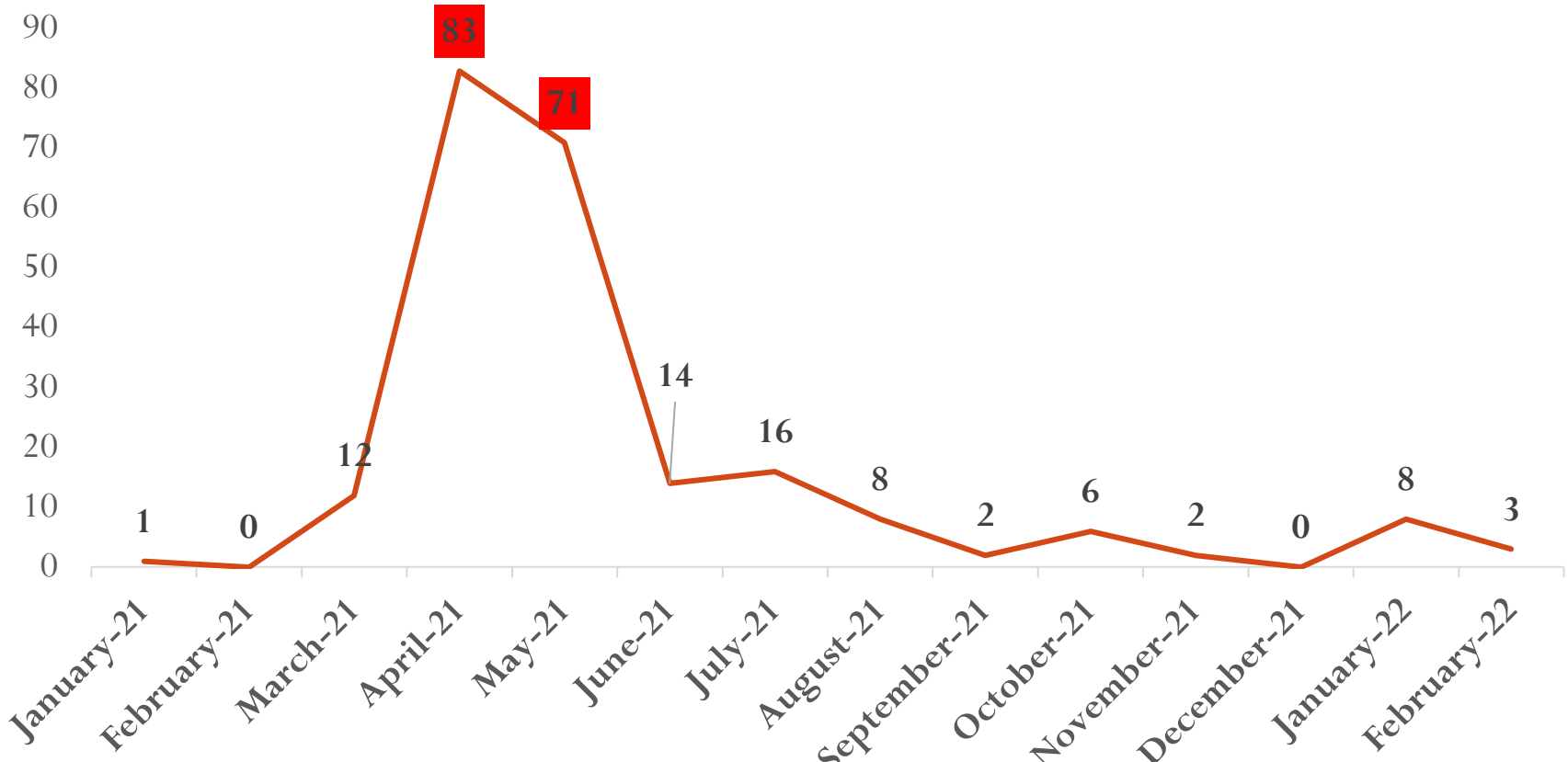
Maternal mortality and COVID-19

Dr. D.B. Kadam

Gender	2020			Jan-Dec 21			Jan- Apr 2022		
	Cases	Deaths	CFR	Cases	Deaths	CFR	Cases	Deaths	CFR
Female	758131	16329	2.15	1961657	32092	1.64	485697	803	0.17
Male	1186658	38240	3.22	2789684	56952	2.04	664308	1551	0.23
Total	**1944789**	**54569**	**2.81**	**4751341**	**89044**	**1.87**	**1150005**	**2354**	**0.20**

Trend of Maternal death due to Covid-19 (Jan 21 to Feb 22)



Susceptibility and mortality difference in pregnancy with COVID-19 infection?

Infection risk

- similar to general population
- >2/3rd of identified pregnant women - asymptomatic.
- The most common symptoms of COVID-19 in pregnant women
  - cough, fever, sore throat, dyspnoea, myalgia and loss of sense of taste.

