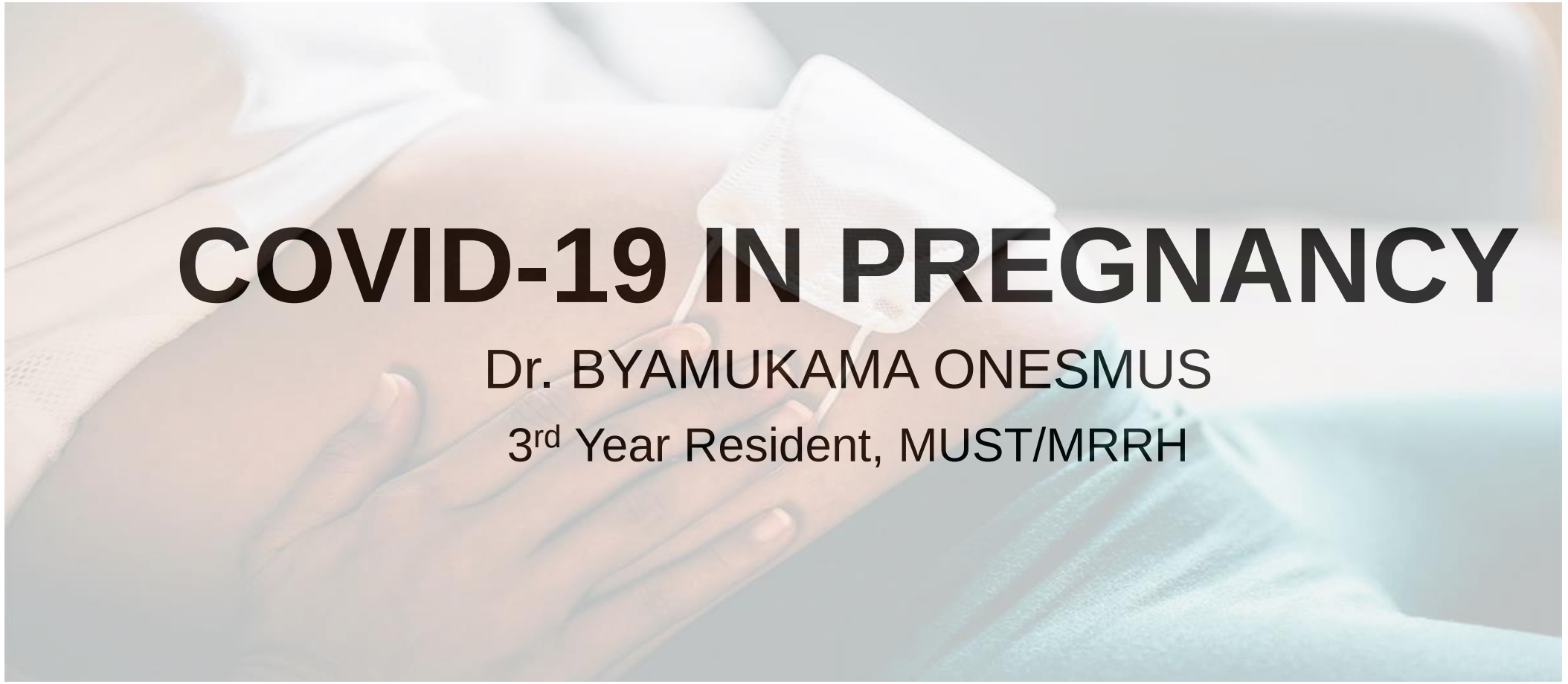


COVID-19 IN PREGNANCY

Dr. BYAMUKAMA ONESMUS

3rd Year Resident, MUST/MRRH

INTRODUCTION

Table of Cases

Age	GA	SEVERITY	DELIVERY	MODE	CO-MORBIDITY	MATERNAL OUTCOME	BABY
42	24	Critical	No	-	Pre-eclampsia	Died D2	-
30	36	Critical	Yes	C/S	PE, Hyperglycemia Pre-eclampsia	Died D3	Alive****
33	34	Critical	Yes	SVD	S. Preeclampsia, DM	ALive	MSB
31	36	Severe	Yes	C/S	-	Alive	Alive
32	39	Severe	Yes	C/S	-	Alive	Alive
35	28	Critical	No	-	PE	Died D2	-
40	35	Critical	Yes	C/S	PE	Died D3	Alive****
35	37	Severe	Yes	C/S	-	Alive	Alive
30	20	Severe	HBC	-	TRRk	Alive (On HBC)	
30	24	Critical	-	-	-	Died on arrival	
44	33	Critical	Yes	VD	PROM, PE	Died D1	Alive****
24	41	Moderate	Yes	VD	-	Alive	Alive (HIE)
25	36	Moderate	Yes	C/S	IUFD	Alive	MSB
20	28	Critical	-	-		Died on arrival	
23	32W	Severe	-	-	PE	Alive	On HBC

Case Scenerio

- 33Y, G8P5+2, admitted with 1/52 h/o cough, fever, and vomiting for 2 weeks.
- One week prior, she developed headache and epigastric pain She reported 3 days h/o loss of fetal movts. No DIB
- All previous deliveries were vaginal. No history of chronic illnesses.
- Ex, BP 220/127mmHg, PR 110b/m, SaO2a 96% on R/A, RR 32b/m, GCS 14/15(V4)
  - **FHS, not appreciated with fetoscope and doppler**
- Admitted as a case of severe pre-eclampsia with IUFD. Suspected covid
  - **Controlled BP, prevented convulsions. Induction of labour started.**
- She detoriated while in active labour, cx – 7cm. SaO2 46%, RBS Hi. HBAIC 14.1%
- Oxygen therapy, 10L, ROM, oxytocin augmentation
  - She delivered 2.1kg MSB
  - SC insulin, Abcx, anti-hypertensive drugs, COVID19 supportive rx
- Discharged after one week, stable

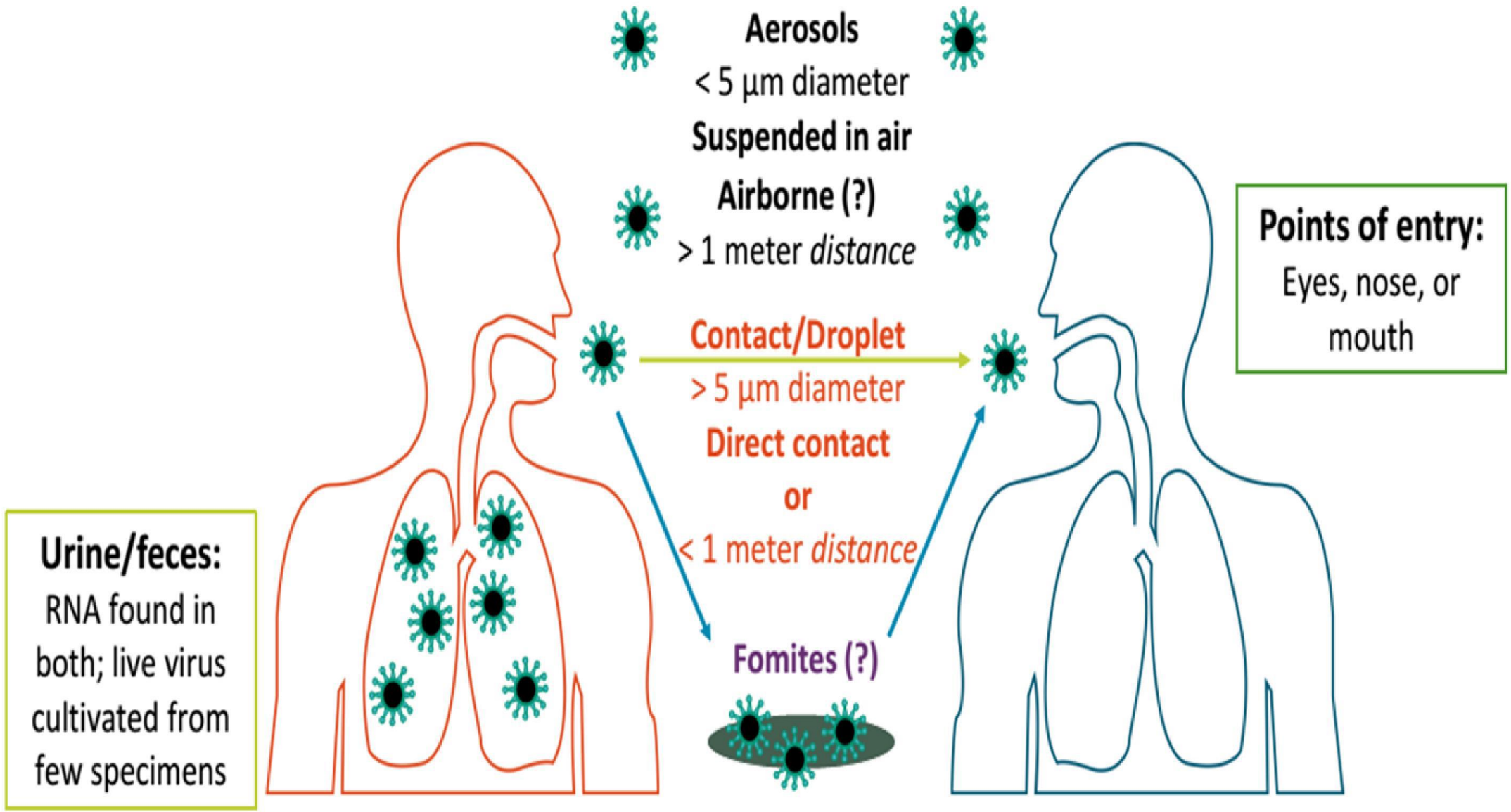
Introduction

- Pregnancy causes immunological and physiological changes and women susceptible to viral RTIs, including COVID-19.
- Rapid clinical deterioration occurs, and symptomatic pregnant patients are at increased risk of severe disease and death.
- Risk factors for severe disease and death include ≥35 years, obesity, and preexisting medical comorbidities.

