Society for Maternal•Fetal Medicine

CoVID-19: Preparedness for OB/MFM

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“Know the enemy and know yourself;
in a hundred battles
you will never be in peril.”
- Sun Tzu

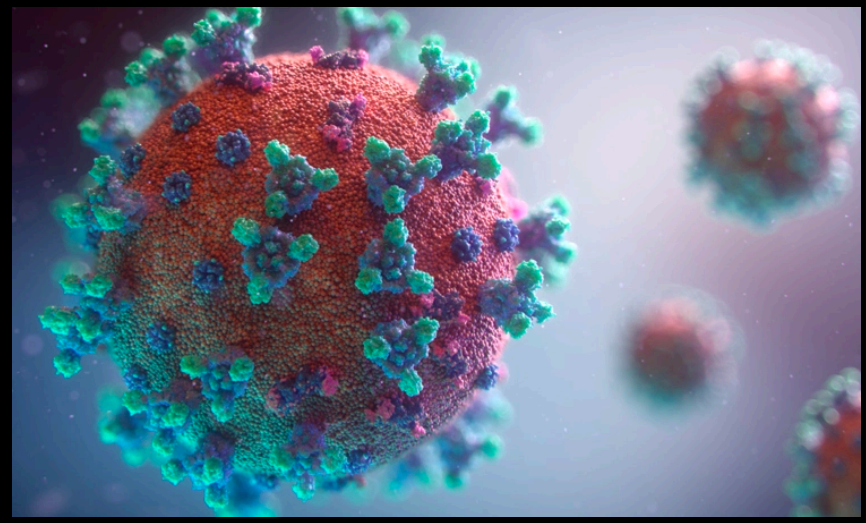
知己知彼 百戰百勝

Objectives

- Understand CoVID-19
- Summarize available guidance
- Review sample algorithm from UWash (Dr. Ma)
- Specific questions for your own unit
- Research efforts
- President’s address (Dr. Louis)

Slides will be released

Coronaviridae



- α, β, γ, δ
  - α : human coronaviruses
    - HCoVs: HCoV-229E and NL63
  - β : zoonotic coronavirus
    - A lineage - Embecovirus: OC43 and HKU1
    - B lineage - Sarbecovirus: SARS-CoV (‘03), SARS-CoV2 (’20)
    - C lineage - Merbecovirus: MERS
    - D lineage - Nobecovirus

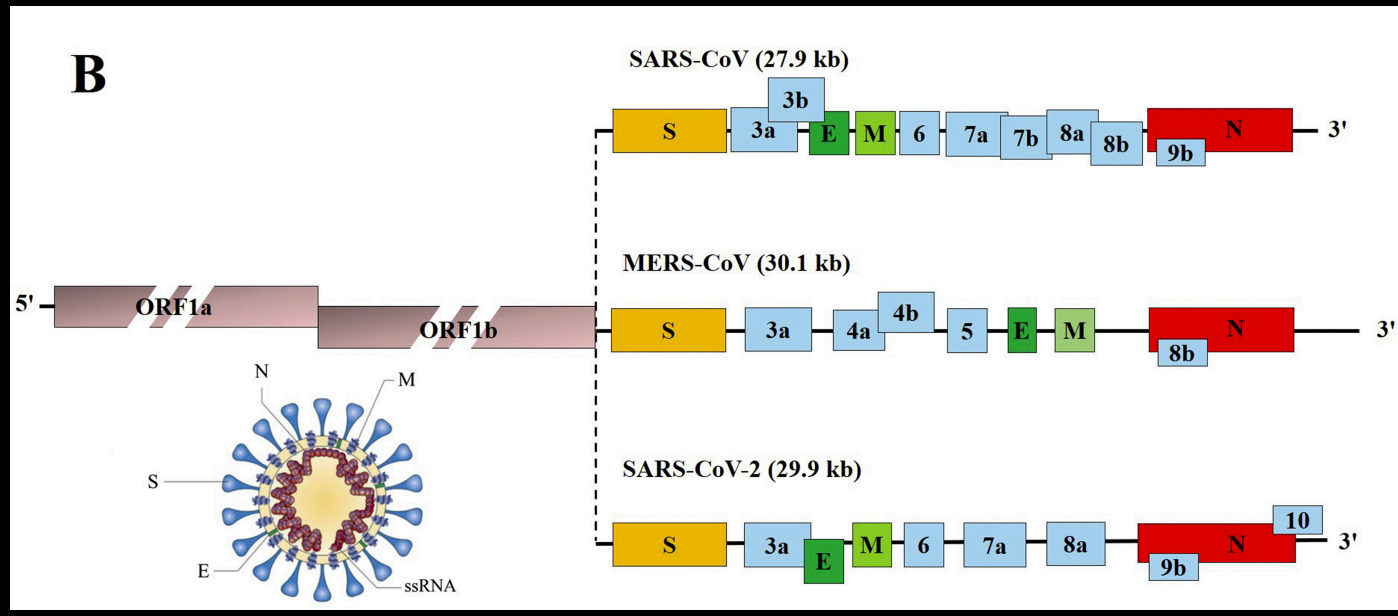
nCoV-19

CoVID-19

Li, et al. J pharmaceutical analysis, 3/5/20

SARS-CoV2: Virology

- Host cell receptor:
  - ACE-2 receptor
- Sequence similarity
  - 79% to SARS-CoV
  - 50% to MERS-CoV
- R_0: Basic Reproduction Number
  - 2.2 (95% CI 1.4-3.9)



Li, et al. J pharmaceutical analysis, 3/5/20

Coronavirus
COVID-19

Transmission

Ireland DoH

Coronavirus
Covid-19
Public Health
Advice

Seasonal Influenza	COVID-19 (Coronavirus)	SARS	Measles
			
R0 1 - 2	R0 2 - 3	R0 3 - 5	R0 12 - 18

 = Infected person

 = Person who may become infected

R0 ("R naught") ***basic reproduction number*** = how many people, on average, each infected person will in turn infect in a fully susceptible population.

SARS-CoV2: Virology

- Incubation:
  - Mean: ~ 5.2 days (95%CI 4.1-7.0 days)
  - Range: 2-14 days

- Viral Shedding
  - Median: 20 days (max 37 days)

Rasmussen S, et al. COVID-19 and Pregnancy: What obstetricians need to know AJOG. 2/12/20

CoVID-19: Patient characteristics

- Age:
  - Range: 10-89 years
  - Median: 59 years
- 56% M; 44% F
- Hospitalized patients: 49-56 years (average)
  - Underlying illness (1/3 to 1/2)
  - Men more frequent (54-73%)
  - Rarely children

Rasmussen S, et al. COVID-19 and Pregnancy: What obstetricians need to know AJOG. 2/12/20

COVID-19: Transmission

- Respiratory droplets
  - Prolonged unprotected contact between infector / infectee
  - Aerosol transmission is also possible in case of protracted exposure to elevated aerosol concentrations in closed spaces
- Fomites
- No reports of transmission via: Airborne*, Fecal-oral

https://www.who.int/docs/default-source/coronaviruse/who-china-joint-mission-on-covid-19-final-report.pdf

CoVID-19: Signs & Symptoms

• Fever	87.9%	• Myalgia/arthralgia	14.8%
• Dry cough	67.7%	• Chills	11.4%
• Fatigue	38.1%	• Nausea or vomiting	5.0%
• Sputum	33.4%	• Nasal congestion	4.8%
• SOB	18.6%	• Diarrhea	3.7%
• Sore throat	13.9%	• Hemoptysis	0.9%
• Headache	13.6%	• Conjunctival cong	0.8%

https://www.who.int/docs/default-source/coronaviruse/who-china-joint-mission-on-covid-19-final-report.pdf

CoVID-19: Signs & Symptoms

- Abnormal testing:
  - CXR (up to 100%)
  - Lymphopenia, Leukopenia, Thrombocytopenia

- Acute respiratory distress
  - 17-29% of hospitalized

Rasmussen S, et al. COVID-19)and Pregnancy: What obstetricians need toknow AJOG. 2/12/20

N=1099

ORIGINAL ARTICLE

Clinical Characteristics of Coronavirus Disease 2019 in China

Wei-jie Guan, Ph.D., Zheng-yi Ni, M.D., Yu Hu, M.D., Wen-hua Liang, Ph.D., Chun-quan Ou, Ph.D., Jian-xing He, M.D., Lei Liu, M.D., Hong Shan, M.D., Chun-liang Lei, M.D., David S.C. Hui, M.D., Bin Du, M.D., Lan-juan Li, M.D., et al., for the China Medical Treatment Expert Group for Covid-19*

Lab	Change	Incidence[1,2]
Lymphopenia	<1500/mm3	35-70%
Leukopenia	4.7 median	9-33.7%
Hematocrit	Decrease	41-50%
Thrombocytopenia	<150/mm3	4-35%
AST/ALT	Increase	4-22%
LDH	Increase	27-75%
CRP	Increase	61-85
Procalcitonin	Can be > 0.5	5.5% 14% if severe 24% if ICU

2 - Rasmussen S, et al. COVID-19)and Pregnancy: What obstetricians need toknow AJOG. 2/12/20