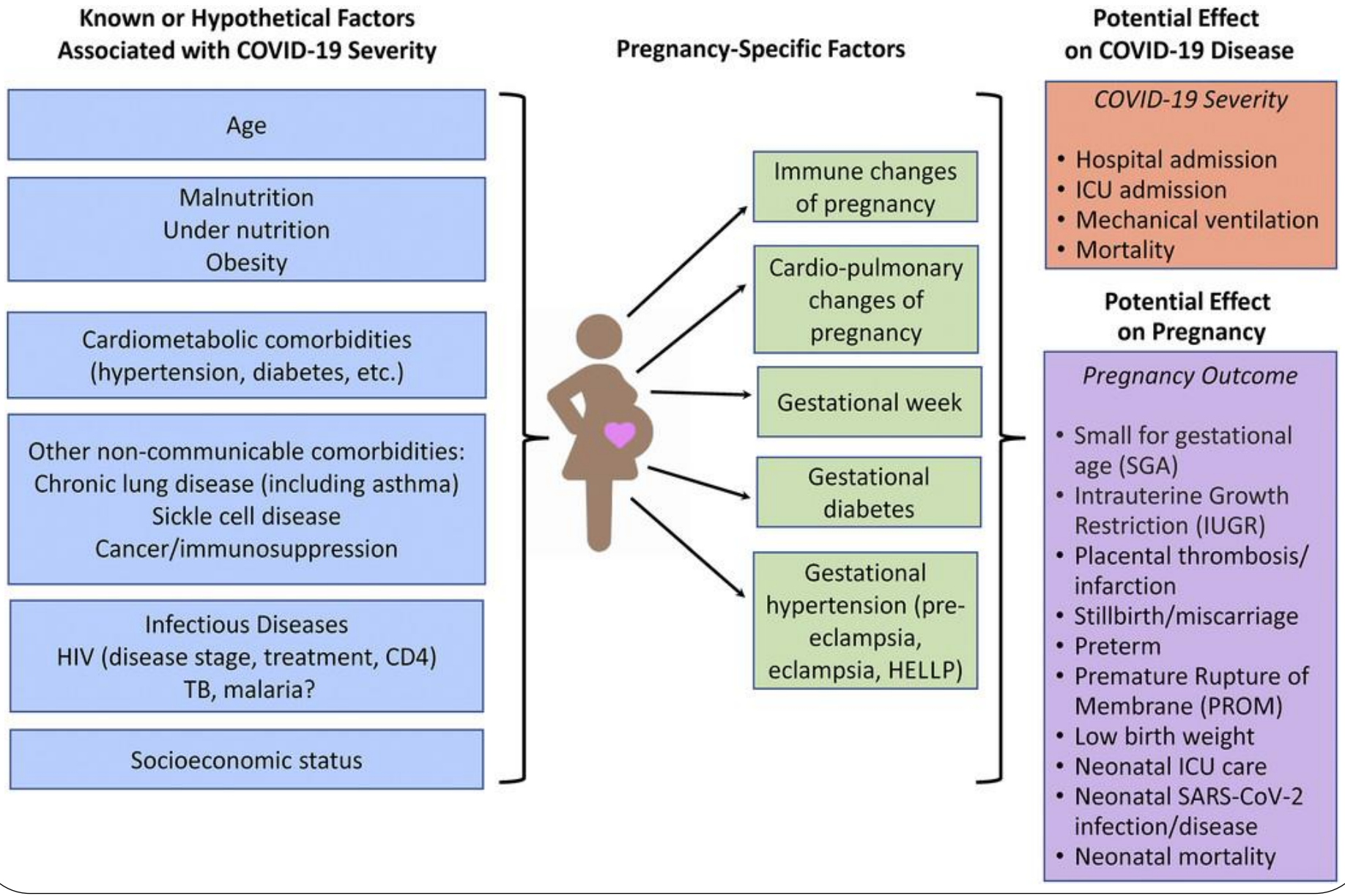
Risk of severity

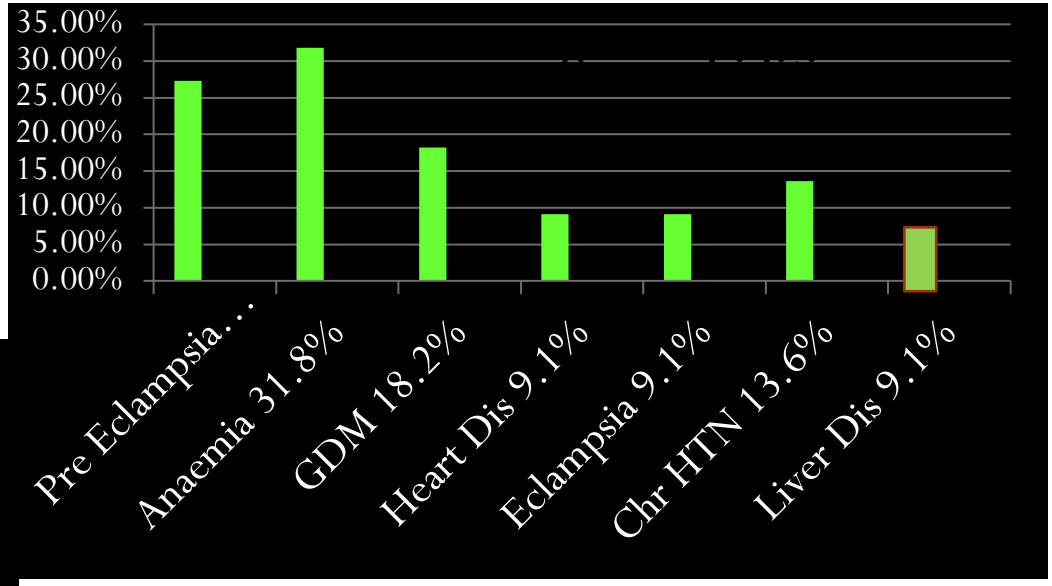
- Increased risk
- particularly in the third trimester.

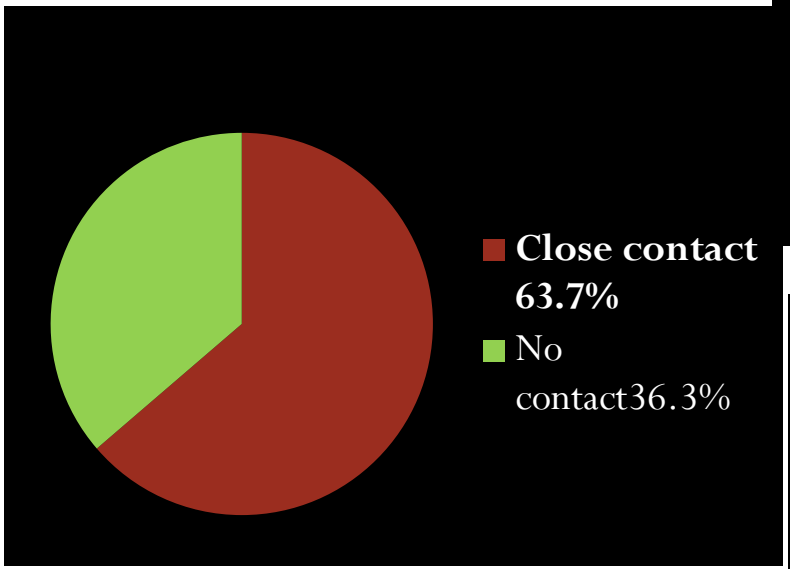
Sassoon Experience :