COVID-19 virology

- Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is the virus that causes coronavirus disease 2019 (COVID-19).
- Variants;
  - B.1.1.7 lineage (Alpha) – UK
  - B.1.617.2 lineage (Delta)- India
  - B.1.351 lineage (Beta) – South Africa
  - P.1 lineage (Gamma) – Japan
  - B.1.427 and B.1.429 lineages (Epsilon)- South California.

Transmission



Pathophysiology

- The altered immune response during pregnancy allows for the growth of a semiallogenic fetus.
- SARS-CoV-2 enters the body via the nasal passage;
  - Infects pulmonary cells via the SARS- CoV ACE2 receptor
  - Uses transmembrane serine protease 2 for S protein priming.
- The infection is followed by viral replication and release of the virus, causing inflammation-mediated programmed cell death.

Pathophysiology

- This releases damage-associated molecular patterns including **ATP and nucleic acids**, that trigger an inflammatory response.
- This pro-inflammatory response includes production of;
  - **IL-6,**
  - **chemokines**
  - **type 1 interferons**,
- These are chemo-attractants for monocytes, macrophages, and T cells to the infection site

Pathophysiology

- This positive feedback loop leads:
  - To excessive inflammation
  - Damage to the integrity of the lung
  - Resulting in infection with other microbes .
- The inflammation caused by SARS-CoV-2 may also result in a "**cytokine storm**" that can lead to multisystem organ failure.

Respiratory system

- The physiological and anatomical changes in the respiratory system during pregnancy have an impact on lung function.
- Alterations to the chest shape and elevation of the diaphragm by the gravid uterus.
- Hence reduction in total lung capacity and inability to clear secretions makes women more susceptible to severe infections.

Covid and pregnancy

- In normal pregnancy, there is increase in ACE2 receptors and other components of the RAAS.
- The early symptoms of COVID-19 may resemble physiologic dyspnoea causing a delay in diagnosis.
- T helper 2 polarization allows the immune system to tolerate the fetus and maintains adequate response to pathogens.

Covid and pregnancy

- In the 1st and 3rd trimesters, the immune system is proinflammatory to promote implantation and parturition and may evoke a higher risk of cytokine storm
- Pregnant women with COVID-19 are more at risk of complications like DVT, stroke and PE.
- Increased level of stress, inflammation during labour and the physiological changes postpartum could cause poorer outcomes in these periods.

Covid and Pre-eclampsia

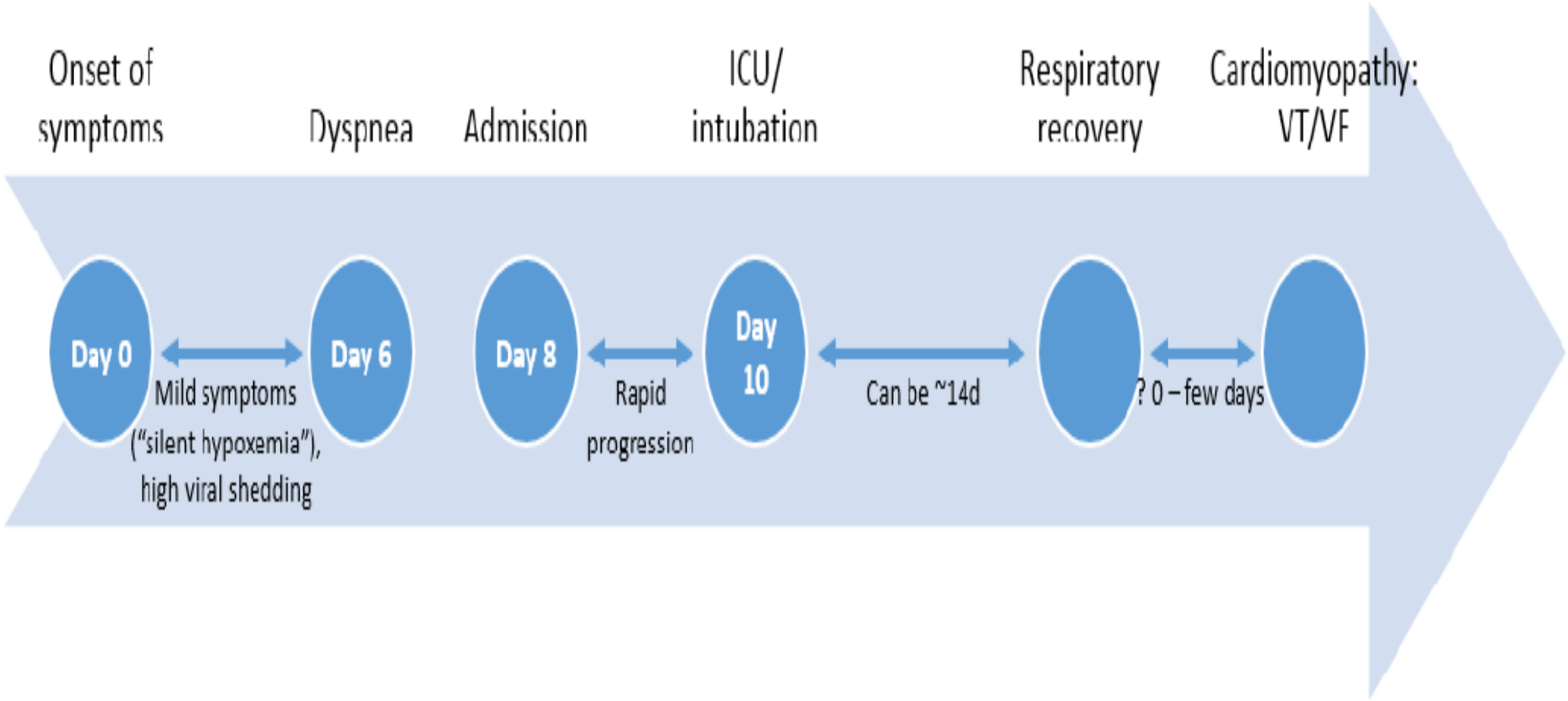
- Normal blood pressure in pregnancy is maintained by a balance between Ang 11 and Ang 1
- This balance is lost in pre-eclampsia and the blood pressure response to Ang II is overexaggerated.
- The RAAS abnormalities seen in pre-eclampsia may be potentiated in women with COVID-19 infections
- Also, the mechanisms for COVID-19 and pre-eclampsia are similar, causing endothelial cell dysfunction and coagulation abnormalities.

Covid and Pre-eclampsia

- Endothelial cells have ACE2 receptors and are infected with the virus.
- Injury to the endothelial cells via cell-mediated immune response can also occur.
- The endothelitis caused by SARS-CoV-2 infection initiates microvascular dysfunction.
- Also, both pre-eclampsia and COVID-19 cause complement activation.
- Thrombotic vascular injury may be severe in pregnant women with both diseases.

Covid and hyperglycemia

Timeline for severe cases



Severity spectrum

Stage	Characteristics
Asymptomatic or presymptomatic infection	▪ Positive test for SARS-CoV-2 but no symptoms
Mild illness	▪ Varied symptoms (eg, fever, cough, sore throat, malaise, headache, muscle pain) but no shortness of breath, dyspnea, abnormal imaging
Moderate illness	▪ $SpO_2 \geq 94\%$ and lower respiratory disease evidenced by clinical assessment or imaging
Severe illness	▪ $SpO_2 < 94\%$, $PaO_2/FiO_2 < 300$, respiratory rate > 30 breaths/min, or lung infiltrates > 50%
Critical illness	▪ Respiratory failure, septic shock, and/or multiorgan dysfunction

Signs and symptoms

- Cough
- Headache
- Muscle aches
- Fever
- Sore throat
- Shortness of breath
- New loss of taste or smell
- Other symptoms that occur include nausea, vomiting, fatigue, diarrhea, and rhinorrhea.