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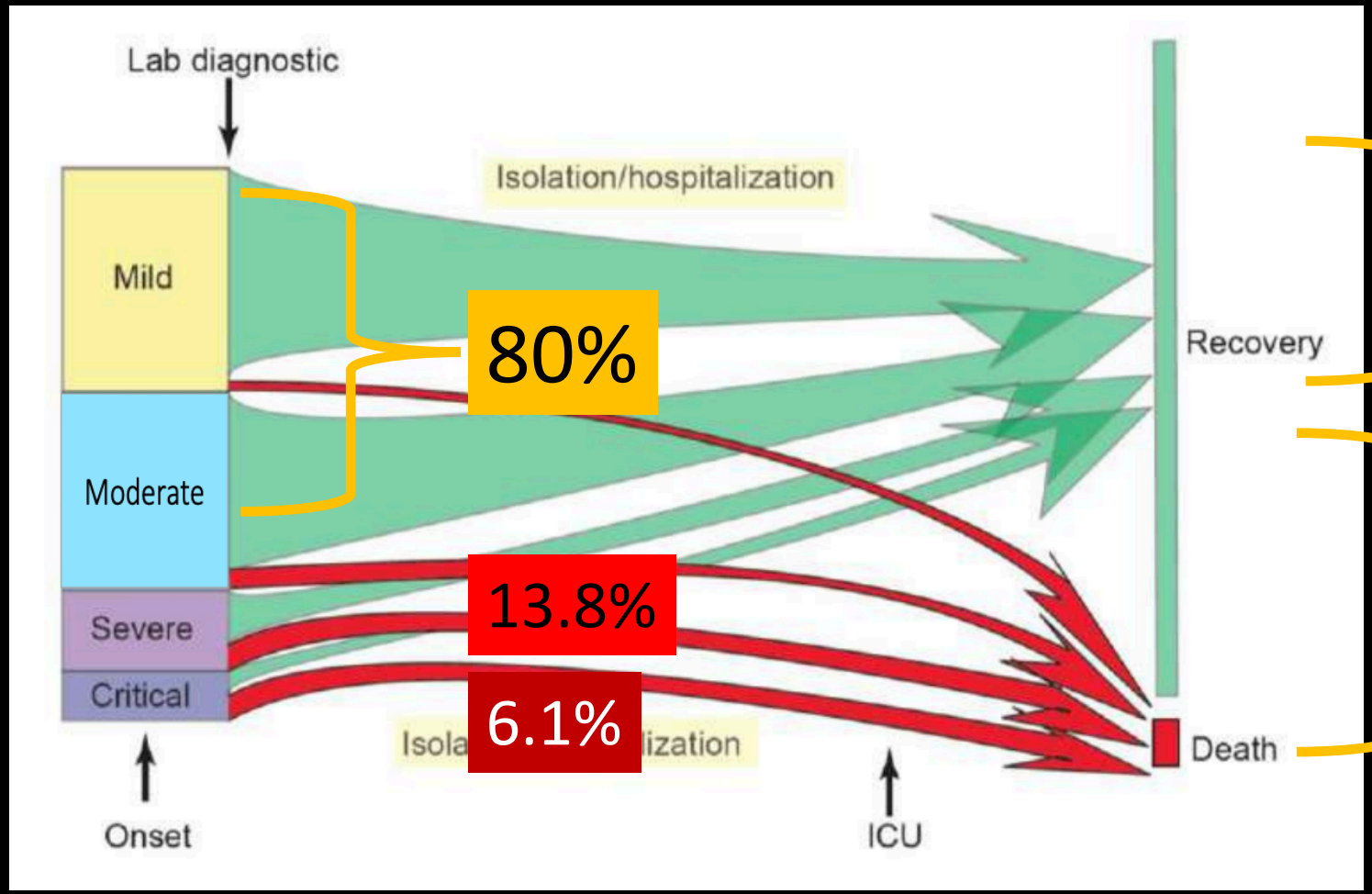
Lab	Non-severe	Severe
WBC (Median)	**4.9**	**3.7**
High >10	4.8%	11.4%
Low <4	28.1%	61.1%
Lymphocyte (Median)	**1000**	**800**
<1500	80.4%	96.1%
Platelet (Median)	**172k**	**137.5k**
<150k	31.6%	57.7%
Hemoglobin (Median)	**13.5 (IQR: 12-14.8)**	**12.8 (IQR: 11.2-14.1)**

CoVID-19: Progression of Disease

Onset

1 wk



Recovery

2 weeks

3-6 weeks

https://www.who.int/docs/default-source/coronaviruse/who-china-joint-mission-on-covid-19-final-report.pdf

CoVID-19: Case Fatality Rates

EMERGING INFECTIOUS DISEASES®

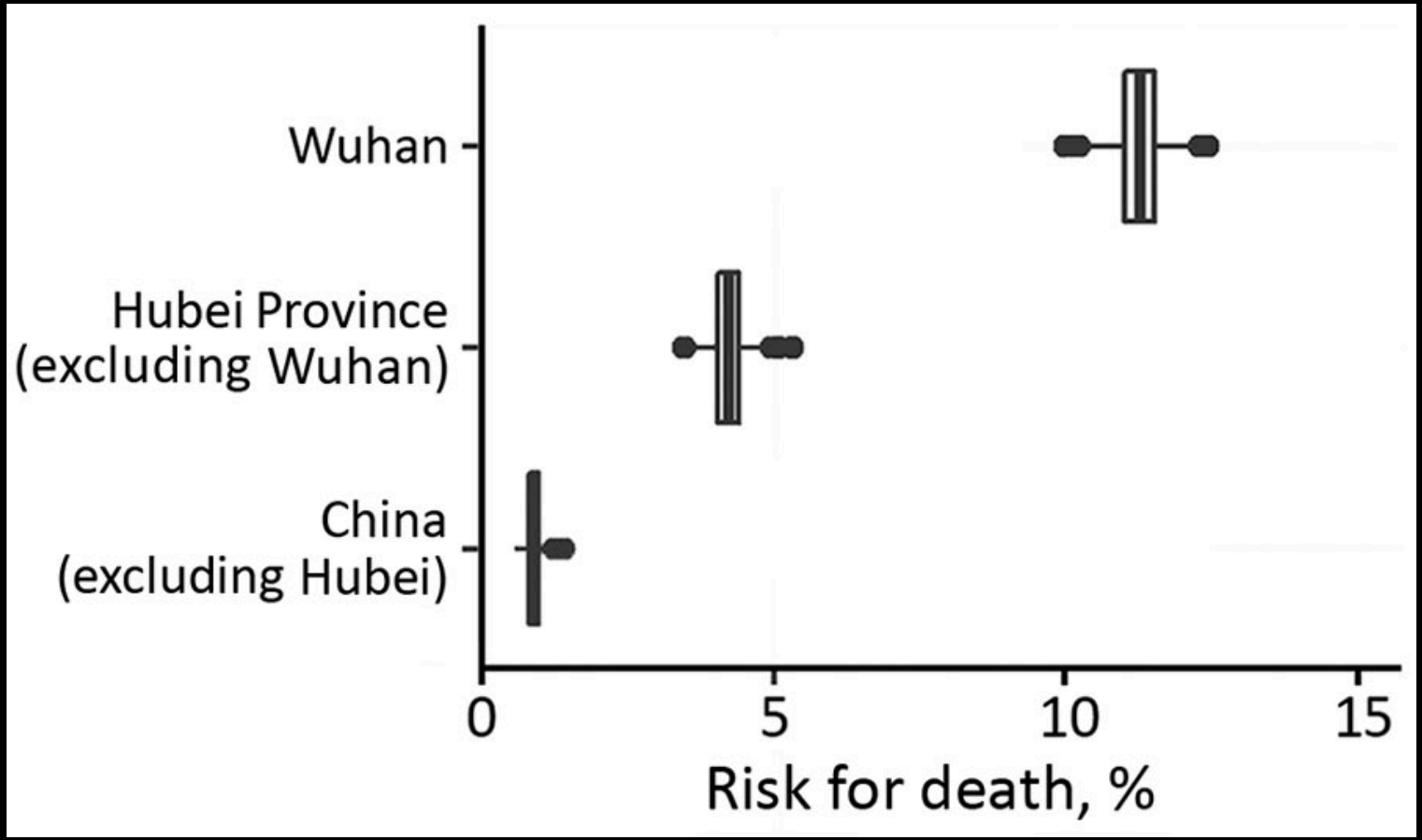
- China (3.5%)
- China, excluding Hubei Province (0.8%)
- 82 countries, territories, and areas (4.2%)
- Cruise ship (0.6%)

- Broad range of 0.25%–3.0%

Wilson et al. Case-Fatality Risk Estimates for COVID-19 Calculated by Using a Lag time for Fatality. EID. 3/13/20

CoVID-19: Case Fatality Rates

EMERGING INFECTIOUS DISEASES®



Mizumoto, Chowell.
EID 3/13/20

CoVID-19: RF for demise

Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study

Fei Zhou, MD † • Ting Yu, MD † • Ronghui Du, MD † • Guohui Fan, MS † • Ying Liu, MD † • Zhibo Liu, MD † • et al. Show all authors

	Univariable OR (95% CI)	p value	Multivariable OR (95% CI)	p value
Demographics and clinical characteristics				
Age, years*	1·14 (1·09–1·18)	<0·0001	1·10 (1·03–1·17)	0·0043
Female sex (*vs* male)	0·61 (0·31–1·20)	0·15	..	..
Current smoker (*vs* non-smoker)	2·23 (0·65–7·63)	0·20	..	..
Comorbidity present (*vs* not present)				
Chronic obstructive lung disease	5·40 (0·96–30·40)	0·056	..	..
Coronary heart disease	21·40 (4·64–98·76)	<0·0001	2·14 (0·26–17·79)	0·48
Diabetes	2·85 (1·35–6·05)	0·0062	..	..
Hypertension	3·05 (1·57–5·92)	0·0010	..	..