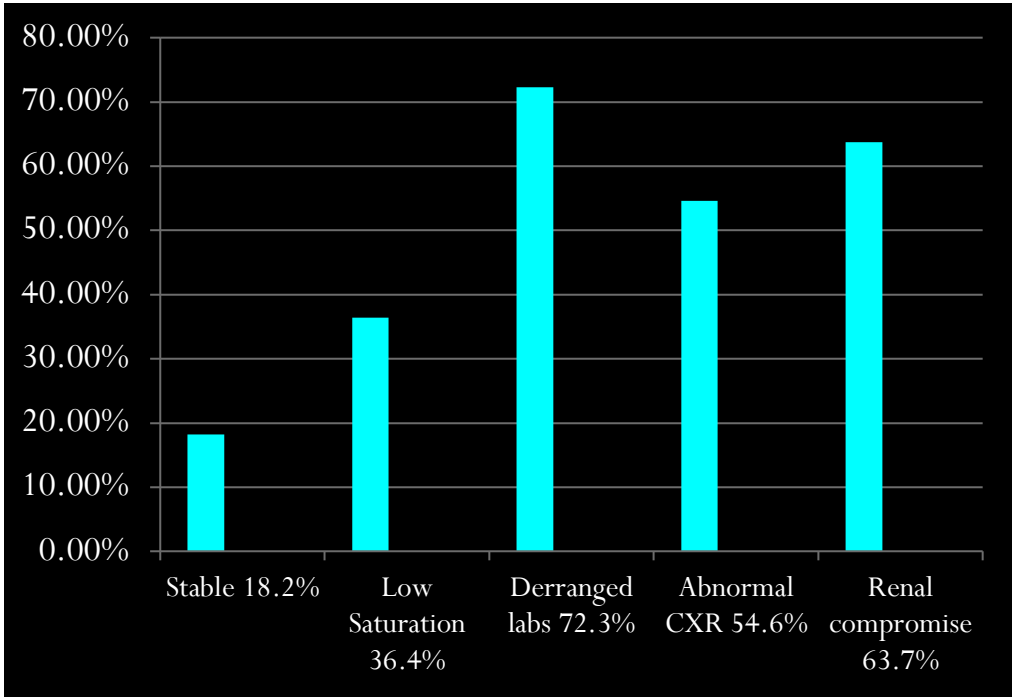
- Total pregnant females admitted in our in the period of 2 years was 25558
- Total deliveries 15565
- Total maternal deaths in non COVID wards - 38
- Out of the 852 COVID positive mothers admitted in our institute so far,
- 254 delivered vaginally, 263 underwent LSCS, 6 underwent dilatation and evacuation and 108 managed conservatively
- Of the 22 deaths in our institute 8 (36%) occurred in 1st wave, 8 (36%) in 2nd wave and 6 (28%) in 3rd wave.
- Mortality rate – 0.244 in non covid
- Mortality rate – 8.66 in covid19
- 33 times increased in mortality