COVID-19 MANAGEMENT IN PREGNANCY

AHABWE ONESMUS

Third year resident - MUST

Infection Prevention

- Follow the general guidelines for IPC
  - Infection control in hospital settings
  - Personal preventive measures
    - Hand hygiene/ washing
    - Social distancing
    - Cough hygiene
    - Disinfect frequently touched surfaces
  - Wearing masks in the community
  - Social or physical distancing
  - Screening in high risk settings

3.1 Personal Protective Equipment

Level	Setting	PPE
Level 1(No Interaction with Patients)	In the community such as administrative areas, cafeterias, and in the community. Staff are encouraged to observe social distancing recommendations and frequent hand hygiene practices.	**No PPE**. Home clothes/ scrubs with closed shoes.
Level 2 (Patient Interaction without Contact	Screening at entry points Ambulance drivers Symptomatic patients at screening points and during transit	Medical mask needed for droplet precautions when talking to patients. It is important that staff do not touch patients or patient belongings when in this posture:
Level 3 (Patient Contact, no risk of aerosols)	• Collection of respiratory samples • Transfer of Suspect/confirmed patients • Cleaners* • Caring for patients with suspected or confirmed COVID-19 with no aerosol risk • Visitors to the patient care area • Laboratory personnel	**Facial protection, Gown, gloves(x2) , medical mask , Gum boots** for tasks that involve contact with suspect/confirmed COVID-19 patients without an aerosol generating procedures.
Level 4 (Risk of Aerosols with or without patient Contact)	Aerosol generating procedures on a suspect or confirmed COVDI-19 patient such as: • bronchoscopy • tracheal intubation • pressure on the chest during cardiopulmonary resuscitation may induce production of aerosol • Collection/induction of sputum • Airway Suctioning • Passage of a nasogastric tube	Similar to level 3, the only difference being the **N95 mask.**

Investigations….. Diagnostic tests

- Reverse Transcriptase-PCR
  - Highly sensitive and specific
  - Depends on type, quality of specimen and duration of illness at testing
  - False negative rates <5% to 40%
- Rapid diagnostic test/ antigen
  - Sensitivity highest within 5-7 days of on set of symptoms
- Serology (antibody)
  - Variable sensitivity and specificity

	RT-qPCR (or other NAAT)	Antigen (Ag) RDT	Antibody (IgM/IgG) RDT
Sample	Nasopharyngeal, oropharyngeal, saliva, lower respiratory	Nasopharyngeal, oropharyngeal, saliva, lower respiratory	Blood
False Positives	Rare, except for cases of sample contamination. However, can remain positive after virus is no longer viable.	Very low	Low to moderate, most commonly due to cross-reactivity with other coronaviruses.
False Negatives	Occasional, especially early in infection.	Moderate, not as sensitive as NAAT.	Variable. Performs poorly at the onset of the symptoms.
Turnaround time/ Laboratory Requirements	Usually hours - requires a laboratory with high technical capacity.	Under 30 min – no laboratory required.	Under 30 min – no laboratory required.

Specific data on the availability and performance of commercial COVID-19 diagnostic testing options continues to change rapidly.

Other Laboratory tests

- Raised inflammatory markers
  - C-reactive protein, ferritin, ESR, procalcitonin, IL-6, TNF-alpha, D-dimer levels
- **CBC**
  - Lymphopenia, Leukocytosis, Thrombocytopenia
- Abnormal liver chemistries
  - ↑aminotransferases
  - Elevated LDH
- High Elevated troponin and creatinine phosphokinase
- Elevated prothrombin time
- Random blood sugar/FBS

Laboratory features associated with severe COVID-19 [1-6]

Abnormality	Possible threshold
Elevations in:	
▪ D-dimer	>1000 ng/mL (normal range: <500 ng/mL)
▪ CRP	>100 mg/L (normal range: <8.0 mg/L)
▪ LDH	>245 units/L (normal range: 110 to 210 units/L)
▪ Troponin	>2× the upper limit of normal (normal range for troponin T high sensitivity: females 0 to 9 ng/L; males 0 to 14 ng/L)
▪ Ferritin	>500 mcg/L (normal range: females 10 to 200 mcg/L; males 30 to 300 mcg/L)
▪ CPK	>2× the upper limit of normal (normal range: 40 to 150 units/L)
Decrease in:	
▪ Absolute lymphocyte count	<800/microL (normal range for age ≥21 years: 1800 to 7700/microL)

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Investigations…Imaging

- Chest radiograph
  - Can be normal in early/mild disease
  - Ground glass opacities
    - Posterior, multilobar, peripheral, bilateral involvement
  - Consolidations
  - Features more pronounced 10 -12 days after on set of symptoms

- CT scan
  - Findings can be typical, indeterminate or atypical

Proposed reporting language for CT findings related to COVID-19

Routine screening CT for diagnosis or exclusion of COVID-19 is currently not recommended by most professional organizations or the US Centers for Disease Control and Prevention

COVID-19 pneumonia imaging classification	Rationale	CT findings	Suggested reporting language
Typical appearance	Commonly reported imaging features of greater specificity for COVID-19 pneumonia.	▪ Peripheral, bilateral, GGO with or without consolidation or visible intralobular lines ("crazy-paving") ▪ Multifocal GGO of rounded morphology with or without consolidation or visible intralobular lines ("crazy-paving") ▪ Reverse halo sign or other findings of organizing pneumonia (seen later in the disease)	"Commonly reported imaging features of (COVID-19) pneumonia are present. Other processes such as influenza pneumonia and organizing pneumonia, as can be seen with drug toxicity and connective tissue disease, can cause a similar imaging pattern."
Indeterminate appearance	Nonspecific imaging features of COVID-19 pneumonia.	▪ **Absence of typical features AND** ▪ **Presence of:** • Multifocal, diffuse, perihilar, or unilateral GGO with or without consolidation lacking a specific distribution and are non-rounded or non-peripheral. • Few very small GGO with a non-rounded and non-peripheral distribution.	"Imaging features can be seen with (COVID-19) pneumonia, though are nonspecific and can occur with a variety of infectious and noninfectious processes."

Activate Windows

Antenatal care

- Based on disease severity
  - Asymptomatic patients
  - Symptomatic patients

Asymptomatic mothers

- Assess risk of developing severe disease
- Close monitoring for respiratory decompensation
- Infection control and self isolation

Symptomatic mothers

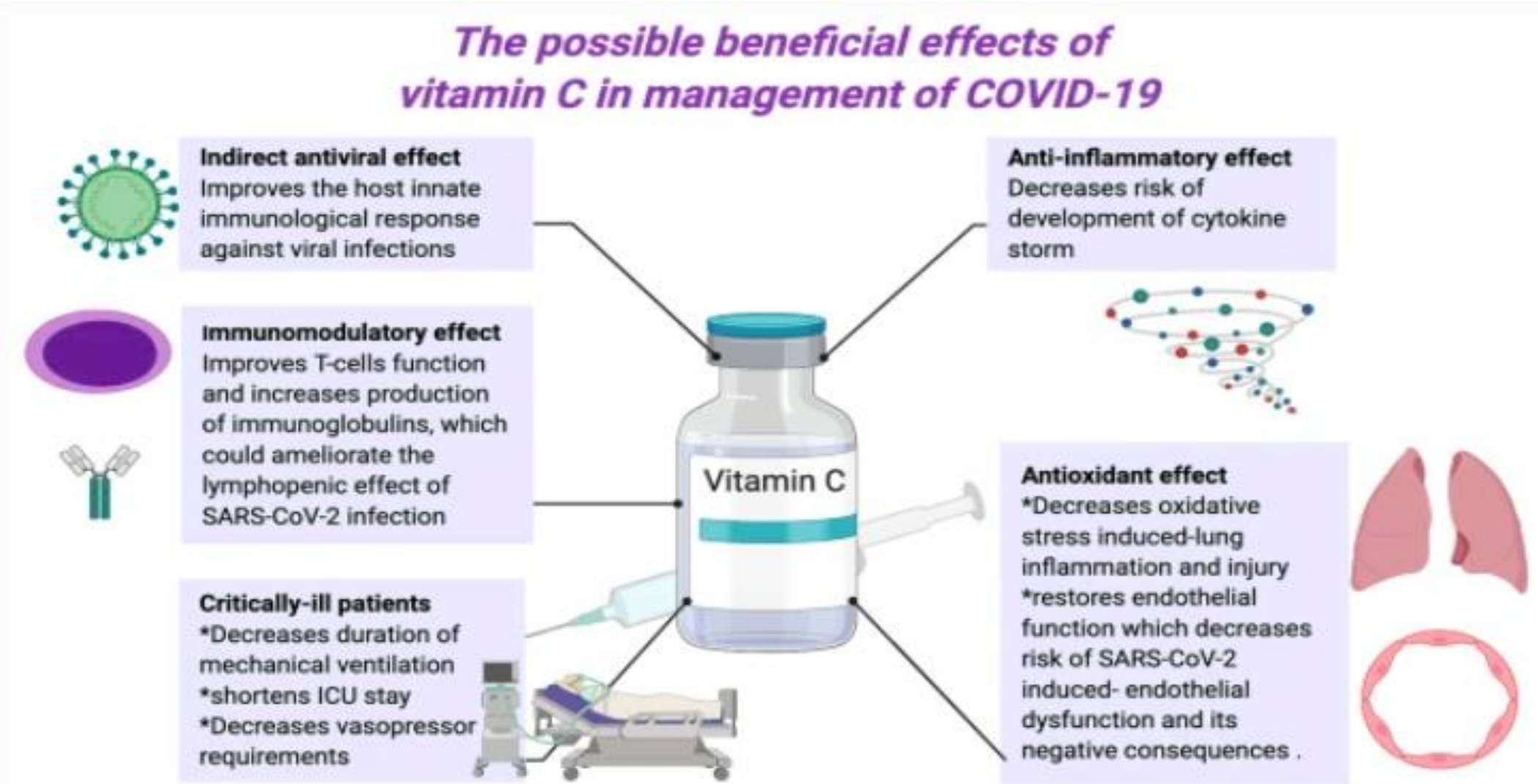
- Care depends on
  - severity, underlying medical conditions, coexistent pregnancy complications and social situation (self care/follow up)