	Univariable OR (95% CI)	p value	Multivariable OR (95% CI)	p value
Demographics and clinical characteristics				
Respiratory rate, breaths per min				
≤24	1 (ref)	..	..	..
>24	8·89 (4·34–18·19)	<0·0001	..	..
SOFA score	6·14 (3·48–10·85)	<0·0001	5·65 (2·61–12·23)	<0·0001
qSOFA score	12·00 (5·06–28·43)	<0·0001	..	..

N=191

CoVID-19: Risk factors for demise

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Laboratory findings

White blood cell count, × 10^9 per L				
<4	0·73 (0·26–2·10)	0·56	..	..
4–10	1 (ref)	..	..	..
>10	6·60 (3·02–14·41)	<0·0001	..	..
Lymphocyte count, × 10^9 per L*	0·02 (0·01–0·08)	<0·0001	0·19 (0·02–1·62)	0·13
ALT, U/L				
≤40	1 (ref)	..	..	..
>40	2·87 (1·48–5·57)	0·0018	..	..

(Table 3 continues in next column)

	Univariable OR (95% CI)	p value	Multivariable OR (95% CI)	p value
(Continued from previous column)				
Creatinine, µmol/L				
≤133	1 (ref)	..	..	..
>133	4·39 (1·01–19·06)	0·048	..	..
Lactate dehydrogenase, U/L				
≤245	1 (ref)	..	..	..
>245	45·43 (6·10–338·44)	0·0002	..	..
Creatine kinase, U/L				
≤185	1 (ref)	..	..	..
>185	2·56 (1·03–6·36)	0·043	..	..
High-sensitivity cardiac troponin I, pg/mL				
≤28	1 (ref)	..	..	..
>28	80·07 (10·34–620·36)	<0·0001	..	..
D-dimer, µg/mL				
≤0·5	1 (ref)	..	1 (ref)	..
> 0·5	1·96 (0·52–7·43)	0·32	2·14 (0·21–21·39)	0·52
> 1	20·04 (6·52–61·56)	<0·0001	18·42 (2·64–128·55)	0·0033
Prothrombin time, s				
<16	1 (ref)	..	..	..
≥16	4·62 (1·29–16·50)	0·019	..	..
Serum ferritin, µg/L				
≤300	1 (ref)	..	..	..
>300	9·10 (2·04–40·58)	0·0038	..	..
IL-6, pg/mL*	1·12 (1·03–1·23)	0·0080	..	..
Procalcitonin, ng/mL*	13·75 (1·81–104·40)	0·011	..	..

1.5

OR=odds ratio. SOFA=Sequential Organ Failure Assessment. qSOFA=Quick SOFA. ALT=alanine aminotransferase. IL-6=interleukin-6. *Per 1 unit increase.

***Table* 3: Risk factors associated with in-hospital death**

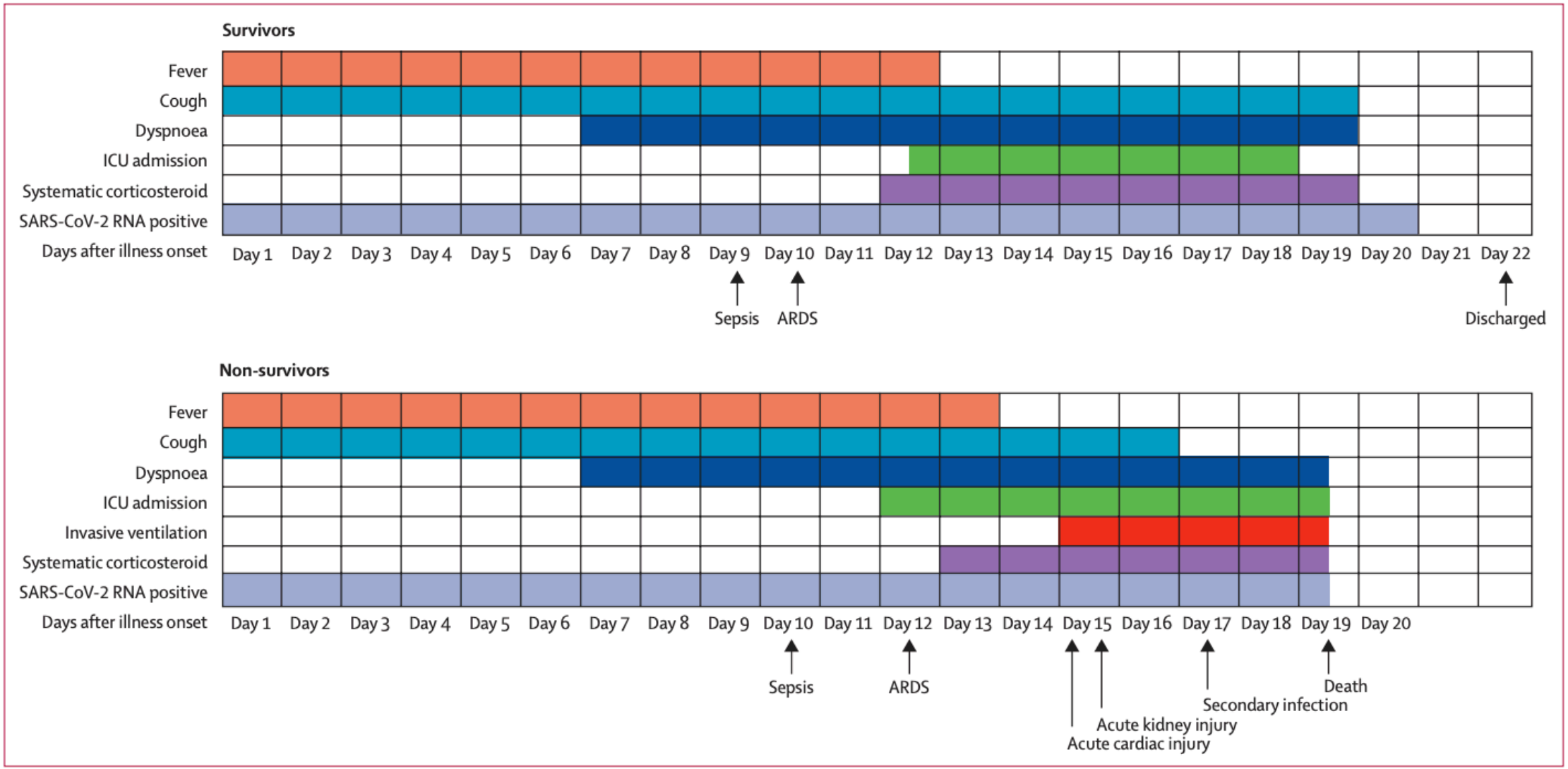
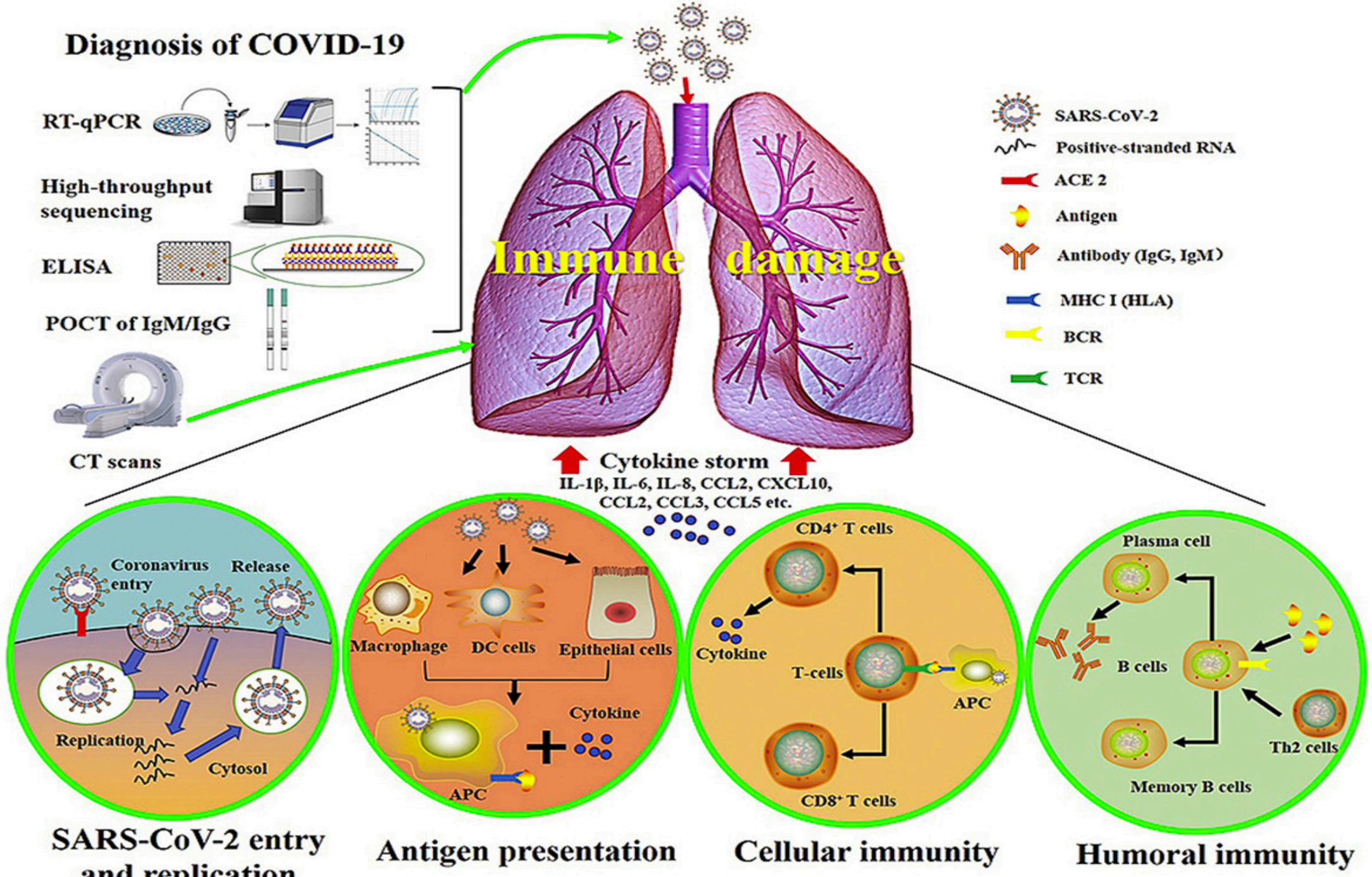