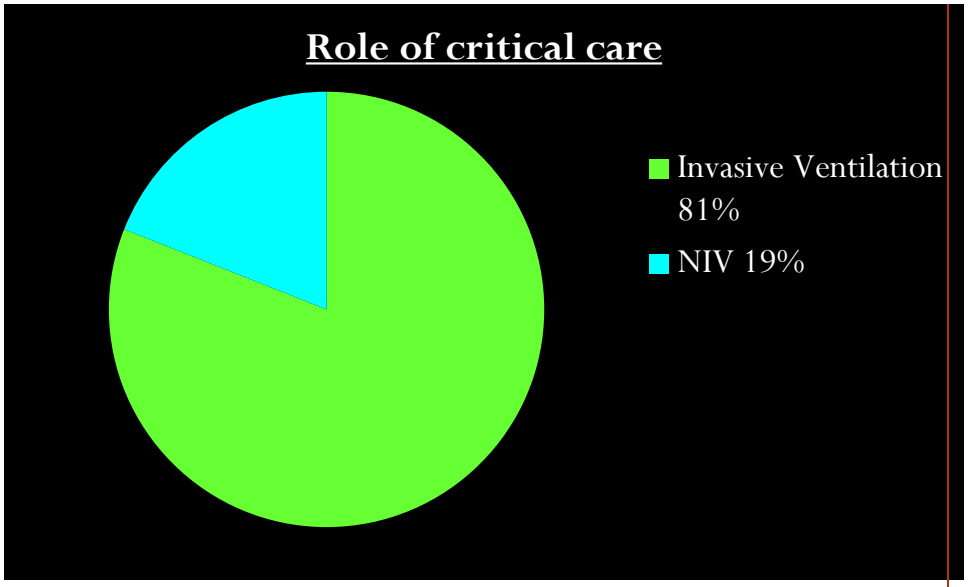
Covid 19 in pregnancy

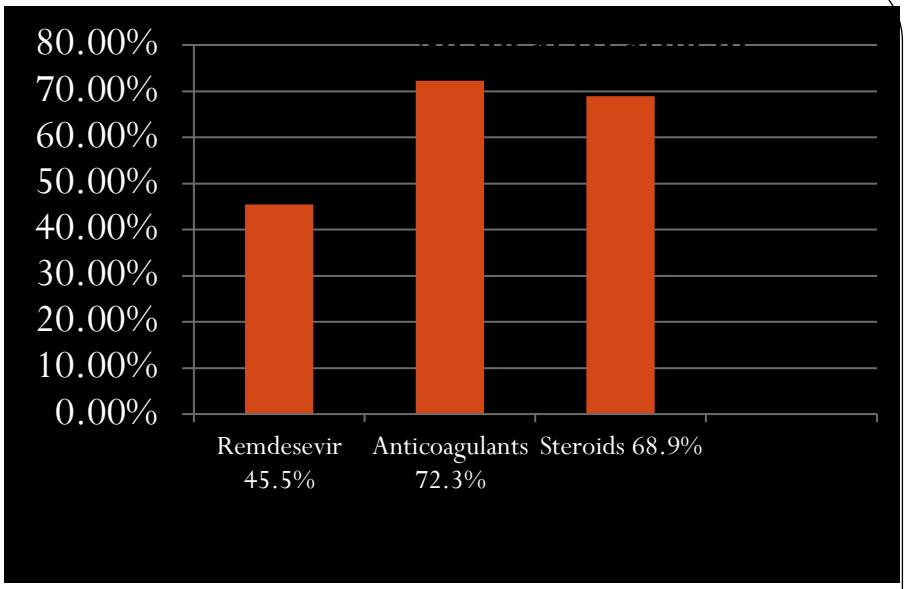


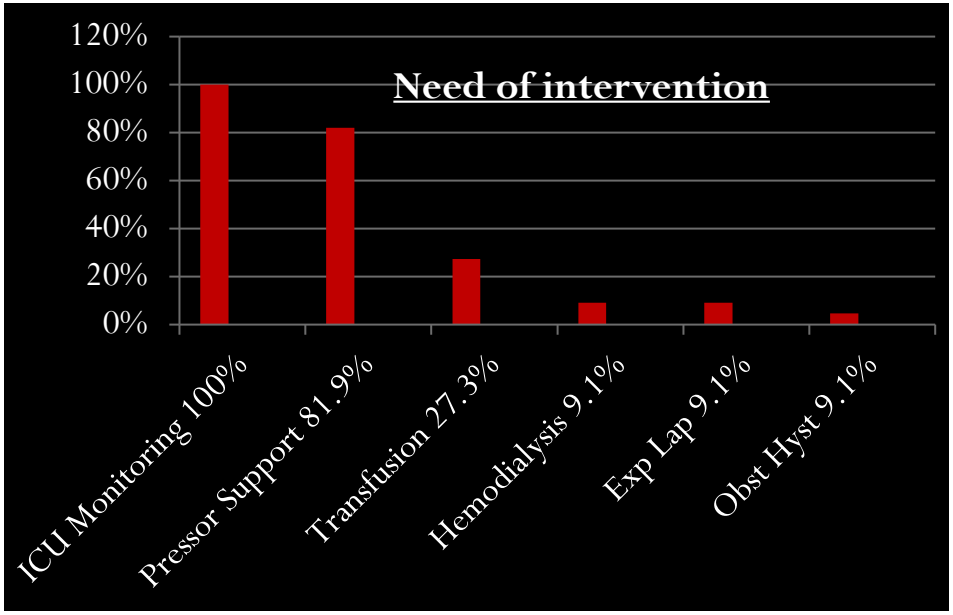

35.00%
30.00%
25.00%
20.00%
15.00%
10.00%
5.00%
0.00%
Pre Eclampsia…
Anaemia 31.8%
GDM 18.2%
Heart Dis 9.1%
Eclampsia 9.1%
Chr HTN 13.6%
Liver Dis 9.1%

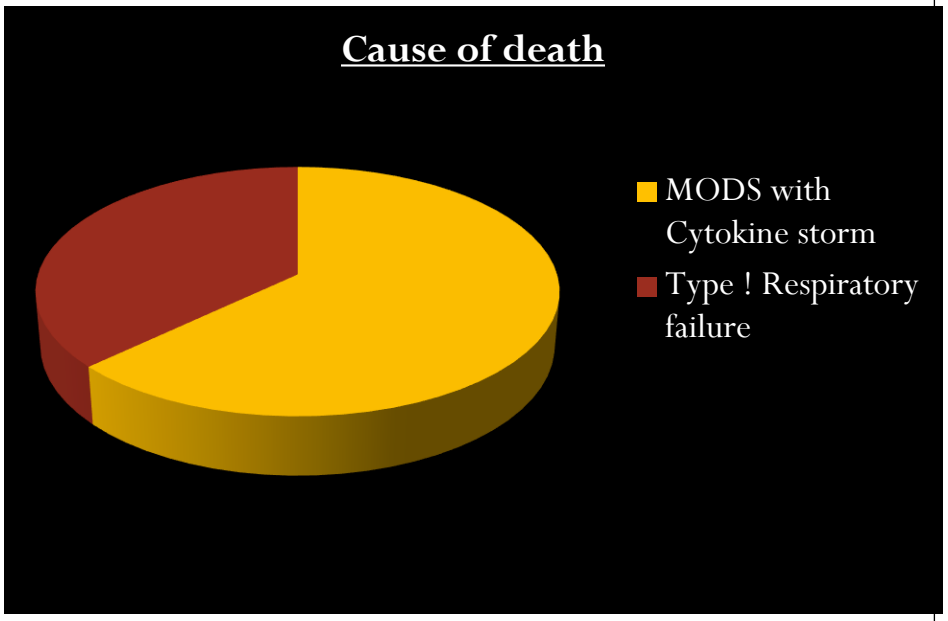

Close contact 63.7%
No contact36.3%


80.00%
70.00%
60.00%
50.00%
40.00%
30.00%
20.00%
10.00%
0.00%
Stable 18.2%
Low Saturation 36.4%
Derranged labs 72.3%
Abnormal CXR 54.6%
Renal compromise 63.7%


Role of critical care
Invasive Ventilation 81%
NIV 19%


80.00%
70.00%
60.00%
50.00%
40.00%
30.00%
20.00%
10.00%
0.00%
Remdesevir 45.5%
Anticoagulants 72.3%
Steroids 68.9%


Need of intervention
120%
100%
80%
60%
40%
20%
0%
ICU Monitoring 100%
Pressor Support 81.9%
Transfusion 27.3%
Hemodialysis 9.1%
Exp Lap 9.1%
Obst Hyst 9.1%


Cause of death
MODS with Cytokine storm
Type ! Respiratory failure

Categories based on symptomatology

A	Mild sore throat / cough / rhinitis /diarrhea/anosmia
B	Fever and/or severe sore throat / cough /diarrhea/anosmia OR Category-A with any one of • Lung/ heart / liver/ kidney / neurological disease/ Hypertension / haematological disorders/ uncontrolled diabetes/ cancer /HIV-AIDS/ Cardiovascular disease • On long term steroids /immunosuppressive drugs. • Pregnant woman • Age –more than 60 years
C	• Breathlessness, chest pain, drowsiness, fall in blood pressure, haemoptysis, cyanosis [red flag signs] • Children with ILI (influenza like illness) with ***red flag signs*** (Somnolence, high/persistent fever, inability to feed well, convulsions, dyspnoea /respiratory distress, etc) • Worsening of underlying chronic conditions

Categorization

Categorization of Pregnant Women with COVID 19 infection

B1	The asymptomatic pregnant woman
B2	The pregnant woman with ILI symptoms(fever, cough, rhinitis, sore throat) or diarrhoea or fatigue , or those with co morbidities like hypertension, diabetes, liver disease, renal disease
C	The pregnant woman with either breathlessness, chest pain, drowsiness, or hypotension, hemoptysis , cyanosis [red flag signs]

Clinical stages of severity

Mild	no breathlessness or hypoxia, RR < 24/mt, spO2 > 94% on room air, and otherwise asymptomatic
Moderate	Dyspnea and / or hypoxia , RR 24-29 / mt, spO2 91-94% on room air, or fever and cough
Severe	Dyspnea and / or hypoxia RR> 30 breaths/ mt or spO2 < 90% on room air or a pulse rate > 125/mt with or without pneumonia

Hurdles in continuing pregnancy

- Stress on compromised cardio-respiratory system
- Hypoxemia –impaired foetal oxygenation
- Prothrombotic and hyperinflammatory state
- Higher Oxygenation goals
- Drugs: Compassionate / EUA use
- Progress not predictable
- Slow reversal of COVID pneumonia
- Prone position difficult i. CXR CT technically difficult

Does COVID-19 increase the risk for pregnancy complications?

- Yes

- Maternal COVID-19 infection is associated with
  - Approx. double risk of stillbirth
  - increased incidence of small-for-gestational age babies.
  - two to three times preterm birth rate in women with symptomatic COVID-19
    - These are primarily iatrogenic preterm births.