- Home care
  - Mild disease (no shortness of breath)
  - Follow up closely for progression to severe/critical disease
  - Instructions on infection control, symptom management, warning symptoms
  - Obstetric follow up at least once in two weeks following diagnosis
  - Provide accommodation if homeless

Home care- supportive care

- 14 days self quarantine
- Hydration
- Adequate rest
- Frequent ambulation as tolerated
- Zinc sulphate, vitamin D, Vitamin C (ACOG 2020, Feyaerts and Luyten 2020)
- Monoclonal antibodies (undergoing trial)

- Call back if
  - worsening dyspnea, unremitting fever > 39 Ċ despite paracetamol, inability to tolerate oral medication, pleuritic chest pain, confusion, obstetric complications, RR>24c/m, PR >100bpm



The possible beneficial effects of vitamin C in management of COVID-19 (created with BioRender.com)

Criteria for inpatient care

- For patients with moderate to severe infection
- Oxygen saturation <95%
  - Exertional oxygen saturation: If saturation is ≤95% on room air with exertion, consider inpatient care
- Comorbid conditions
  - Hypertension, Gestational or pre-gestational diabetes (inadequate control)
  - Chronic disorders (e.g., renal or cardiopulmonary disease)
  - Immunosuppressed patients
- Patients who require inpatient pharmacologic treatments, labour , >39 weeks

Hospital care includes…..

- Maternal respiratory support
- VTE prophylaxis
- Dexamethasone
- Acetaminophen
- Antiviral drugs (investigational)
- Fetal monitoring
- Monitor for preterm labour

Dexamethasone

- Associated with decreased mortality in patients requiring oxygen therapy especially those on mechanical ventilation

- Glucocorticoids required for fetal lung maturity
  - 6mg BD x 48 hours (4 doses), followed by 6mg/d for 10 days

- Glucocorticoids not required for fetal lung maturity
  - 6mg daily (PO/IV) for 10 days- as in non pregnant patients

*** (hydrocortisone 150 mg, methylprednisolone 32 mg, or prednisolone 40 mg)

Antiviral drugs…….Remdesivir

- Trials have demonstrated that remdesivir decreased duration of disease among patients with COVID-19 who required oxygen therapy
- No known fetal toxicity with the drug
- May offer “to pregnant patients with COVID-19 meeting criteria”

Antibiotics

- If bacterial infection suspected, treat with appropriate antibiotics
- Community acquired pneumonia: Ceftriaxone plus azithromycin or ceftriaxone alone
- Hospital acquired pneumonia | Severe diz| Mechanical Ventilation:
  - Cefepime, meropenem, piperacillin-tazobactam, linezolid, and vancomycin can all be used in pregnancy

Anticoagulation

- Prophylactic dosing
  - For patients who are critically ill unless therapeutic dosing indicated (e.g., confirmed venous thromboembolism) due to increased risk of coagulopathy
  - LMWH ‘may be preferred’ due to daily dosing, which will limit exposure to healthcare personnel
  - Consider UFH due to short half-life and reversibility with protamine sulfate especially where imminent delivery is being considered

Magnesium sulphate Vs prematurity

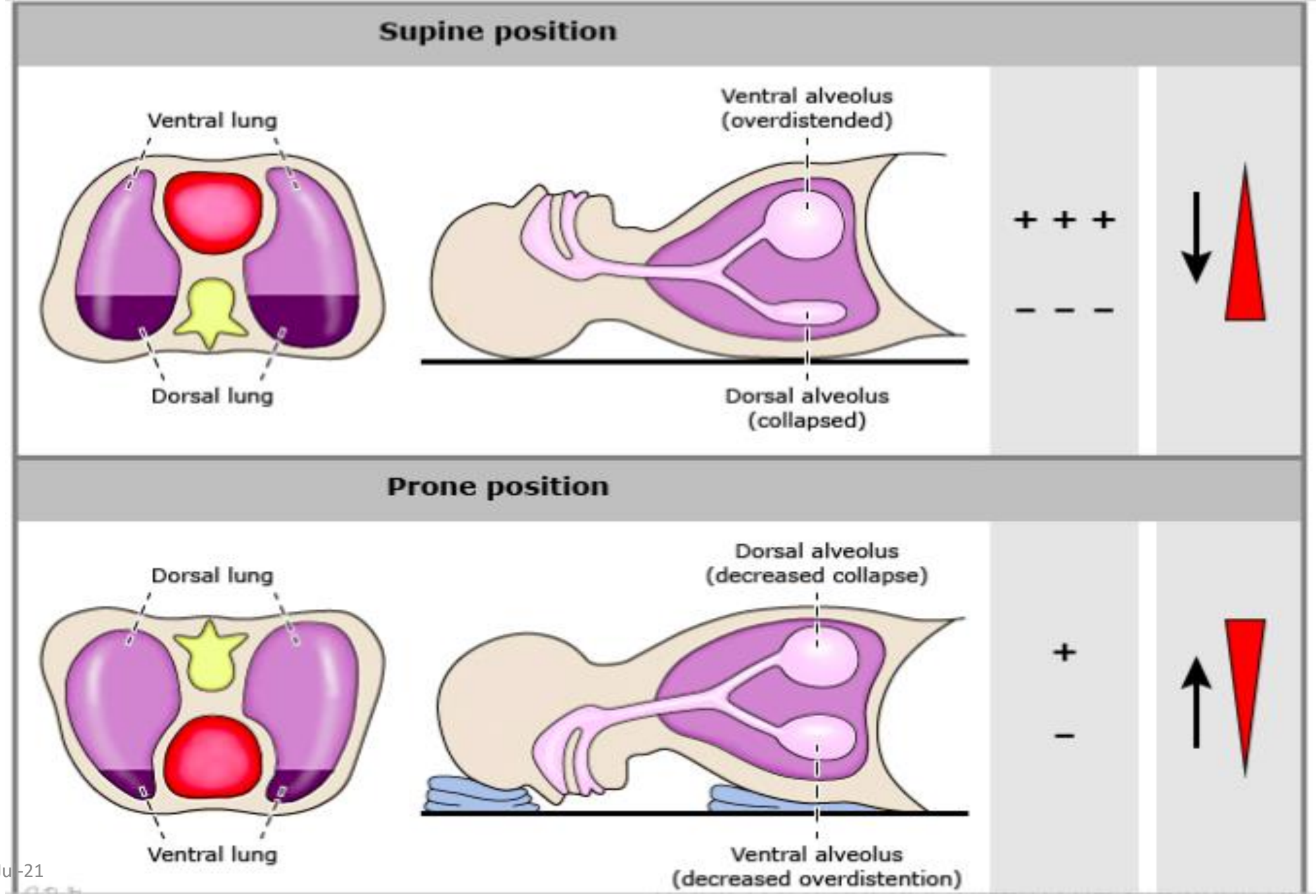
- For fetal neuroprotection
- Monitor Magnesium levels, respiratory rates, pulse oximetry
- 10 to 13 mEq/L [12 to 16 mg/dL or 5.0 to 6.5 mmol/L] can cause respiratory paralysis
- In acute renal injury- dose-adjusting magnesium sulfate rather than withholding the drug
- Intubated patients-cardiac arrhythmias or arrest can be the first sign of serious toxicity.
- Maternal-fetal medicine and pulmonary/critical care specialists is advised

Consideration for ICU…

- Obtain ICU consult for the following scenarios
  - Oxygen requirements: Saturation does not stay ≥95% with supplemental oxygen or Oxygen requirements are increasing rapidly
  - Hypotension: MAP <65 despite attempts at resuscitation
  - New end organ insufficiency (e.g., renal, liver, cardiac, neurologic etc.)