Figure 1: **Clinical courses of major symptoms and outcomes and duration of viral shedding from illness onset in patients hospitalised with COVID-19**
Figure shows median duration of symptoms and onset of complications and outcomes. ICU=intensive care unit. SARS-CoV-2=severe acute respiratory syndrome coronavirus 2. ARDS=acute respiratory distress syndrome. COVID-19=coronavirus disease 2019.



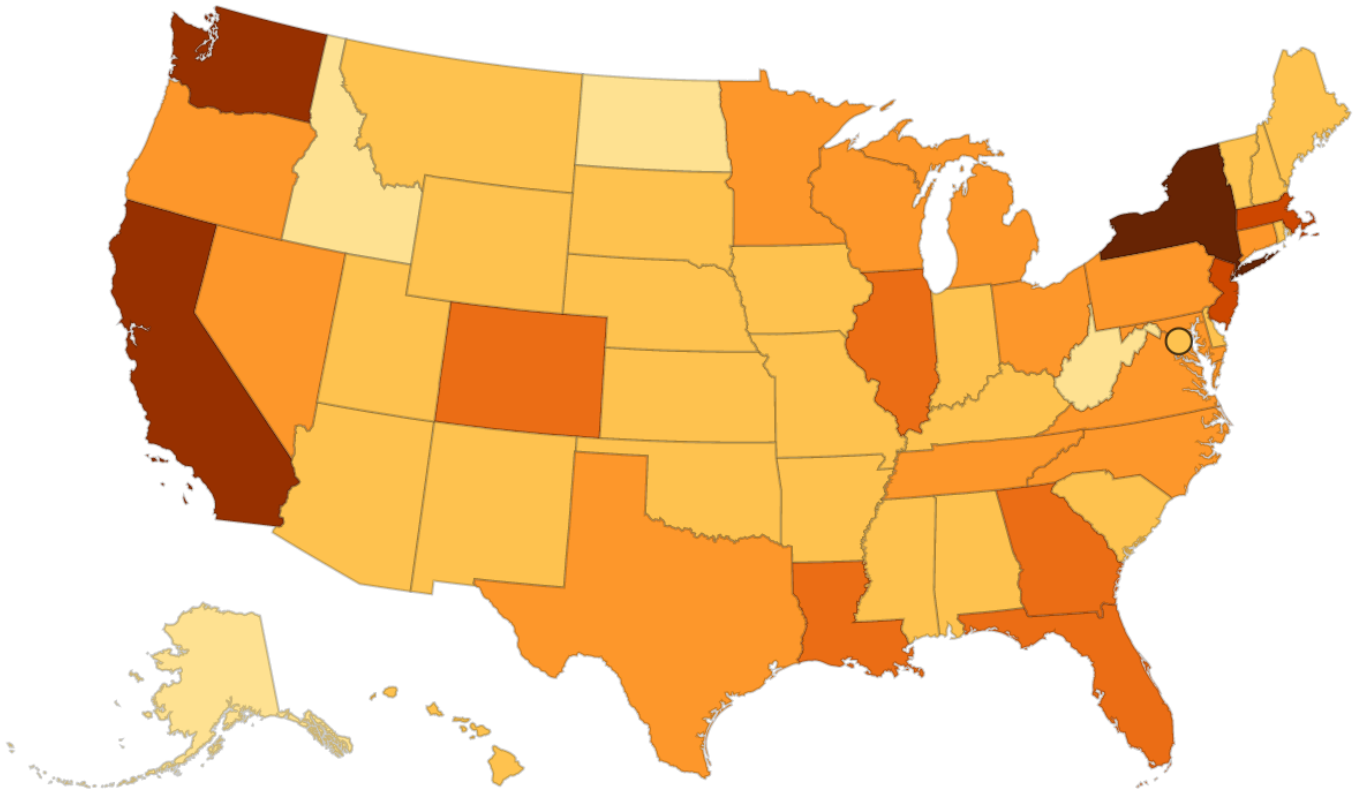
Li, et al. J pharmaceutical analysis, 3/5/20

Where are we in U.S. today?

COVID-19: U.S. at a Glance *(as of 3/18/20)*	
Total cases	7038
Total deaths	97
Jurisdictions reporting	54

COVID-19: Source of Exposure *(as of 3/18/20)*	
Travel	269
Close contact	276
Under investigation	6,493
Total	7,038

States Reporting Cases of COVID-19 to CDC*



Territories AS GU MH FM MP PW PR VI

Reported Cases

(last updated March 18, 2020)

None 1 to 5 6 to 50 51 to 100 101 to 200 201 to 500 501 to 1000 1001 to 5000

What do we know regarding CoVID-19 in pregnancy?

CoVID-19 + Pregn: Liu, et al

- SYS University, Guangzhou
- N=13
  - Age 22-36
  - GA: 2 = <28 weeks; 11 = 3rd trim
  - No underlying medical comorbidities

Clinical manifestations and outcome of SARS-CoV-2 infection during pregnancy

Yangli Liu , Haihong Chen , Kejing Tang , Yubiao Guo

CoVID-19 + Pregn: Liu, et al

- Symptoms:
  - Fever: 10 (77%)
  - Dyspnea: 3 (23%)
  - None: 1 (close contact)
- Epidemiologic history:
  - Close contact or Wuhan < 2 weeks before onset: 12 (92%)

Clinical manifestations and outcome of SARS-CoV-2 infection during pregnancy

Yangli Liu , Haihong Chen , Kejing Tang , Yubiao Guo

CoVID-19 + Pregn: Liu, et al

- Disposition
  - Improved and discharged: 3 (23%)
  - Delivered: 10 (77%), , all by CD
    - Emergent = 5 → NRFHT = 3, PPROM = 1, IUFD = 1
  - Preterm labor 32-36 weeks = 6 (46%)
  - ICU admission = 1 → MOD, including ARDS/ventilation, acute hepatic failure, ARF, septic shock → ECMO
- No vertical transmission

Clinical manifestations and outcome of SARS-CoV-2 infection during pregnancy

Yangli Liu , Haihong Chen , Kejing Tang , Yubiao Guo

CoVID-19 + Pregn: Chen, et al

- Zhongnan Hospital, WuHan
- N = 9
  - Age = 26-40
  - GA = 36-39.7 weeks
  - No underlying medical comorbidities

Clinical characteristics and intrauterine vertical transmission potential of COVID-19 infection in nine pregnant women: a retrospective review of medical records

Huijun Chen, Juanjuan Guo*, Chen Wang*, Fan Luo, Xuechen Yu, Wei Zhang, Jiafu Li, Dongchi Zhao, Dan Xu, Qing Gong, Jing Liao, Huixia Yang, Wei Hou, Yuanzhen Zhang*

CoVID-19 + Pregn: Chen, et al

- Symptoms
  - Fever: On admission = 7 (78%); Postpartum fever = 6 (67%)
  - Myalgia: 3 (33%); Malaise: 2 (22%); Rigor: 0
  - Cough: 4 (44%); Dyspnea: 1 (11%); Sore throat: 2 (22%); CP: 0
  - Diarrhea: 1 (11%)
- Epidemiologic history
  - All had contact via infected person or “relevant environment”

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CoVID-19 + Pregn: Chen, et al

	Patient 1	Patient 2	Patient 3	Patient 4	Patient 5	Patient 6	Patient 7	Patient 8	Patient 9	n (%)
(Continued from previous page)										
CT evidence of pneumonia										
Typical signs of viral infection	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	8 (89%)
Delivery										
Method of delivery	C-section	C-section	C-section	C-section	C-section	C-section	C-section	C-section	C-section	..
Indication for C-section	Severely elevated ALT or AST; COVID-19 pneumonia	Mature; COVID-19 pneumonia	History of C-section (×2); COVID-19 pneumonia	Pre-eclampsia; COVID-19 pneumonia	Fetal distress; COVID-19 pneumonia	History of stillbirth (×2); COVID-19 pneumonia	PROM; COVID-19 pneumonia	Fetal distress; COVID-19 pneumonia	PROM; COVID-19 pneumonia	..
Treatment after delivery										
Oxygen support (nasal cannula)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	9 (100%)
Antiviral therapy	Yes	Yes	Yes	No	No	No	Yes	Yes	Yes	6 (67%)
Antibiotic therapy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	9 (100%)
Use of corticosteroid	No	No	No	No	No	No	No	No	No	0

PROM=premature rupture of membrane. NA=not applicable. ALT=alanine transaminase. AST=aspartate transaminase. COVID-19=2019 novel coronavirus disease. C-section=caesarean section. SARS-CoV-2=severe acute respiratory syndrome coronavirus 2. *Exposure to Hankou, the area in Wuhan where the epidemic was first detected. †A university where the patient works, and a gathering of people. ‡Data missing for one patient.