Different strain and Pregnancy

The Delta variant

- associated with more severe disease
- 1:10 of symptomatic women with Alpha variant needed admission to intensive care
- 1:7 for symptomatic women with the Delta variant required intensive care

The Omicron variant

- associated with less severe disease
- But it is more infectious
- likely to be associated with adverse maternal and neonatal outcomes
- especially in pregnant women who are unvaccinated.

Risk factor for increase pregnancy complication with COVID 19?

- Unvaccinated
- Black/Asian/minority ethnic backgrounds,
- BMI > 25 kg/m2
- Pre-pregnancy co-morbidity, (e.g. diabetes or hypertension),
- Maternal age of 35 years or older,
- Living in increased socioeconomic deprivation
- Working in healthcare or other public-facing occupations

Vertical transmission ?

- No definite evidence
- Few cases of placental tissue or membranes positive for SARS-CoV-2 reported.
- There is no reported increase in congenital anomalies incidence because of COVID-19 infection.

How can prenatal care be modified to decrease risk of contracting COVID-19?

- Categorize - low- versus high-risk pregnancies
- Tele health in areas of active infection transmission,
- Minimize maternal contact with others
- Minimum and indicated hospital visit and test.

When to admit and where and how to manage?

- **Category B1**
- **Category B2**
- **Category C**

Category B1

< 34 weeks of pregnancy

- Allowed care at self-isolate.
- Iron calcium folic acid to be continued.
- Must report if- spO2 < 94%
- 3 / 6 minute walk test

> 34 weeks of pregnancy

- Admitted in CCC for proper work up and observation.
- If stable, may be discharged to continue care from home
- Report if
  - any symptoms of the disease
  - pain or leaking or bleeding
  - diminished fetal movements.
- Not discharged if close to term

Category B2

- Admission in CCC
- Symptomatic treatment + routine iron, calcium and folic acid.
- Lab investigations- CBC, RFT, LFT, RBS, S.electrolytes, ECG, CRP.
- Additional markers like d - dimer, ferritin, CPK if symptom increased.
- MDI/DPI Budesonide 800mcg twice a day can be started if symptoms (fever and/or cough) are persistent beyond 5 days of disease onset.
- Monitored by thrice daily recording of temperature, pulse rate, respiratory rate, SPo2 and Walk test and review of symptoms.
- Once patients have been worked up and are stable with subsidence of symptoms, they can go into home quarantine with the same checks as detailed for others on quarantine.

Category C:

- Require multi-disciplinary care
- Admitted in Dedicated Covid hospitals.
- A thorough history, especially with regard to covid symptomatology, extensive review of records, and a well done general and Obstetric examination is a must.

Should glucocorticoids be avoided in pregnant women with COVID-19?

- No such contraindication.
- MDI/DPI Budesonide 800mcg twice a day started when the symptoms (fever and/or cough) are persistent beyond 5 days of disease onset.
- Parenteral/oral steroids can be started when

1. Moderate to severe rise in RR or a fall in spO2 even without pneumonia
2. 3% desaturation with 6-minute walk test
3. Bronchopneumonia and
4. Marked rise in pro inflammatory markers with symptoms.

- Methyl Prednisolone does not cross the placenta and hence cannot be a substitute for the dexamethasone that is used to enhance lung maturity.

VTE prophylaxis in COVID-19 & pregnancy

- All admitted patients in category B2/C in 3rd trimester = prophylactic LMWH.
- LMWH has to be stopped 12 hours prior to delivery/ C section (24 hours if taking higher doses)
- Higher dose of LMWH
  - category C
  - hypoxia
  - severely ill patients
  - very high d- dimer values.

- Thrombocytopenia may be associated with severe Covid 19 infection.
- Platelet count < 50,000/mm3- LMWH and aspirin has to be discontinued.
- Since women tend to be discharged early, and if they can't take the injections at home, low dose aspirin at 150 mg/day HS can be considered a viable option for 2-3 weeks.
- If women are admitted with confirmed COVID 19 infection within 6 weeks post-partum, thromboprophylaxis should be offered for the duration of hospitalization and continued at least 10 days after discharge.
- For those with significant comorbidity, duration of thromboprophylaxis may be extended to 6 weeks post-partum

D Dimer cut offs in normal pregnancy

First Trimester	169-1202 mcg/L
Second trimester	393-3258 mcg/L
Third trimester	551-3333 mcg/L

Antiviral in pregnancy?

- Remdesivir – if pregnant women with COVID-19 who are not improving/deteriorating.
- Hydroxychloroquine, lopinavir/ritonavir and azithromycin – ineffective
- Ivermectin and Favipiravir are contraindicated in pregnancy
- Molnupiravir - not recommended in pregnancy
- Paxlovid - ?

Remdesivir

- Indicated in Category C with bronchopneumonia not responding to steroids and oxygen.
- Its safety in pregnancy though not yet established, it may be offered on a compassionate basis with written informed consent.
- To be started within 10 days of onset of symptoms.
- Recommended dose
  - 200mg IV on day1 , followed by 100 mg daily iv x 4 days
- RFT and LFT must be normal and it is preferable to do a creatinine clearance.

Monoclonal Antibody in pregnancy?

- Strongly consider if unwell in hospital settings
- if unvaccinated /additional risk factors for severe illness.
- Monoclonal antibodies- if very high-risk criteria.
- Tocilizumab (IL-6 antagonist)
  - hospitalised patients with hypoxia and evidence of systemic inflammation.
- Antibody cocktail-
- Sotrovimab-

COVID Vaccination & pregnancy – is it safe ?

- Yes, strongly recommended.
- Pregnant women are a priority group for vaccination.
- COVID-19 vaccines doesn't affect fertility.
- Excellent real-world evidence of vaccine efficacy
  - 98% of women with severe infection were unvaccinated.
- No need to delay conception after vaccination.
- Similar VITT risk with non pregnant female.

When to receive COVID vaccine?

- Can be given at any time in pregnancy,
- Peri conception/1st trimester/peri-birth/ postpartum
- Even after uncomplicated assisted birth/ caesarean birth.
- Lactation
  - NO contraindication
  - No need to stop breastfeeding.

The benefits of vaccination..

- Reduction in
  - Maternal sars-cov-2 infection
  - Severity of disease
  - Perinatal death
  - COVID-19 hospitalization among infants up to six months of age

Is maternal COVID-19 an indication for cesarean delivery?

- No
- cesarean delivery would increase maternal risk and would be unlikely to improve newborn outcome.

Should planned induction of labor or cesarean delivery of asymptomatic women be postponed during the pandemic?