Prone Position in Pregnancy

- Can be done during pregnancy and postpartum
- Padding/pillows may be required
- Ensure tube remains in place and secure it following rotation
- “Passive prone positioning”
  - Patient not intubated | “Theoretically” may prevent intubation
  - Positions herself either lateral or fully prone
  - Maintain approximately 2 hours in each position


Supine position
Ventral lung
Dorsal lung
Ventral alveolus
(overdistended)
Dorsal alveolus
(collapsed)
+ + +
– – –
Prone position
Dorsal lung
Ventral lung
Dorsal alveolus
(decreased collapse)
Ventral alveolus
(decreased overdistention)
+
–

Complications- maternal

- Respiratory system
  - pneumonia, Acute RDS, respiratory failure
- Cardiac
  - Arrhythmias, acute cardiac injury
- Thromboembolic disorders (hypercoagulability)
- Secondary infections
- Neurological disorders, psychiatric illnesses
- AKI
- Cutaneous disorders
- GIT/ liver disorders
- Increased cesarean delivery

Fetal complications

- Risk of miscarriage
- Iatrogenic Preterm delivery
- Still birth
- MTCT covid-19 (rare)

Follow-Up of Pregnant Women after Covid-19 Resolution

- Telehealth follow-up to ensure maternal well-being
- Appointment scheduled after the end of infective period (≥4 weeks after the onset of symptoms or after a negative test)
- Routine ANC assessment of pregnancy risks, fetal growth,& well-being
- Serial USS in the 3rd trimester (28, 32, and 37 weeks) may be indicated due to fetal growth concerns *(Lopez M et al, 2020)*
- If follow-up assessment required within the contagiousness period, ensure the necessary protection measures

COVID-19 Vaccination & Pregnancy

- Vaccines are safe in pregnant & lactating mothers *(ACOG, CDC)*

- The best covid-19 vaccine is the one available to you
- All current vaccines are effective & reduce risk of severe illness and death
- CDC doesn't recommend one vaccine over another one

- Advisable minimum interval of 14 days between routinely administered vaccines and the Covid-19 vaccine series *(CDC)*

Labour & Delivery Considerations in COVID-19

- Anxiety & Depression
  - Increased
  - Assessment with an appropriate tool
  - 1 care giver / birth partner, provide appropriate PPE
- Use of PPE
  - Periodic training & drills
  - That is appropriate for the task to be performed
  - Develop a local SOP
  - Particularly in emergency CS where PPE is perceived as a delay
  - GA is an aerosol generating procedure

Labour & Delivery Considerations in COVID-19

- Team work
  - MW, ObGyn, Anesthesiologist, Pediatrician
  - Limit HW in the delivery room
- Managing a delivery room
  - Separate delivery room (where possible)
  - Decontamination, IPC measures
  - Engineering controls
- Managing the operating room
  - Separate delivery room (where possible)
  - Decontamination

Labour & Delivery Considerations in COVID-19

- Challenging Cases
  - Virtual consultations with colleagues,
  - Shared decision making
- Probable cases of COVID-19: treat as confirmed COVID-19
- Obstetric complications that mimic severe / critical COVID-19; pre-eclampsia, HELLP syndrome
- Thrombocytopenia
- Multiple organ injury

Labour & Delivery Considerations in COVID-19

❖Challenging Cases

- Severe / critical COVID-19 disease
- Refractory hypoxemia
- IUGR
- Anticipated preterm delivery

Labour & Delivery Considerations in COVID-19

- Obstetric analgesia
  - Epidural analgesia
  - Entonox (50% nitrous oxide, 50% O_2) – delivered with a single-patient microbiological filter
- Level of Health Facility
  - Severe / Critical COVID-19, (or recently recovered from severe / critical COVID-19) → tertiary (referral) facility
  - Symptomatic moderate COVID-19 (? SOP)
  - Asymptomatic (? SOP)

Labour & Delivery Considerations in COVID-19

❖ Preterm Delivery / Termination of Pregnancy

- COVID 19 infection – not an indication

➢ Team / shared decision when preterm delivery is required to facilitate maternal resuscitation

➢ Worsening acute organ damage

➢ Refractory hypoxemia

➢ Foetal distress

✓ Dexamethasone – functional lung maturity

✓ Magnesium sulfate – foetal neuroprotection

✓ UFH (vs. LMWH) in severe / critical COVID-19 disease when preterm delivery is anticipated

Labour & Delivery Considerations in COVID-19

- ❖ Mode of Delivery
- ➢ No particular mode of delivery favoured over the other
- ➢ CS
  - Foetal / maternal compromise yet vaginal delivery is not imminent
- ➢ Vaginal delivery
  - Induction of labour – carefully selected mothers
  - Deterioration during 2nd Stage of labour – older mothers (≥35, immunocompromised, obese, GDM / pre-existing DM, asthma)
  - Individualized decision to shorten 2nd stage – instrumental vaginal delivery
  - Oxygen titrated to maintain saturation >94%

Labour & Delivery Considerations in COVID 19

- Assessment & monitoring during labour
  - Assessment of severity of COVID-19
  - Obstetric maternal assessment – to confirm labour
  - Maternal condition – standard tools for monitoring; partograph, WHO Labour Care Guide
  - Hourly SPO_2, RR, Temp
  - Foetal wellbeing
    - CEFM – with CTG
    - Intermittent FHR measurement – handheld foetal Doppler monitor

    (? SOP)

Labour & Delivery Considerations in COVID 19

- ❖ Timing of delivery
- ➢ Asymptomatic
  - Planned elective induction / CS – shd be delayed for 7d from onset of symptoms, & 3d after resolution of symptoms / 14d after +ve test
  - Early term – expectant mgt until 14d after +ve test, OR until 7d from onset of S+S, & 3d after resolution of S+S
  - Full term – consider delivery
- ➢ Severe / critical COVID-19
  - Mechanical ventilation – not an indication for delivery
  - Delivery in worsening critical illness, particularly in refractory hypoxemia

Labour & Delivery Considerations in COVID 19

- Refractory hypoxemia
  - $PaO_2 \leq 60$ mmHg
  - $PaO_2 / FiO_2 \leq 60$ mmHg ratio ≤ 100 (on the FiO_2 of 0.8-1.0 with PEEP of >15cm H_2O or with plateau pressures > 30cm H_2O for more than 12h despite lung protective low tidal volumes of 4-6mL/Kg)
  - Oxygenation index (OI) < 40
- Refractory hypoxemia, GA <32 wks
  - First explore advanced ventilator options to assist respiration in severe hypoxemia
  - Delivery – when oxygenation does not improve timely / adequately
- Refractory hypoxemia, GA ≥ 32 wks
  - Delivery may optimize care, minimizes physiological demand, avoids perimortem delivery

THE REPUBLIC OF UGANDA
MINISTRY OF HEALTH

Postpartum care

Dr. Leevan Tibaijuka

Obstetrician & Gynecologist, MRRH

Post-partum monitoring

- **Asymptomatic or mild illness:** check vital signs every 4 hours for 24 hours after VD and 48 hours after CS
- **Moderate illness:** perform continuous pulse oximetry monitoring for the first 24 hours or until clinical improvement
- **Severe or critical illness:** very close maternal monitoring & care in the ICU are indicated

Analgesia

- **Postpartum analgesia** — Pain management is routine
- Acetaminophen is the preferred analgesic agent
- NSAIDs may be used when clinically indicated

VTE Prophylaxis(↑ Risk of DVT & PE)

- Prophylactic anticoagulants, preferably LMWH (if weight<80kg, enoxaparin 40 mg O.D, if >80kg: 60mg O.D) for at least 10-14 days unless C.I
- No Heparin 12-24 hours prior to delivery (VD or CS). Resume 4-6 hours (VD) or 6-12 hours (CS) post-delivery
- Consider increased duration of 6 wks if additional risks for VTE present *(J. P. Vogel et al.2020)*
- Heparin safe during breastfeeding

Postpartum clinical deterioration

- Some case series & studies have reported improvement of women post-delivery*(Hirshberg et al.2020)*
- Majority report deterioration *(Breslin N et al, 2020; Trahn M et al, 2021; Martínez-Perez O, et al, 2020)*
- Usually sudden, with in hours-1 week of delivery
- Some have deteriorated after discharge & required re-admission *(Hantoushzadeh et al,2020)*
- Evidenced by:
  - Worsening clinical features & laboratory tests
  - Chest CT findings (postpartum CT show features that were not present or very mild in prepartum CT scans) (*Peng A et al,2020)*

Postpartum clinical deterioration

- Probable cause: *natural course of disease (severe or critical)
  - Pulmonary edema—synergistic effects of natural postpartum physiology & pro-inflammatory viral states *(Javanmardi et al, 2020)*
  - DVT/PE—physiologic rise of coagulation factors in the 3rd trimester with the cytokine storm provoked by COVID-19 infection *(Khodamoradi et al. 2020)*
  - Potentially immune restitution in early post-partum period could trigger a clinical deterioration, as described in other pathogens *(N. Singh et al, 2007)*
  - Co-morbidities—cardiac & resp. disease, DM, HTN, etc*(Pfeiffer et al, 2021)*
  - Postpartum complications—endometritis, SSIs, pyelonephritis, mastitis etc.

Does mode of delivery impact clinical deterioration?