Table 1: **Maternal clinical and laboratory characteristics**

CoVID-19 + Pregn: Chen, et al

Laboratory characteristics										
White blood cell count ($\times 10^9$ cells per L)	6·15	5·07	8·78	7·63	9·34	5·57	10·61	9·96	7·08	..
Low or normal leukocyte count ($<9·5 \times 10^9$ cells per L)	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	7 (78%)
Lymphocyte count ($\times 10^9$ cells per L)	1·59	0·56	0·46	2·83	0·69	0·66	0·87	1·53	1·47	..
Lymphopenia ($<10^9$ cells per L)	No	Yes	Yes	No	Yes	Yes	Yes	No	No	5 (56%)
C-reactive protein concentration (mg/L)	20·3	14·4	33·4	3·3	28·2	18·2	NA	6·2	24·9	..
Elevated C-reactive protein (>10 mg/L)	Yes	Yes	Yes	No	Yes	Yes	NA	No	Yes	6 (75%)‡
Elevated ALT (>45 U/L) or AST (>35 U/L)	Yes	No	Yes	Yes	No	No	No	No	No	3 (33%)
ALT (U/L)	2093	9	62	54	18	14	6	16	12	..
AST (U/L)	1263	24	71	67	24	23	15	22	21	..
Confirmatory test done (SARS-CoV-2 quantitative RT-PCR)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	9 (100%)

(Table 1 continues on next page)

Clinical characteristics and intrauterine vertical transmission potential of COVID-19 infection in nine pregnant women: a retrospective review of medical records

CoVID-19 + Pregn: Chen, et al

- Delivery
  - Cesarean delivery = 9
    - NRFHT = 2
  - Late preterm = 4 (44%)
- No vertical transmission

Clinical characteristics and intrauterine vertical transmission potential of COVID-19 infection in nine pregnant women: a retrospective review of medical records

Huijun Chen, Juanjuan Guo*, Chen Wang*, Fan Luo, Xuechen Yu, Wei Zhang, Jiafu Li, Dongchi Zhao, Dan Xu, Qing Gong, Jing Liao, Huixia Yang, Wei Hou, Yuanzhen Zhang*

CoVID-19 + Pregn: Zhu, et al.

- N = 9 pregnancies → 10 neonates
- Symptom onset:
  - Before delivery = 4; Day of = 2; After = 3
  - Fever and cough; 1 with diarrhea
- Term = 4; Preterm = 6
  - SOB = 6; Fever = 2; Thrombocytopenia = 2; Tachycardia = 1, Pneumothorax = 1, Vomiting = 1
- Negative SARS-CoV2 swabs = 9
- 1 death (34+5/7, DOL #8 multiorgan failure, DIC, Shock)

Transl Pediatr. 2020 Feb;9(1):51-60. doi: 10.21037/tp.2020.02.06.

Clinical analysis of 10 neonates born to mothers with 2019-nCoV pneumonia.

Zhu H[1], Wang L[2], Fang C[3], Peng S[1], Zhang L[4], Chang G[5], Xia S[1], Zhou W[6].

Similar viruses in Pregnancy

- SARS-CoV:
  - Largest series of 12 pregnancies
  - Complications: ARDS, DIC, ARF, Bacterial pneumonia, Sepsis, Mechanical ventilation, Sab (4/7)
  - 25% fatality
- MERS-CoV:
  - 13 case reports
  - 2 asymptomatic
  - IUFD, preterm delivery
  - 23% fatality

Current Pregnancy Data Summary

- Available data are reassuring but are limited to small case series.
- Limited information about:
  - Susceptibility of pregnant women to COVID-19
  - Severity of infection
- Denominator unknown

Coronavirus (COVID-19) and Pregnancy: What Maternal-Fetal Medicine Subspecialists Need to Know

The Society for Maternal-Fetal Medicine (SMFM); Sarah Dotters-Katz, MD, MMHPE; and Brenna L. Hughes, MD, MSc

Vertical Transmission?

- Spread mainly by respiratory droplets
- Vertical transmission: unknown / presumed no.
  - None of the infants have tested positive
  - Virus was not detected in amniotic fluid or breastmilk.
- MERS-CoV & SARS-CoV:
  - Limited; has not been reported for these infections.

Vertical Transmission?

- 2/6/2020: China
  - Neonate tested positive at 36h after birth
  - Swab performed at 30 hours
  - No direct testing of AF, cord blood placenta

- 3/14/2020: UK
  - Swabbed immediately after Cesarean birth

What do our guidelines say?

CoVID-19: Who to Test?

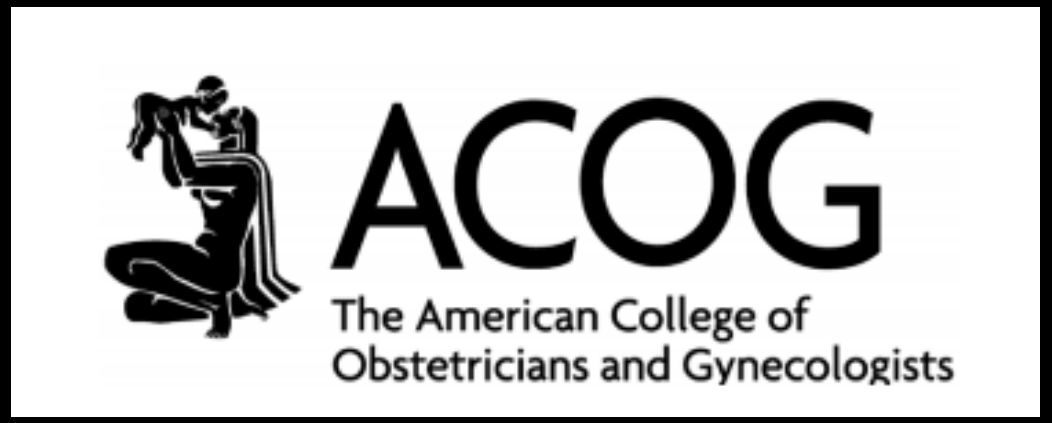
- "Clinician judgment to determine if a patient has signs/symptoms compatible with COVID-19 "
- Priorities for testing may include:
  - Signs/symptoms + Hospitalized
  - Signs/symptoms + At-risk individuals
  - Signs/symptoms + epidemiologic RF within 14 days of symptoms
    - Contact with PUI/confirmed CoVID-19 (including healthcare personnel)
    - H/o travel from affected geographic areas

CoVID-19: Who to Test?