- No, in asymptomatic women, inductions of labor and cesarean deliveries with appropriate medical indications should not be postponed or rescheduled.

How long should mother-newborn should take precautions ?

For symptomatic mothers

- 5 days from testing positive
  - If no symptoms or their symptoms are resolving,
- But to wear a mask around others for 5 additional days.

For asymptomatic mothers

- If incidentally detected due to routine screening
- recommended time for isolation is 5 days,
- followed by 5 days of wearing a mask when around others

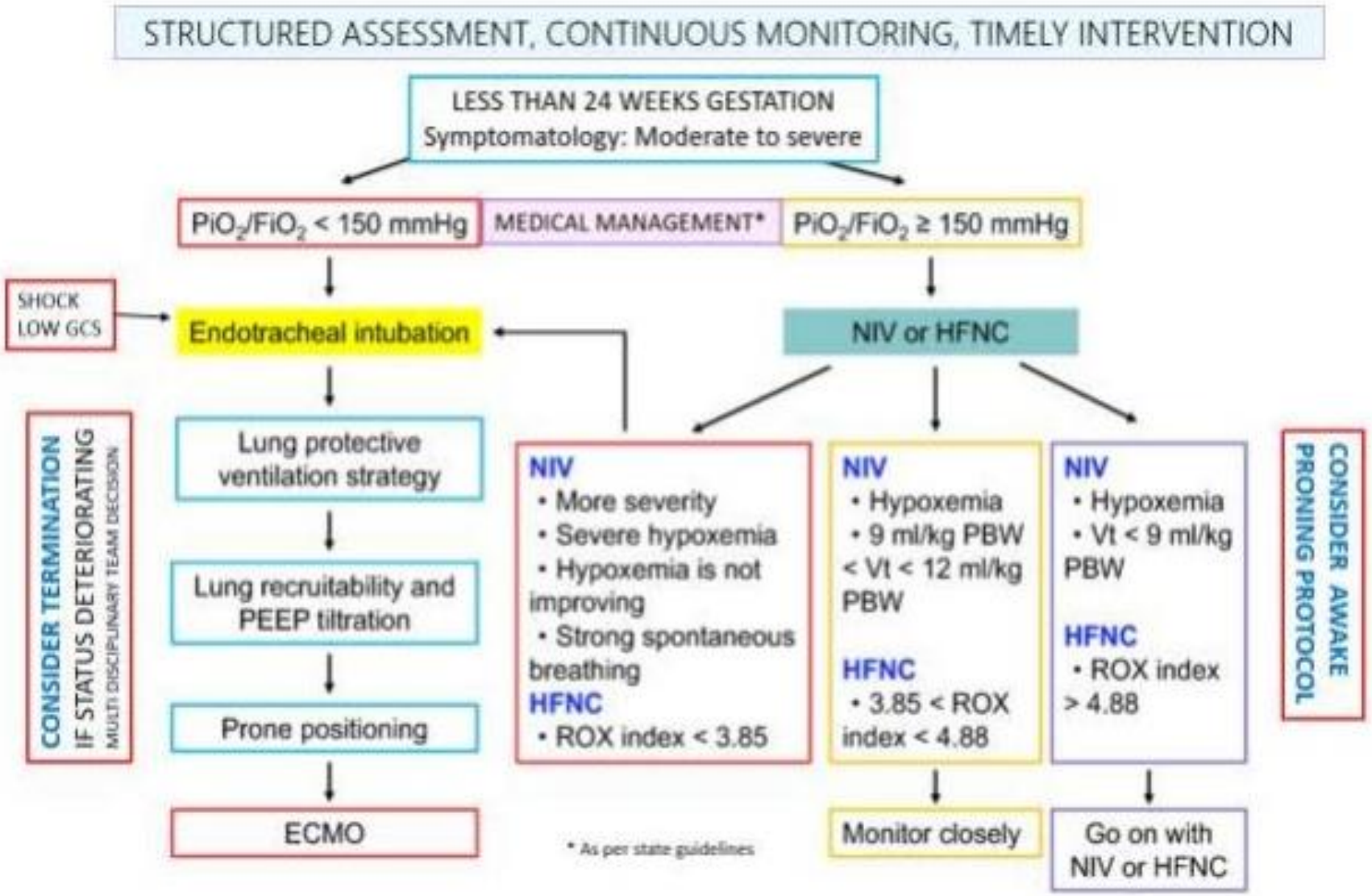
Can breast milk transmit SARS-CoV-2?

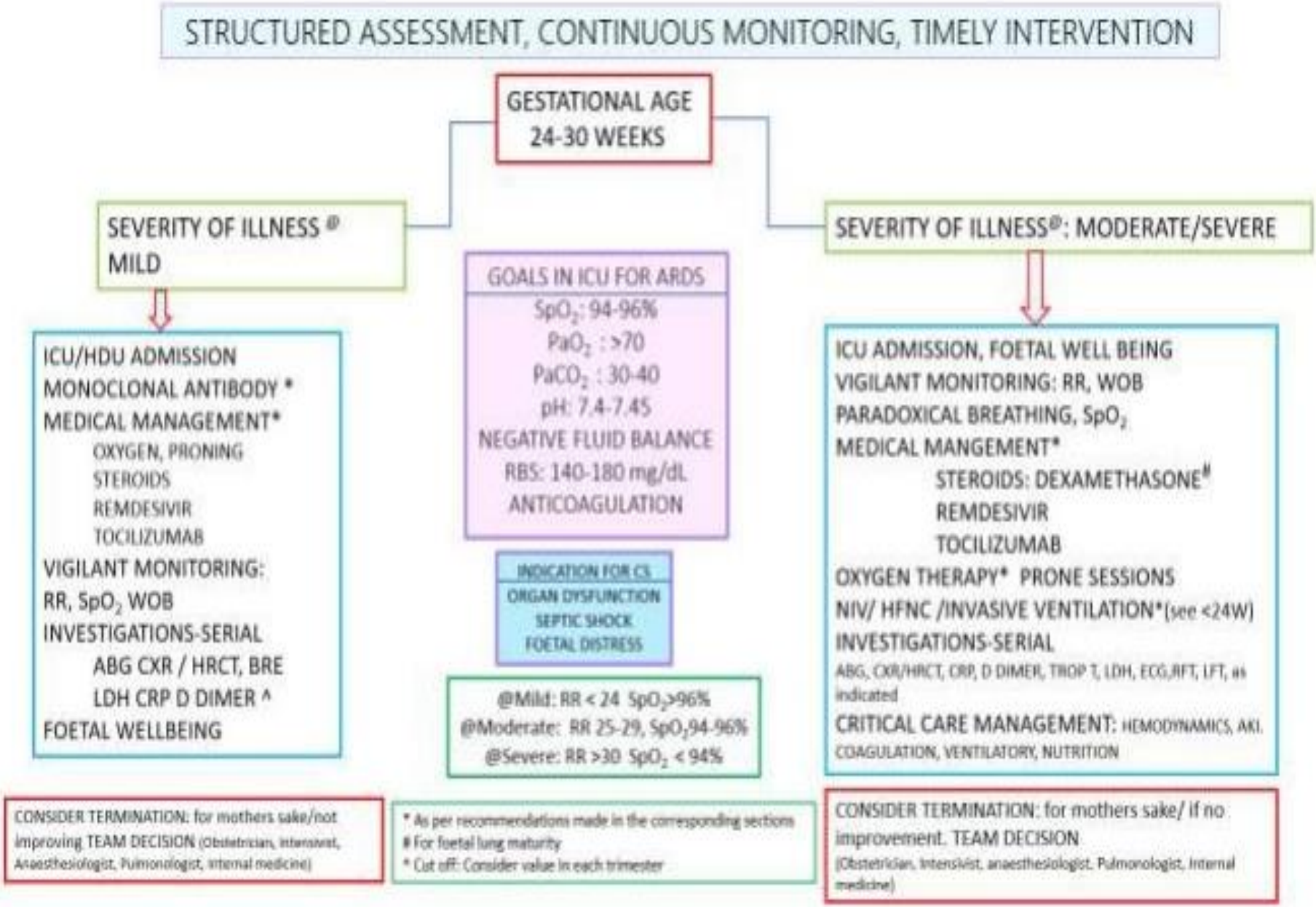
- Unknown
- WHO study
- COVID positive mother
- breast milk samples from 43 mothers were negative for SARS-CoV-2 by RT-PCR
- three mothers sample tested positive
- specific testing for viable and infective virus was not performed.