- Most deliveries in these circumstances have been by CS
  - CS rates: China (89%) *(Yang R et al, 2020),* USA (38% & 94% in critically-ill) *(Pierce-W et al,2020)*
- No adequate evidence that route of delivery adversely influences maternal prognosis
- Spain: CS—13.4 times associated with clinical deterioration, & severe maternal outcomes among women with no or mild symptoms compared to VD*(Martínez-Perez O, et al, 2020)*
- Surgery induced physiological stress—increases postpartum maternal complications*(Middleton PG et al, 2020; Sandall J et al, 2018)*
- Covid 19 & CS delivery—risks for VTE in postpartum women*(Menezes M et.al, 2020)*

Postpartum clinical deterioration

- Individualized & multidisciplinary approach
- Careful consideration of the expected risks & benefits of expectant obstetric management vs delivery
- Closely monitoring of postpartum women with Covid-19
- Consider delayed discharge in postpartum women with Covid19

Discharge from the hospital

- Individualize decision basing on patient's clinical status prepartum
  - Asymptomatic or mild disease (without comorbidities): May recover at home following discharge
  - Severe or critical disease: continued inpatient observation & management
- Routine PNC review at 6 weeks
- Screen for postpartum depression 4-8 weeks after delivery—risk of exacerbated depression & anxiety*(ACOG)*
- Psycho-education to help patients cope with stress (adequate sleep, healthy diet, regular exercise, etc.)

COVID 19: NEONATAL ASSESSMENT AND CARE

Dr. Kyoyagala Stella Kayanja

Paediatrician Neonatal Unit MUST/MRRH

PRENATAL AND ANTENATAL CONSIDERATIONS

- Sexual & reproductive rights must be respected
- Infections/vaccinations just before or after conception said to be safe/no added risk for severe disease- recommended to use Moderna, J&J
- No known/documented congenital abnormalities/defects
- Covid 19 seems not to cross placenta/MTCT
- Infections more problematic in 3rd trimester, if maternal co-mobidites present-PPROM,fetal distress & preterm birth.
- ***Avoid covid contact/infections during pregnancy***

DELIVERY

- Delivery should be done in an isolation unit
- Staff to wear full PPE-gowns, N95, face shield
- Standard delivery procedure (EMOC and HBB)
- Delayed cord clamping and skin to skin are okay

Note:

Transmission of covid 19 to newborns is almost entirely through respiratory droplets from parents, HCW, and other visitors/attendants

Evaluation

Clinical signs & symptoms

-Infections rare in neonates

-Prematures at risk of severe diz

-C/S similar to other neonatal issues eg sepsis, asphyxia,RDS

- Fever
- Lethargy
- Rhinorrhea/congestion
- DIB-↑RR, indrawing, grunt
- Vomiting and Diarrhea
- Poor feeding

Lab Evaluation

Test

RT-PCR –nasopharynx, oropharynx or nasal swab

Who

All symptomatic with exposure or contact with sick mother

When

24-48 hours if asymptomatic or

Until symptomatic if above is negative

Routine care

The following are encouraged, as long as the baby and mother are stable:

- Rooming in/6 ft apart
- Temporary separation only for medical reasons
- Exclusive breastfeeding
- Skin to skin for small babies
- Routine immunization-confirmed symptomatic neonates can wait until discharge

However, infection prevention has to be paramount- *mother must wear medical masks, wash hands thoroughly, bathe frequently, prevent respiratory droplets*

RECOMMENDATIONS FOR MOTHERS IN ALL SCENARIOS – SUMMARY

HAND HYGIENE

- Wash hands frequently with soap,water for 40-60s or alcohol based hand rub for 20s, especially before touching baby
- Regularly clean and disinfect surfaces

RESPIRATORY HYGIENE

- Wear triple layer mask all the time
- Replace mask as soon as they become damp
- Dispose mask immediately
- Do not re use mask
- Do not touch front of mask, untie from behind
- Cough/ sneeze into tissue , dispose immediately and follow hand hygiene

FEEDING OPTIONS

- Breastfeeding has to be encouraged for all mothers
- Expression of breastmilk to be done – hand expression / pump in case mother cannot breastfeed or if baby is isolation NICU.
- Hand hygiene and respiratory hygiene to be strictly followed.
- Baby should be preferably at 6 ft distance from mother when roomed in.
- Other feeding options – Donor human milk, formula feeds – with consent, convert to breastfeeding before discharge or earliest possible opportunity

NOTE

1.Follow above precautions before giving KMC, no need to disinfect chest area, regular bathing is required for mothers.

2.Confirmed Positive mother should be advised to follow hand hygiene and respiratory hygiene for at least for 14 days from symptom onset after discharge

Care for a covid 19 sick newborn

- Only symptomatic neonates to be admitted-*asymptomatic ones stay with mother*
- Admission can be in a neonatal isolation unit or same NICU with others but 6ft away
- Staff and attendants to practice IPC

NB: Since covid symptoms are similar to other neonatal conditions, these babies should be evaluated and managed for these conditions if suspected

Additional lab evaluation for symptomatic neonates

- CBC
- CRP-Quantitative-CRP/Procalcitonin
- Blood cultures
- Chest-Xray
- CSF analysis
- Urine routine and culture
- D-Dimer, S.Fibrinogen, PT, APTT, INR, LDH, S.Ferritin, IL-6levels)

Specific Management

- Specific anti-COVID19 treatment in not recommended in symptomatic neonates
- Neonates should be managed as per standard neonatal protocols, antibiotics as per unit policy and cultures.
- In suspected cases of Neonatal MIS-C, use systemic corticosteroids, IVIG and LMW Heparin
- In asymptomatic/mild cases- Continue DBF and Vitamin D3 drops(400IU/day)

Supportive management

- Feeding
- Nasal decongestion with NS drops/suctioning
- Temperature control
- Oxygen support:-nasal prongs/CPAP
- Rehydration if oral feeds not sufficient
- Monitoring

Discharge and Home care

- If asymptomatic, can be allowed home after 48 hours of delivery
- No need to wait for covid results
- All IPC recommendations continue at home
- Ensure baby is vaccinated
- Given a phone number for follow up -results communicated on phone and baby’s change in condition too.

Acknowledgements

- CDC-https://www.cdc.gov/
- WHO
- MOH-Uganda: National guidelines for management of covid 19, 3rd Edition
- Bangalore Medical College and Research Institute

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ANAESTHESIA FOR CAESAREAN SECTION IN SARS-CoV-2

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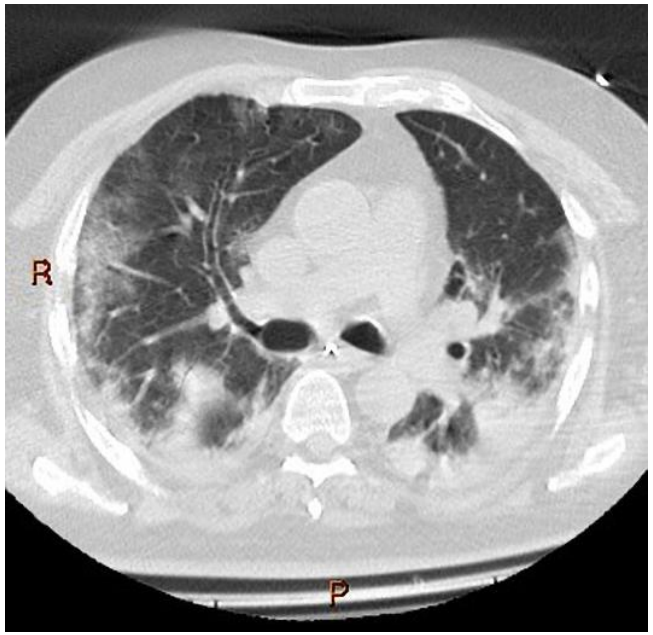
Outline

- National Guidelines on Perioperative Care
- Organisation for the operation
- Options for Anaesthesia
  - Neuroaxial
  - General anaesthesia
- Anticoagulation in SARS-CoV-2 treatment
- Pain management

Scan the QR codes for the references



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7.5 Standard Operating procedures for Surgical Services during COVID-19 pandemic in Uganda.

Introduction

Although COVID-19 is not primarily a surgical disease, the pandemic has significantly affected delivery of surgical services countrywide. Local guidance and standard operating procedures (SOP) are in existence for the management of suspected, probable and confirmed COVID-19 at the various surgical service delivery points in the SOPD, Casualty or Emergency Unit, In-patient and Operating Theatre during the COVID-19 era. These SPOs are aimed at protecting surgical patients, staff and community from the risk of SARS-CoV2, by providing safe environment for surgical care in Uganda.

Section 1: Ambulatory/ Surgical Out Patient Department Services

The SOPD should run different clinics on each day of the week. Clinicians should endeavor to review patients on an appointment basis.