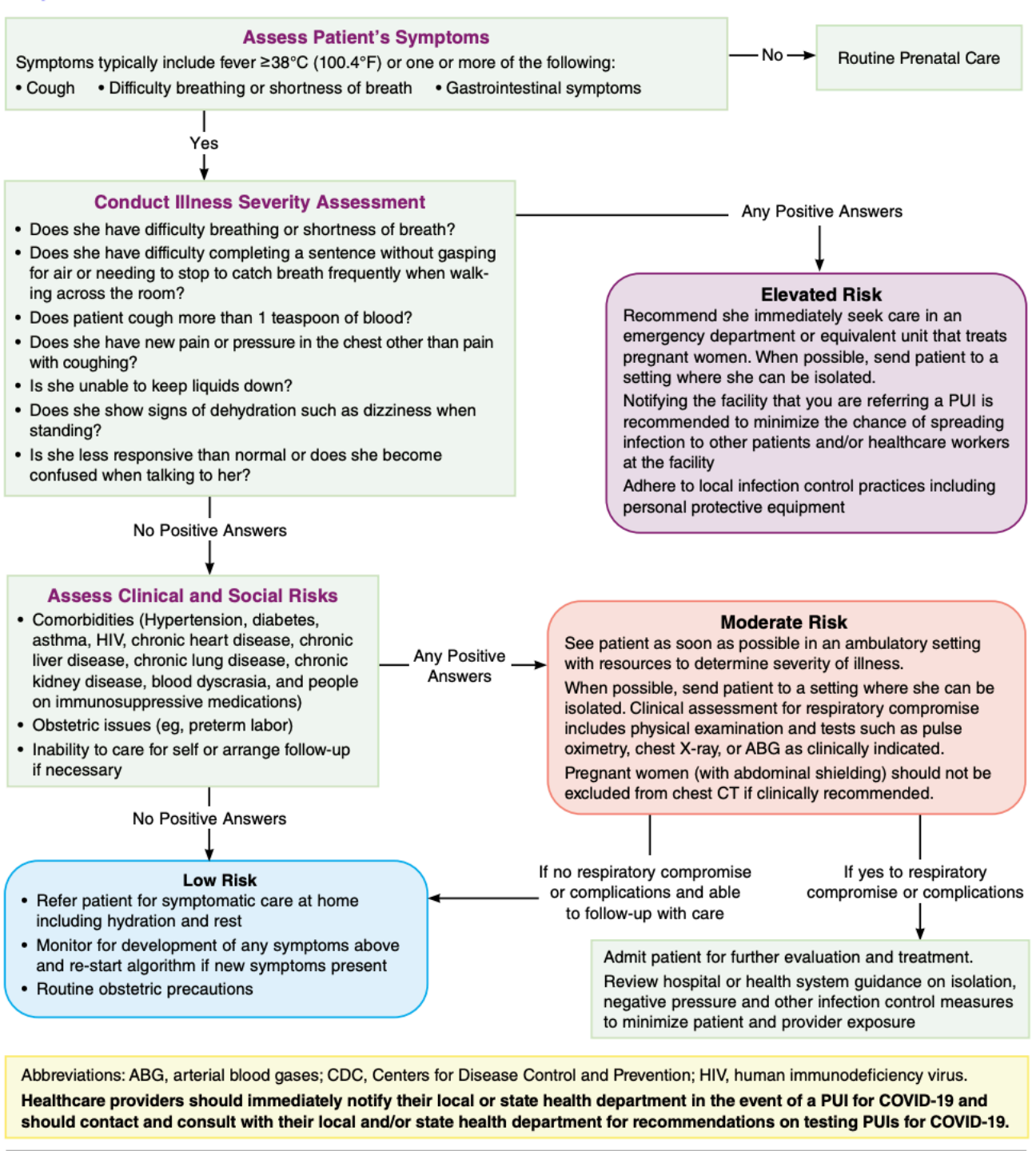
- Find your regional criteria

LAC DPH Public Health Lab (PHL) COVID-19 Testing Criteria		
Clinical Features	**&**	**Epidemiologic Risk**
Fever **or** signs/symptoms of lower respiratory illness (e.g. cough or shortness of breath)	**AND**	Any person (including healthcare workers) who in the last 14 days before symptom onset has had close contact with a laboratory-confirmed COVID-19 patient
Fever **and** signs/symptoms of lower respiratory illness (e.g. cough, shortness of breath)	**AND**	Any healthcare worker without an alternative diagnosis (e.g., negative molecular respiratory panel)
Fever **and** signs/symptoms of a community-acquired lower respiratory illness (e.g. cough or shortness of breath) **requiring hospitalization**	**AND**	A history of travel from affected geographic areas* in the last 14 days before symptom onset -or- Radiographic findings compatible with a viral pneumonia and no alternative diagnosis
Part of a cluster of 2 or more cases of an acute respiratory illness within a 72-hour period	**AND**	Congregate living setting with a large proportion of older adults and persons with comorbid medical conditions (e.g. skilled-nursing facility, senior assisted-living facility, homeless shelters)
Affected Geographic Areas* with Widespread or Sustained Community Transmission: China, Iran, Italy, Japan, and South Korea. *Last updated March 11, 2020.*		

Guidance


ACOG
The American College of
Obstetricians and Gynecologists


Society for
Maternal•Fetal
Medicine
High-risk pregnancy experts


Assess Patient's Symptoms
Symptoms typically include fever ≥38°C (100.4°F) or one or more of the following:
• Cough • Difficulty breathing or shortness of breath • Gastrointestinal symptoms
No
Routine Prenatal Care
Yes
Conduct Illness Severity Assessment
• Does she have difficulty breathing or shortness of breath?
• Does she have difficulty completing a sentence without gasping for air or needing to stop to catch breath frequently when walking across the room?
• Does patient cough more than 1 teaspoon of blood?
• Does she have new pain or pressure in the chest other than pain with coughing?
• Is she unable to keep liquids down?
• Does she show signs of dehydration such as dizziness when standing?
• Is she less responsive than normal or does she become confused when talking to her?
Any Positive Answers
Elevated Risk
Recommend she immediately seek care in an emergency department or equivalent unit that treats pregnant women. When possible, send patient to a setting where she can be isolated.
Notifying the facility that you are referring a PUI is recommended to minimize the chance of spreading infection to other patients and/or healthcare workers at the facility
Adhere to local infection control practices including personal protective equipment
No Positive Answers
Assess Clinical and Social Risks
• Comorbidities (Hypertension, diabetes, asthma, HIV, chronic heart disease, chronic liver disease, chronic lung disease, chronic kidney disease, blood dyscrasia, and people on immunosuppressive medications)
• Obstetric issues (eg, preterm labor)
• Inability to care for self or arrange follow-up if necessary
Any Positive Answers
Moderate Risk
See patient as soon as possible in an ambulatory setting with resources to determine severity of illness.
When possible, send patient to a setting where she can be isolated. Clinical assessment for respiratory compromise includes physical examination and tests such as pulse oximetry, chest X-ray, or ABG as clinically indicated.
Pregnant women (with abdominal shielding) should not be excluded from chest CT if clinically recommended.
No Positive Answers
Low Risk
• Refer patient for symptomatic care at home including hydration and rest
• Monitor for development of any symptoms above and re-start algorithm if new symptoms present
• Routine obstetric precautions
If no respiratory compromise or complications and able to follow-up with care
If yes to respiratory compromise or complications
Admit patient for further evaluation and treatment.
Review hospital or health system guidance on isolation, negative pressure and other infection control measures to minimize patient and provider exposure
Abbreviations: ABG, arterial blood gases; CDC, Centers for Disease Control and Prevention; HIV, human immunodeficiency virus.
Healthcare providers should immediately notify their local or state health department in the event of a PUI for COVID-19 and should contact and consult with their local and/or state health department for recommendations on testing PUIs for COVID-19.

Guidance

Coronavirus (COVID-19) and Pregnancy: What Maternal-Fetal Medicine Subspecialists Need to Know

The Society for Maternal-Fetal Medicine (SMFM); Sarah Dotters-Katz, MD, MMHPE; and Brenna L. Hughes, MD, MSc

Society for Maternal•Fetal Medicine

Coronavirus Disease 2019 (COVID-19) and Pregnancy: What obstetricians need to know

Sonja A. Rasmussen, MD, MS, John C. Smulian, MD, MPH, John A. Lednicky, PhD, Tony S. Wen, MD, Denise J. Jamieson, MD, MPH

AJOG American Journal of Obstetrics & Gynecology

General principles: PUI / confirmed

- Prevention of spread
  - Wait in a separate, well-ventilated area, > 6 feet from others
  - Respiratory hygiene: Face mask
  - Rapid triage
  - Isolated ASAP in AIIR (*)
  - CDC Infection prevention and control procedures
  - Limit visitor and HCP access to patient rooms
  - Contact Hospital ID

General principles: PUI / confirmed

- Testing
  - Collect and send relevant specimens*
  - Screen for other viral respiratory infections and bacterial infections
  - Fetal heart rate and contraction monitoring if appropriate
- Management
  - Early oxygen therapy (target > 95%; pO2 > 70 mmHg)
  - Early mechanical ventilation with evidence of advancing respiratory failure

Testing

- Swabs
  - Upper respiratory nasopharyngeal swab ONLY (Oropharyngeal less important; conserve supplies)
    - Both nares, All the way back
- Sputum
  - Only for those with productive cough
  - Induced samples not recommended

https://www.cdc.gov/coronavirus/2019-ncov/lab/guidelines-clinical-specimens.html

Testing

- Swabs
  - Synthetic fiber swabs with plastic shafts.
  - Do not use calcium alginate swabs or swabs with wooden shafts, as they may contain substances that inactivate some viruses and inhibit PCR testing
- Maintain proper infection control while collecting specimen
- Place swabs immediately into sterile tubes containing 2-3 ml of viral transport media

https://www.cdc.gov/coronavirus/2019-ncov/lab/guidelines-clinical-specimens.html

Example of a swab used by providers

Example of a CDC diagnostic panel

General principles: PUI / confirmed

- Management
  - IVF: Be conservative, unless cardiovascular instability is present
  - Antibiotics: Consider empiric antimicrobial therapy
  - Oseltamivir: Consider empiric oseltamivir
  - If septic shock → prompt, targeted management
  - Steroids: DO NOT routinely use corticosteroids; individual basis for ACS

General principles: PUI / confirmed

- Notify/consult:
  - MFM, Neonatology, ICU, Anesthesia, Nursing
- Delivery
  - Based on GA, maternal condition, fetal stability, maternal wishes
- Communicate with family

Guidance on Infection Prevention

Interim Considerations for Infection Prevention and Control of Coronavirus Disease 2019 (COVID-19) in Inpatient Obstetric Healthcare Settings

Interim Considerations for Infection Prevention and Control of Coronavirus Disease 2019 (COVID-19) in Inpatient Obstetric Healthcare Settings

- Recommended considerations:
  - PPE:
    - Basic and refresher training on PPE use and handling
    - Sufficient and appropriate PPE supplies positioned at all points of care
  - Processes to protect newborns from risk of COVID-19.