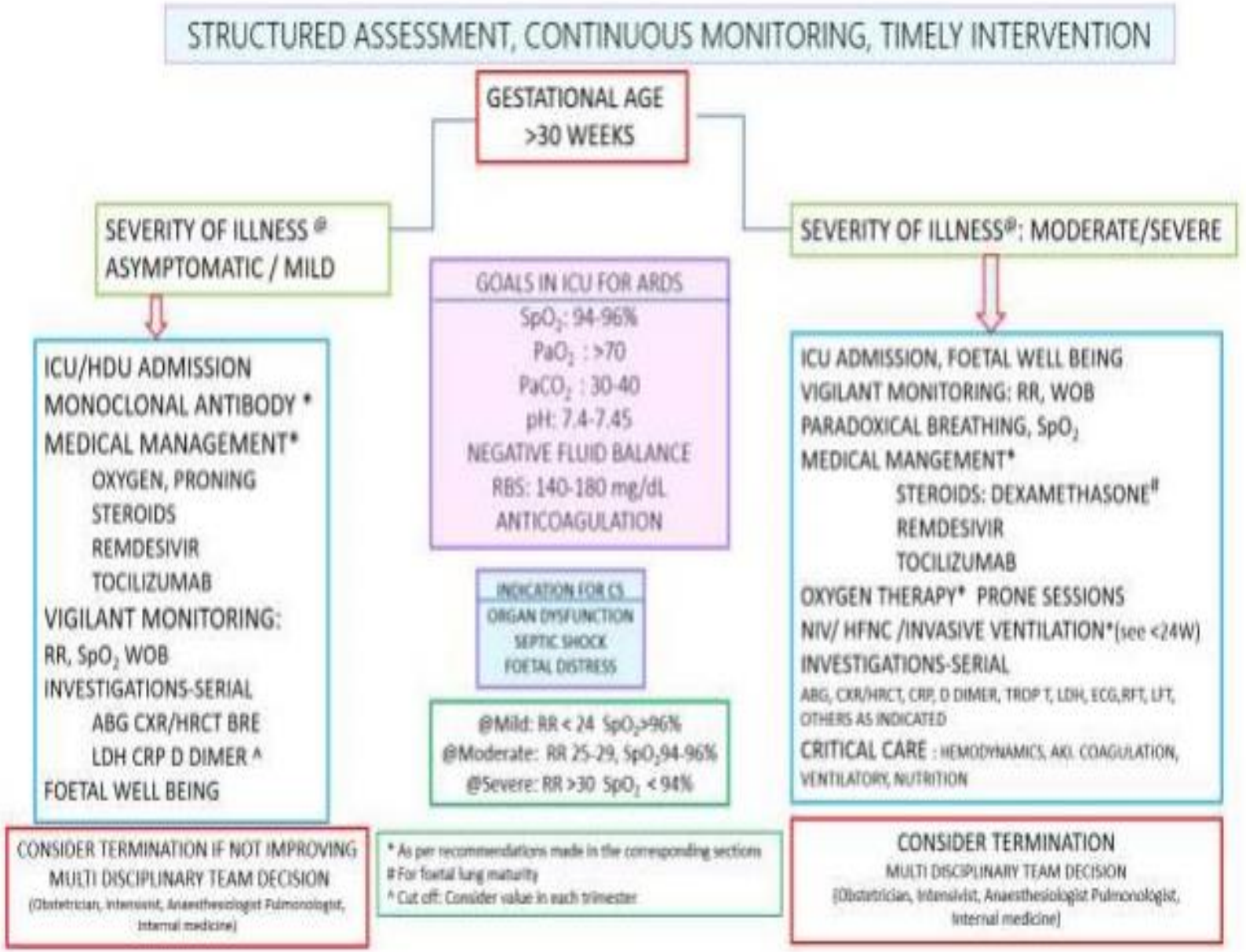
What precautions should mothers with confirmed or suspected COVID-19 take when breastfeeding?