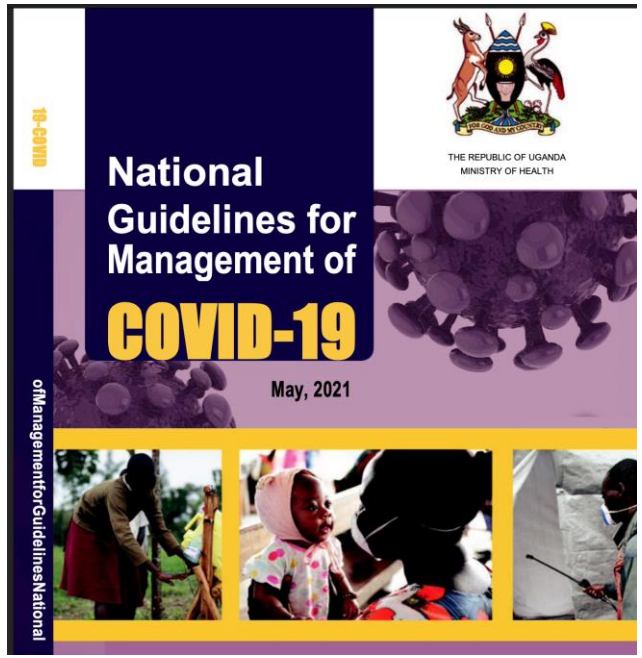
Section 2: Surgical inpatient services

Elective surgical admissions will be evaluated on a case-by-case basis with a plan to postpone or defer. Selected diagnostic/therapeutic procedures will be considered where delays may result into worse prognosis, prolonged duration of hospitalization or advancement of disease status.

By the time the patient leaves the admitting point i.e. Casualty or Surgical Outpatient should have a checklist with COVID-19 status.

Section 3: Operating Theatre.

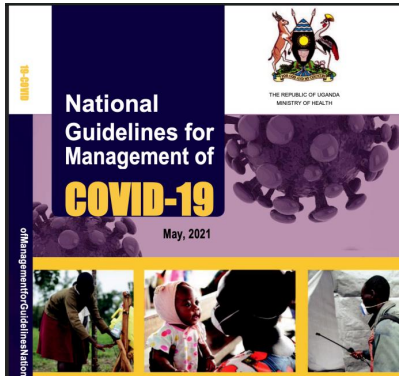
- The dedicated COVID-19 Operating Area should be identified for management of suspected, probable or confirmed.
- Nil Per os (NPO) for G.A, Early introduction of oral feeds, removal of urethral catheter and patient withdrawal from HDU or ICU, to enable ambulation, physiotherapy.



Cover patient with anti-coagulant due to pulmonary complications in severe or critical COVID-19, Enteral Tube feeding via NG-tube, feeding gastrostomy or jejunostomy and for critically sick COVID -19 patients parenteral nutrition is recommended and I.V. 10% Dextrose

- Discharge from Surgical COVID-19
- Nutritional rehabilitation done or continued accordingly post operatively.
- Discharged ASAP to either parent ward or home

Classification of severity of COVID-19



Mild COVID-19: This includes asymptomatic cases or Patients with uncomplicated upper respiratory tract viral infection. These may have nonspecific symptoms

Moderate COVID-19: This refers to cases that present as pneumonia without a need for oxygen.

Severe COVID-19 require hospital level interventions including oxygen therapy.

Critical COVID-19; these are patients who present with ARDS, sepsis and septic shock.

Danger signs	High risk of developing severe disease or complications
• Rapid breathing: >30 per minute (adult/child >5y); ≥ 40 breaths per minute for children 1-5 years, ≥50 breaths per minute for children 2-11months. • Difficult breathing and/or chest in drawing • Persistent high fever for 3 or more days • Disorientation • Lethargy (excessive weakness, tiredness) • Seizures or convulsions • Sunken eyes or other signs of severe dehydration • Inability to drink or eat	• Age < 1 year • Age > 60 years • Cardiovascular conditions such as heart attack or stroke • Diabetes • Sickle cell disease • Cancer patients on/off chemotherapy • Liver disease • Person living with HIV • Lung diseases (e.g. asthma, TB, COPD) • Kidney disease • Severe Acute Malnutrition

?????? Pregnant women

Organisation for the procedure

- Patient transfer to and from the operating theatre
- Minimize the number of staff in theatre
- Locally practicable strategy (timing and location) for donning and doffing PPE
- Intraoperative supply of emergency drugs or equipment
- Intraoperative record of care
- Provision of safe postoperative care

Indication of precaution level (PPE)

In Operating Room:
Airborne protection
(N-95 & fluid shield mask)

Equipment readiness & access to supplies

OR preparedness
Covered anesthesia workstation

Buckets with supplies & drugs
(uncovered here for display)

Anesthesia machine

OR preparedness
Covered anesthesia machine

HEPA filter

COVID-19 Surgical Patient Checklist*

To minimize healthcare provider exposure when operating on COVID+ or suspected patient

Preoperative

Team Briefing

To entire OR team:

- ☐ What is COVID status of patient?
- ☐ What are the anesthesia & surgical plans?
- ☐ Identify additional staff member assigned to remain outside OR and deliver supplies [*OR runner*]
- ☐ Is the recovery plan and location confirmed?

Setup

To Nurse:

- ☐ Is COVID notification sign on door?
- ☐ Is PPE available?
- ☐ Are virucidal cleaning supplies available?
- ☐ Is non-essential equipment removed from OR?

To Anesthesia Provider:

- ☐ Is viral filter at patient end of breathing circuit?
- ☐ Is there a dedicated tray for contaminated items?

Before Patient Transport to OR

To Nurse, Anesthesia Provider & OR runner:

- ☐ Confirm staff don PPE prior to patient pickup
- ☐ Is surgical mask for patient available for transport?
- ☐ Stretcher cleaned after patient transfer?

Intraoperative

Before Induction of Anesthesia

To Nurse & Anesthesia Provider

- ☐ Perform **WHO Surgical Safety Checklist Sign In***
- ☐ Confirm all OR staff wearing appropriate PPE
- ☐ Is OR runner present outside OR?

Will aerosol generating procedure be performed?

If YES:

- ☐ Non-essential staff leave OR
- ☐ Confirm steps to minimize aerosol generation#

If NO:

- ☐ Confirm patient will wear surgical mask during case

Before Skin Incision

To Surgeon, Nurse, Anesthesia Provider:

- ☐ Perform **WHO Surgical Safety Checklist Time Out***

Is the surgery aerosol generating?#

- ☐ If YES, confirm steps to minimize aerosol generation

End of Case

To Surgeon, Nurse, Anesthesia Provider:

- ☐ Perform **WHO Surgical Safety Checklist Sign Out***

Will patient be extubated?

- ☐ If YES: Plan and steps to minimize aerosol generation#
- ☐ Non-essential personnel leave OR
- ☐ Confirm OR runner remains outside OR

Will the patient remain intubated?

- ☐ If YES, Has ICU been notified?

Postoperative

Before Patient Transport from OR

To Anesthesia Provider & Nurse

- ☐ Confirm recovery location
- ☐ Is oxygen flow as low as possible?
- ☐ Is surgical mask on patient?
- ☐ Are unused medication vials wiped with 70% alcohol** or disposed of?
- ☐ Reminder to keep PPE on until transfer complete

After Patient Transport: Operating Room Disinfection

To Nurse:

- ☐ Is COVID notification sign still on OR door?
- ☐ Have cleaning staff been notified to clean COVID OR?

WAIT ONE HOUR AFTER EXTUBATION TO CLEAN OPERATING ROOM***

*To be used in conjunction with WHO Surgical Safety Checklist. This checklist is not intended to be comprehensive. Additions and modifications to fit local practice are encouraged.

**Cleaning and reuse of disposables during COVID-19 pandemic is not recommended if resources are adequate; these recommendations are for critical resource limitations only.

*** This refers to standard unventilated room. Time may vary depending on OR ventilation system.

COVID in obstetrics: labor analgesia and cesarean section

Guasch, Emilia[a]; Brogly, Nicolas[a]; Gilsanz, Fernando[b] Author Information

- SARS-CoV-2 is associated with thrombocytopenia and coagulopathy
- Preferably elective
- Early use of neuroaxial anaesthesia (CSEs, Single shot spinal)
- Most experienced and knowledgeable anaesthesia provider
- Oxygen supplementation only if SpO_2 < 93-95%

- Review the CBC, consider LFTs and RFTs in AKI
- Patient wearing a surgical mask throughout the procedure
- Supplementation of O_2 under the mask
- Avoid if possible >5LPM O_2 flows
- *Hypotension

Challenges of a single shot spinal anaesthetic

- Adequate block up to T4 will compromise accessory muscles of respiration that might be in use — ***worsening hypoxemia***
- Quick onset with vasodilation in patient with inflammatory induced vasodilation — ***worsening hypotension***
- Finite duration —***challenging pain management***

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COVID in obstetrics: labor analgesia and cesarean section

Guasch, Emilia[a]; Brogly, Nicolas[a]; Gilsanz, Fernando[b] Author Information

- General anaesthesia
- Contraindicated regional anaesthesia, Lack of time, failed regional, deteriorating COVID-19 patient
- Physiologically difficult airway

General anesthesia with rapid sequence induction performed by the most experienced amesthesiologist

- Don PPE (Recommended PPE, based on your local authorities protocol, usually "enhanced" PPE)
- Decrease as much as possible the number of persons in OT (2 anesthesiologists if available)
- Apply same measures as for any surgical COVID-19 patient. Special circuit for recovery
- Avoid facial mask manual ventilation, Consider the use of videolaringoscopy
- Use of high efficiency hydrophobic filters (inspiratory and expiratory branches). Disposable material
- Provide a quiet awakening, avoid coughing
- Inmediate postoperative surveillance in OT (do not transfer the patient to the regular PACU unit)
- Transfer the patient to COVID-19 ICU area, if postoperative mechanical ventilation is needed

What obstetricians should know about obstetric anesthesia during the COVID-19 pandemic

Laurence E. Ring, Rebecca Martinez, Kyra Bernstein, and Ruth Landau*

Box 1. Procedures and events considered to be potentially aerosol generating during anesthetic care in Labor and Delivery Units.

Nebulizer administration O_2 administration (> 5 L) Retching or vomiting Bag-mask ventilation Non-invasive ventilation (CPAP, BiPAP) Endotracheal intubation Endotracheal tube suctioning Endotracheal extubation	***The risk of exposure is probably most directly borne by the anesthesia team due to their proximity to the patient's face and mouth, but is shared by all operating room personnel.***

Supplemental oxygen should not be used unless specifically indicated (SpO2<95% prior to delivery or SpO2<90% or lower after delivery) as this is an aerosol generating procedure.
If supplemental oxygen is needed, the patient should wear a surgical mask over the nasal cannula or face mask.

Postoperative

- Pain management
  - Intrathecal or epidural opioids are good; caution with delayed hypoventilation
  - NSAIDs and paracetamol can be used; mind renal and liver functions
  - Regional blocks
- Postoperative care destination also dependent on severity of illness

The Society for Obstetric Anesthesia and Perinatology Consensus Statement on the Anesthetic Management of Pregnant and Postpartum Women Receiving Thromboprophylaxis or Higher Dose Anticoagulants

Lisa Leffert, MD
Brendan Carval
Shannon M. Ba
Timothy Houle,

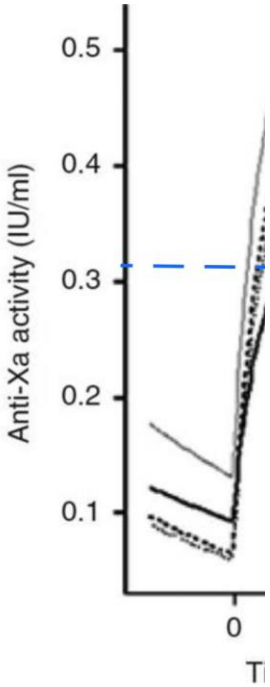

Figure 2. Typical antifa
istration of 40 mg eno
trimester, versus nonp

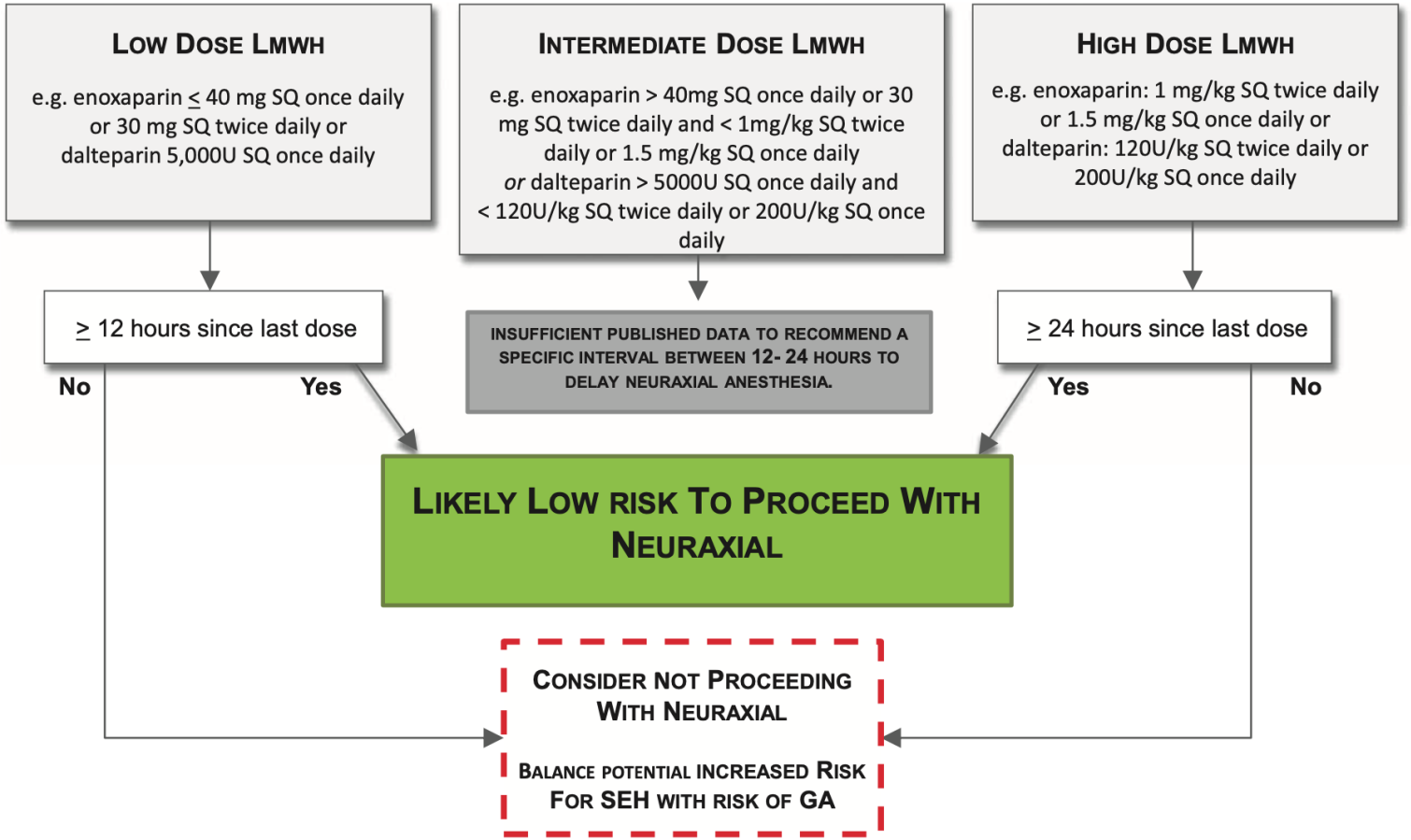

Figure 4. Decision aid for urgent or emergent neuraxial procedures in the obstetric patient receiving LMWH. *Assume normal renal function, body weight >40 kg, and no other contraindications to neuraxial anesthesia. GA indicates general anesthesia; LMWH, low molecular weight heparin; SEH, spinal epidural hematoma; SQ, subcutaneous. Note: This SOAP consensus statement is not intended to set out a legal standard of care and does not replace medical care or the judgment of the responsible medical professional considering all the circumstances presented by an individual patient.

- For IV UFH, wait ≥1 hour after neuraxial block (if no signs of postpartum hemorrhage) before initiating or restarting anticoagulation (Class IIb C-EO).
- For low-dose LMWH thromboprophylaxis (eg, enoxaparin ≤40 mg SQ once daily or 30 mg SQ twice daily, or dalteparin 5000 U SQ once daily), wait ≥12 hours after the neuraxial procedure and ≥4 hours after the epidural catheter removal before initiating or restarting LMWH thromboprophylaxis.
    1. Indwelling catheters can be maintained with low-dose LMWH. NSAIDs (including aspirin), but not acetaminophen, with an in situ epidural and thromboprophylaxis may increase the risk of bleeding complications. Catheter removal can occur ≥12 hours after a LMWH dose and subsequent LMWH dosing should occur ≥4 hours after catheter removal (Class I C-EO).
- For higher dose LMWH (eg, enoxaparin 1 mg/kg SQ twice daily or 1.5 mg/kg SQ once daily; dalteparin 120 U/kg SQ twice daily or 200 U/kg SQ once daily), consider waiting ≥24 hours after the neuraxial procedure and ≥4 hours after epidural catheter removal before initiating or restarting LMWH therapy (Class I C-EO).
- For a few select circumstances, there may be a benefit to bridging with UFH 5000 U SQ (twice or 3 times daily) instead of LMWH because of its shorter duration of action and because it can be restarted sooner than LMWH (1 vs 4 hours) (Class IIb C-EO).

SUMMARY

- Review the patient, with medications they are taking
- Preferably elective procedures
- Neuroaxial anaesthesia is the recommended
- Theatre practices to avoid contamination and spread
- Postoperative pain management and thromboprophylaxis are key

References

Resources:

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