Interim Considerations for Infection Prevention and Control of Coronavirus Disease 2019 (COVID-19) in Inpatient Obstetric Healthcare Settings

- Pre-hospital considerations
  - Confirmed or PUIs should notify the OB unit prior to arrival facility can make appropriate infection control preparations:
    - ID appropriate room
    - Ensure infection prevention and control supplies and PPE are correctly positioned
    - Inform all healthcare personnel who will be involved in the patient's care

Interim Considerations for Infection Prevention and Control of Coronavirus Disease 2019 (COVID-19) in Inpatient Obstetric Healthcare Settings

- Arriving by EMS
  - EMS clinicians should notify the receiving healthcare facility
  - Keep patient separated from other people as much as possible.
  - Family members and contacts should not ride in the transport vehicle, if possible. If riding in the transport vehicle, they should wear a facemask.
  - Follow routine procedures for a transfer of the patient to the receiving healthcare facility (e.g., wheel the patient directly into an examination room).

Interim Considerations for Infection Prevention and Control of Coronavirus Disease 2019 (COVID-19) in Inpatient Obstetric Healthcare Settings

- Mother/Baby Contact
  - Temporary separation
    - Separate isolation room for the infant while they remain a PUI
    - Discuss risks/benefits of temporary separation
    - Consider in the confirmed or PUI COVID-19 until the mother's transmission-based precautions are discontinued

Interim Considerations for Infection Prevention and Control of Coronavirus Disease 2019 (COVID-19) in Inpatient Obstetric Healthcare Settings

- Mother/Baby Contact
  - Decision to discontinue separation:
    - Made on a case-by-case basis in consultation with clinicians, infection prevention and control specialists, and public health officials
    - Account for disease severity, illness signs and symptoms, and results of laboratory testing

Interim Considerations for Infection Prevention and Control of Coronavirus Disease 2019 (COVID-19) in Inpatient Obstetric Healthcare Settings

- Mother/Baby Contact
  - Visitors:
    - Limit visitors, except healthy parent or caregiver
    - Visitors should be wear appropriate PP
    - If another healthy family or staff member is present to provide care (e.g., diapering, bathing) and feeding for the newborn, they should use appropriate PPE.

Interim Considerations for Infection Prevention and Control of Coronavirus Disease 2019 (COVID-19) in Inpatient Obstetric Healthcare Settings

- Mother/Baby Contact
  - Colocation / "Rooming In"
    - Based on mother's wishes or unavoidable due to facility limitations
    - Measures to reduce exposure of the newborn to the virus
      - Physical barriers / curtain
      - Keep newborn ≥6 feet away from the ill mother
      - Put on a facemask and practice hand hygiene before each feeding or other close contact with her newborn. The facemask should remain in place during contact with the newborn.

Interim Considerations for Infection Prevention and Control of Coronavirus Disease 2019 (COVID-19) in Inpatient Obstetric Healthcare Settings

- Breastfeeding
  - Limited studies:
    - Women with SARS-CoV2 and SARS-CoV
    - Virus has not been detected in breast milk

Interim Considerations for Infection Prevention and Control of Coronavirus Disease 2019 (COVID-19) in Inpatient Obstetric Healthcare Settings

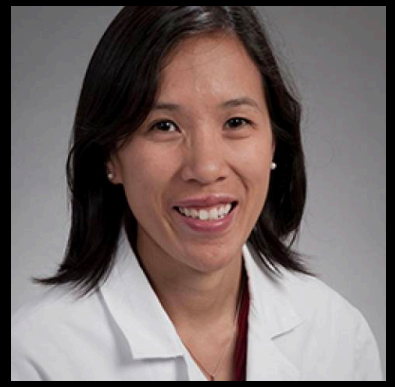
- Breastfeeding
  - Temporary separation
    - Encourage to express milk; dedicated breast pump
    - Practice hand hygiene.
    - All parts that come into contact with breast milk should be thoroughly washed and the entire pump should be appropriately disinfected per the manufacturer's instructions.

Interim Considerations for Infection Prevention and Control of Coronavirus Disease 2019 (COVID-19) in Inpatient Obstetric Healthcare Settings

- Breastfeeding
  - Direct feeding:
    - If the mother wishes, she should put on a facemask and practice hand hygiene before each feeding.
  - Expressed breast milk should be fed to the newborn by a healthy caregiver.

U of Washington Algorithm

Dr. Kimberly Ma
Assistant Professor



Specific queries re: CoVID-19

Specific questions for your units

ADMINISTRATIVE

- Antenatal testing & Ultrasounds
- Operating room procedures
- Immunocompromised staff
- Fomites
- Elective procedures
- Trainees
- CoVID-19 positive tracking
- Staffing

CLINICAL

- Therapeutic options
- Nitrous oxide
- Steroid use
- Elective inductions
- Blood conservation & Cell salvage
- NSAIDS

Specific questions for your units

ADMINISTRATIVE

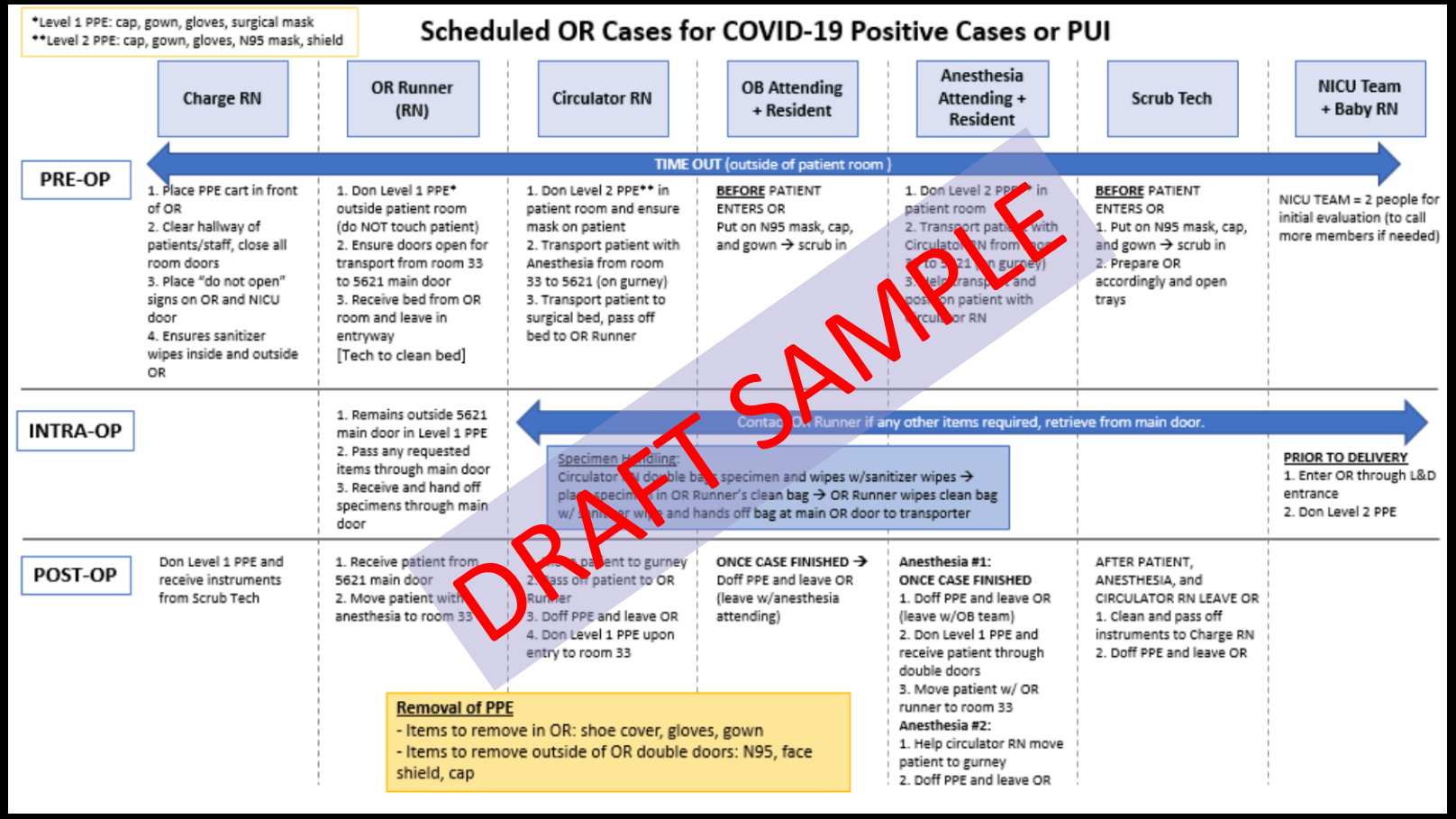
- Antenatal testing & Ultrasounds

- Continue to provide all necessary care for high-risk patients.
- Community mitigation: May decrease foot traffic through medical offices
- Depend on local practice and population factors and resources.
- Telehealth (including telephonic and other remote services) can be a tool leveraged to allow access to care for these patients while