- Mother positive ; baby negative
  - hand hygiene and using a well-fitting face mask.
  - Alternatively, expressed breast milk
- When both the mother and the infant – suspected/confirmed COVID-19
- no special precautions

- study from New York City
- tested and followed 82 infants of 116 mothers who tested positive for SARS-CoV-2,
- No infant was positive for SARS-CoV-2 postnatally, although most roomed-in with their mothers and were breastfed. (protocol followed)


STRUCTURED ASSESSMENT, CONTINUOUS MONITORING, TIMELY INTERVENTION
LESS THAN 24 WEEKS GESTATION
Symptomatology: Moderate to severe
PiO2/FiO2 < 150 mmHg
MEDICAL MANAGEMENT*
PiO2/FiO2 ≥ 150 mmHg
SHOCK
LOW GCS
Endotracheal intubation
NIV or HFNC
CONSIDER TERMINATION
IF STATUS DETERIORATING
MULTI DISCIPLINARY TEAM DECISION
Lung protective ventilation strategy
Lung recruitability and PEEP tiltration
Prone positioning
ECMO
NIV
• More severity
• Severe hypoxemia
• Hypoxemia is not improving
• Strong spontaneous breathing
HFNC
• ROX index < 3.85
NIV
• Hypoxemia
• 9 ml/kg PBW < Vt < 12 ml/kg PBW
HFNC
• 3.85 < ROX index < 4.88
Monitor closely
NIV
• Hypoxemia
• Vt < 9 ml/kg PBW
HFNC
• ROX index > 4.88
Go on with NIV or HFNC
CONSIDER AWAKE PRONING PROTOCOL
* As per state guidelines


STRUCTURED ASSESSMENT, CONTINUOUS MONITORING, TIMELY INTERVENTION
GESTATIONAL AGE 24-30 WEEKS
SEVERITY OF ILLNESS @ MILD
ICU/HDU ADMISSION
MONOCLONAL ANTIBODY *
MEDICAL MANAGEMENT*
OXYGEN, PRONING
STEROIDS
REMDESIVIR
TOCILIZUMAB
VIGILANT MONITORING:
RR, SpO2 WOB
INVESTIGATIONS-SERIAL
ABG CXR / HRCT, BRE
LDH CRP D DIMER ^
FOETAL WELLBEING
GOALS IN ICU FOR ARDS
SpO2: 94-96%
PaO2 : >70
PaCO2 : 30-40
pH: 7.4-7.45
NEGATIVE FLUID BALANCE
RBS: 140-180 mg/dL
ANTICOAGULATION
INDICATION FOR CS
ORGAN DYSFUNCTION
SEPTIC SHOCK
FOETAL DISTRESS
@Mild: RR < 24 SpO2>96%
@Moderate: RR 25-29, SpO2 94-96%
@Severe: RR >30 SpO2 < 94%
SEVERITY OF ILLNESS@: MODERATE/SEVERE
ICU ADMISSION, FOETAL WELL BEING
VIGILANT MONITORING: RR, WOB
PARADOXICAL BREATHING, SpO2
MEDICAL MANGEMENT*
STEROIDS: DEXAMETHASONE#
REMDESIVIR
TOCILIZUMAB
OXYGEN THERAPY* PRONE SESSIONS
NIV/ HFNC /INVASIVE VENTILATION*(see <24W)
INVESTIGATIONS-SERIAL
ABG, CXR/HRCT, CRP, D DIMER, TROP T, LDH, ECG,RFT, LFT, as indicated
CRITICAL CARE MANAGEMENT: HEMODYNAMICS, AKI, COAGULATION, VENTILATORY, NUTRITION
CONSIDER TERMINATION: for mothers sake/not improving TEAM DECISION (Obstetrician, Intensivist, Anaesthesiologist, Pulmonologist, Internal medicine)
* As per recommendations made in the corresponding sections
# For foetal lung maturity
^ Cut off: Consider value in each trimester
CONSIDER TERMINATION: for mothers sake/ if no improvement. TEAM DECISION
(Obstetrician, Intensivist, anaesthesiologist, Pulmonologist, Internal medicine)


STRUCTURED ASSESSMENT, CONTINUOUS MONITORING, TIMELY INTERVENTION
GESTATIONAL AGE >30 WEEKS
SEVERITY OF ILLNESS @ ASYMPTOMATIC / MILD
ICU/HDU ADMISSION
MONOCLONAL ANTIBODY *
MEDICAL MANAGEMENT*
OXYGEN, PRONING
STEROIDS
REMDESIVIR
TOCILIZUMAB
VIGILANT MONITORING:
RR, SpO2 WOB
INVESTIGATIONS-SERIAL
ABG CXR/HRCT BRE
LDH CRP D DIMER ^
FOETAL WELL BEING
CONSIDER TERMINATION IF NOT IMPROVING
MULTI DISCIPLINARY TEAM DECISION
(Obstetrician, Intensivist, Anaesthesiologist Pulmonologist, Internal medicine)
GOALS IN ICU FOR ARDS
SpO2: 94-96%
PaO2 : >70
PaCO2 : 30-40
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SEVERITY OF ILLNESS@: MODERATE/SEVERE
ICU ADMISSION, FOETAL WELL BEING
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CRITICAL CARE : HEMODYNAMICS, AKI, COAGULATION, VENTILATORY, NUTRITION
CONSIDER TERMINATION
MULTI DISCIPLINARY TEAM DECISION
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RCOG 2022 Recommendation

Royal College of Obstetricians & Gynaecologists

Royal College of Midwives

uktis uk teratology information service

MOMS MacDonald Obstetric Medicine Society

Treatment of COVID-19 in pregnant patients

Version 2: Friday 21 January 2022

Initial management of COVID in pregnancy

1. Oxygen – titrate supplemental oxygen to keep sats >94%
2. Thromboprophylaxis – prophylactic LMWH dose according to weight (in the RCOG thromboprophylactic guideline)
3. Corticosteroids – if oxygen dependent give for a total of 10 days
   a. Oral prednisolone 40mg OD; or
   b. IV hydrocortisone 80mg BD; or
   C. Consider IV methyl prednisolone if severely unwell or needing ICU
4. If steroids used for fetal lung maturation use Dexamethasone 12mg IM 24 hourly (2 doses) **followed by** either (a), (b) or (c) above for 10 days
5. Check anti-spike (anti-S) SARS-CoV-2 antibodies

Clinical deterioration

Increased O2 requirements: sats<93%, RR>22

- Convene MDT: obstetrician, neonatologist, intensivist, anaesthetist and infectious diseases/microbiology
- Discuss with obstetric physician at regional maternal medicine centre
- Consider:
  - ✓ site and location of care
  - ✓ delivery
- Give tociluzimab* (or sarilumab if unavailable) if needing escalation of care and/or if CRP>75
- If SARS-CoV-2 antibody negative and non-Omicron variant, consider 2.4g Ronapreve IV once

If continued clinical deterioration

- Re-consider delivery
- Proning (including self-proning) in discussion with intensive care team
- Early discussion with an ECMO centre

Discharge

- Thromboprophylaxis for at least 10 days
- Safety net/telephone follow up
- Encourage COVID19 vaccination: can be given 28 days following recovery
- Advise: if given tocilizumab/sarilumab, be aware of an increased risk of infection without typical signs for several months†.

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THANKYOU .