Specific questions for your units

ADMINISTRATIVE

- OR procedures



Specific questions for your units

ADMINISTRATIVE

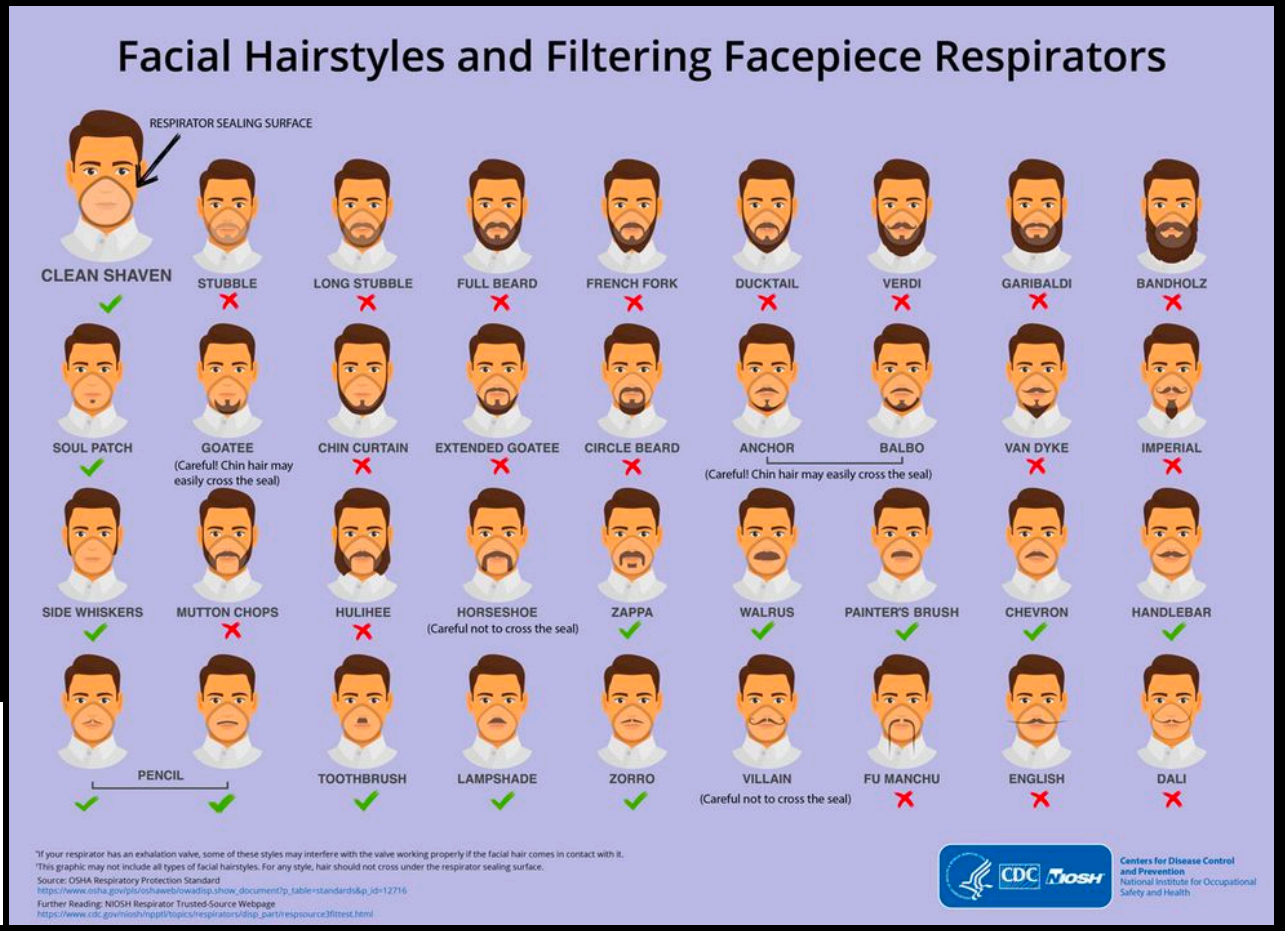
- Immunocompromised staff

- Follow CDC guidelines for infection prev
- May continue to work
- Facilities may want to consider limiting their exposure to patients with confirmed or suspected COVID19, especially during higher risk procedures (e.g., aerosol-generating procedures)
- Balance with community burden of disease and staffing

Specific questions for your units

ADMINISTRATIVE

- Fomites



Infect Control Hosp Epidemiol. 2019 Dec;40(12):1356-1360. doi: 10.1017/ice.2019.298. Epub 2019 Oct 31.

Respiratory viruses on personal protective equipment and bodies of healthcare workers.

Phan LT[1], Sweeney D[2], Maita D[3], Moritz DC[3], Bleasdale SC[3], Jones RM[1]; CDC Prevention Epicenters Program.

Specific questions for your units

ADMINISTRATIVE

- Elective procedures

"The ACOG, ABOG, together with the AAGL, AGOS, ASRM, SASGOG, SFP and SMFM do not support COVID-19 responses that cancel or delay abortion procedures. Community-based and hospital-based clinicians should consider collaboration to ensure abortion access is not compromised during this time."

Specific questions for your units

ADMINISTRATIVE

- Trainees

- Determine trainee schedule and work flow to minimize risk of group exposure and quarantine.
- PDs sharing resources
- Fellowship Aff Comm reaching out to ABOG/ACGME

Specific questions for your units

ADMINISTRATIVE

- CoVID-19 positive tracking

- Modality via division/department, EMR, or hospital ID to track all COVID-19 positive patients and f/u

Specific questions for your units

ADMINISTRATIVE

- Staffing preparations

- Jeopardy system
- Teams: Inpatient / Outpatient / Home
- Minimize risk of group exposures

Specific questions for your units

CLINICAL

- Therapeutic options
  - Plaquenil
    - Raoult, France, n=24, unpublished
  - Lopinavir / ritonavir
    - Cao, China = n=199, no benefit
  - Tocilizumab
    - China, ongoing
  - Sarilumab (Kevzara)

Specific questions for your units

CLINICAL

- Nitrous oxide

- In PUI/confirmed?
- In general use?

Specific questions for your units

CLINICAL

- Steroid use

- SARS-CoV: “possible harm including avascular necrosis, psychosis, diabetes and delayed viral clearance”
  - Gardner, Plos Med, 2006
- Influenza: more secondary infections, less ventilator free days, ? Higher mortality
- WHO: “DO NOT give systemic corticosteroids for treatment of viral pneumonia of ARDS unless indicated for another indication “

Lancet

	Outcomes of corticosteroid therapy*	Comment
MERS-CoV	Delayed clearance of viral RNA from respiratory tract[2]	Adjusted hazard ratio 0·4 (95% CI 0·2–0·7)
SARS-CoV	Delayed clearance of viral RNA from blood[5]	Significant difference but effect size not quantified
SARS-CoV	Complication: psychosis[6]	Associated with higher cumulative dose, 10 975 mg *vs* 6780 mg hydrocortisone equivalent
SARS-CoV	Complication: diabetes[7]	33 (35%) of 95 patients treated with corticosteroid developed corticosteroid-induced diabetes
SARS-CoV	Complication: avascular necrosis in survivors[8]	Among 40 patients who survived after corticosteroid treatment, 12 (30%) had avascular necrosis and 30 (75%) had osteoporosis
Influenza	Increased mortality[9]	Risk ratio for mortality 1·75 (95% CI 1·3–2·4) in a meta-analysis of 6548 patients from ten studies
RSV	No clinical benefit in children[10,11]	No effect in largest randomised controlled trial of 600 children, of whom 305 (51%) had been treated with corticosteroids

CoV=coronavirus. MERS=Middle East respiratory syndrome. RSV=respiratory syncytial virus. SARS=severe acute respiratory syndrome. *Hydrocortisone, methylprednisolone, dexamethasone, and prednisolone.

Table: **Summary of clinical evidence to date**

Specific questions for your units

CLINICAL

- Elective inductions

- PROS: Deliver patients now in order to decrease patient load, before burden of disease increases in next few weeks
- CONS: Increased time in medical setting, load on L&D now
- Outpatient induction?

Specific questions for your units

CLINICAL

- Blood conservation & Cell salvage
- Readily available?

Specific questions for your units

CLINICAL

- NSAIDS

Specific questions for your units

Wellness

Research

Research

- PRIORITY (Pregnancy CoRonavIrus Outcomes RegIsTrY)
  - Prospective Nationwide Registry, UCLA / UCSF
  - PUI or confirmed
  - Anticipated enrollment start date: 3/23/20
  - Yalda Afshar, MD, PhD – yafshar@mednet.ucla.edu
- MFM-U
  - The MFMU is also considering a protocol to evaluate the effect of the COVID pandemic on pregnant and postpartum women

“Don’t worry alone.”

Dr. Beth Karlan

SMFM Free Resources

Dr. Judette Louis
President of SMFM

- Pulmonary critical care lecture
  - Dr. Cornelia Graves
  - Wednesday 3/25/2020 @ 9 PT / 12 ET
- https://www.smfm.org/covid19
- Pulmonary critical care bundle

References
In Dropbox: