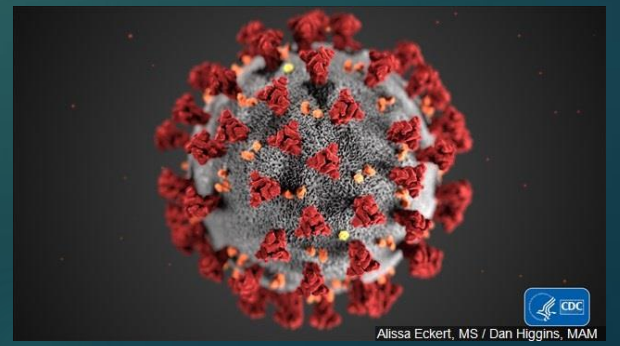
COVID-19

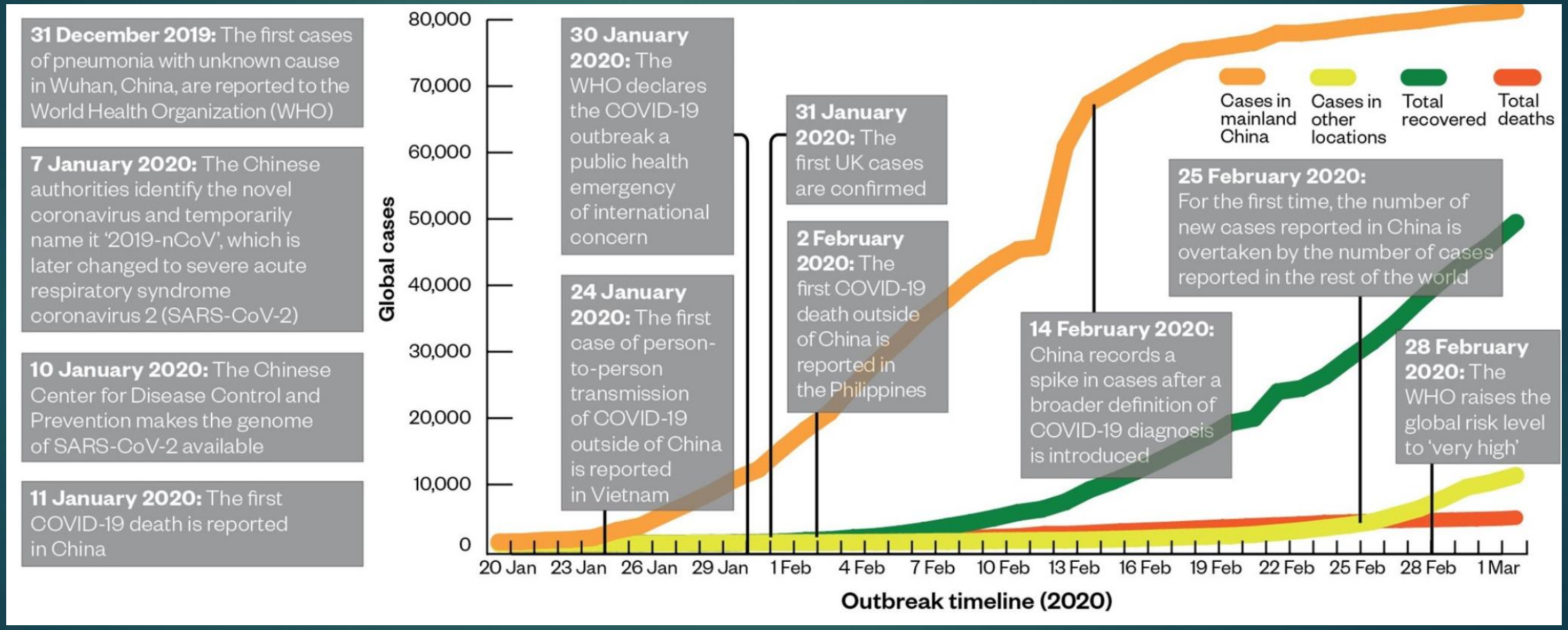
ROXANNE GARCIAORR



Objectives

- Understand transmission and infectivity
- Identify at risk patients
- Understand appropriate selection, donning and doffing of personal protective equipment (PPE)

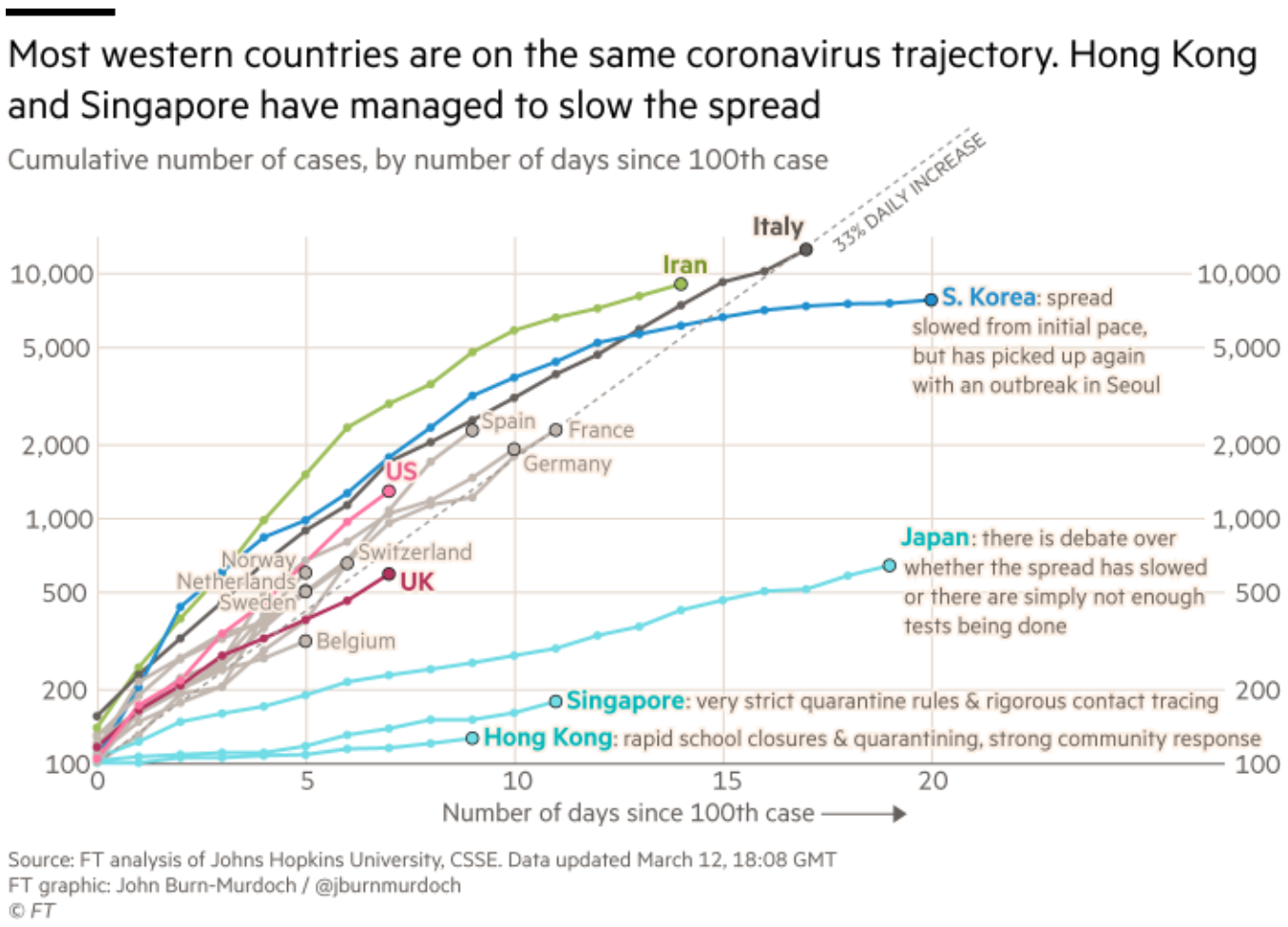
Severe Acute Respiratory Syndrome-Coronavirus 2

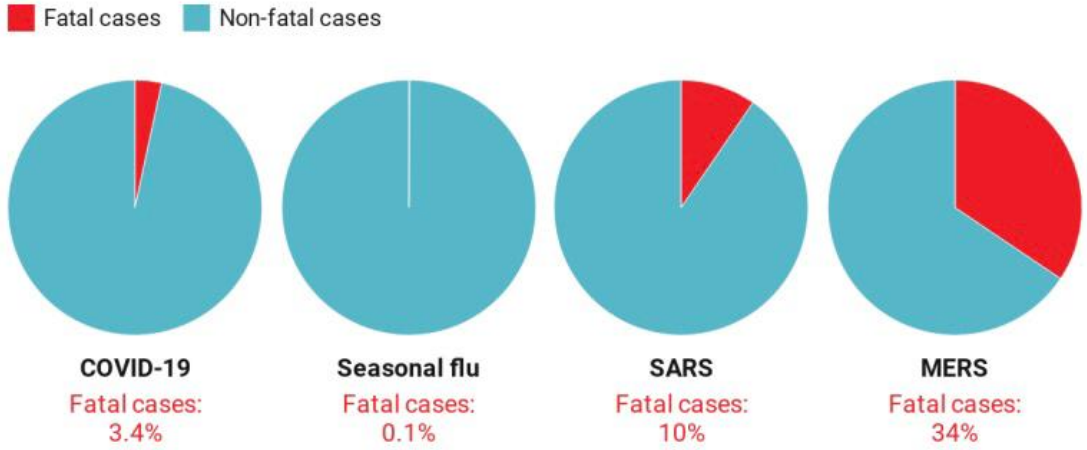


https://www.pharmaceutical-journal.com/news-and-analysis/infographics/the-race-to-stop-covid-19/20207792.article?firstPass=false

COVID-19 USA 3/13/20

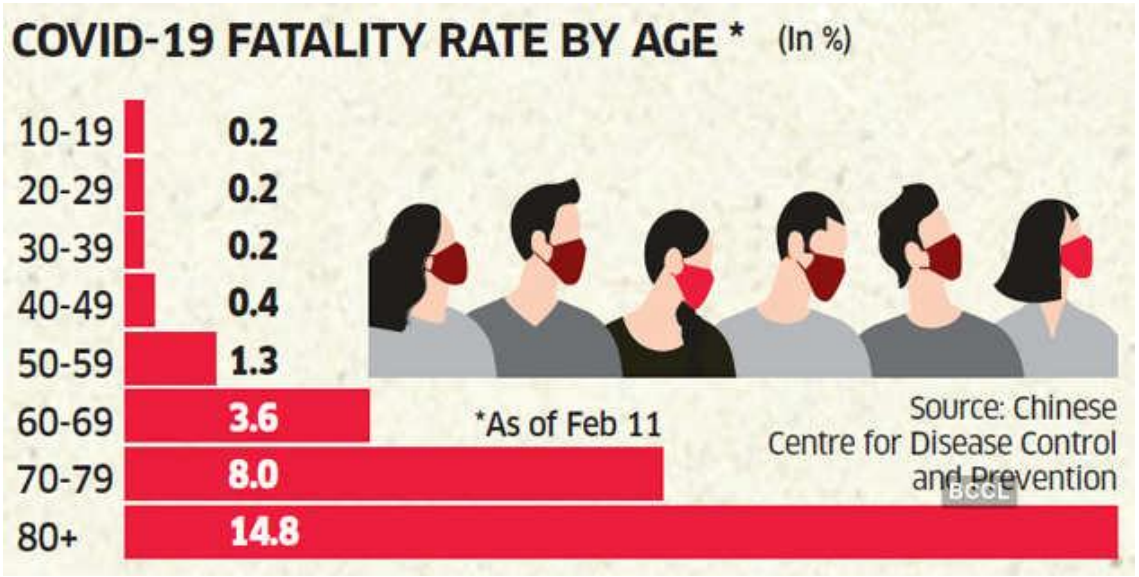
- 1701 cases
- 40 deaths





COVID-19, SARS, and MERS data are global and total to date. Seasonal flu data are U.S., for the 2018-2019 season.

Chart: Elijah Wolfson for TIME • Source: CDC and WHO • Created with Datawrapper



Pandemic

Table 1. Clinical Characteristics of the Study Patients, According to Disease Severity and the Presence or Absence of the Primary Composite End Point.*

Characteristic	All Patients (N=1099)	Disease Severity		Presence of Primary Composite End Point†	
		Nonsevere (N=926)	Severe (N=173)	Yes (N=67)	No (N=1032)
Age					
Median (IQR) — yr	47.0 (35.0–58.0)	45.0 (34.0–57.0)	52.0 (40.0–65.0)	63.0 (53.0–71.0)	46.0 (35.0–57.0)
Distribution — no./total no. (%)					
0–14 yr	9/1011 (0.9)	8/848 (0.9)	1/163 (0.6)	0	9/946 (1.0)
15–49 yr	557/1011 (55.1)	490/848 (57.8)	67/163 (41.1)	12/65 (18.5)	545/946 (57.6)
50–64 yr	292/1011 (28.9)	241/848 (28.4)	51/163 (31.3)	21/65 (32.3)	271/946 (28.6)
≥65 yr	153/1011 (15.1)	109/848 (12.9)	44/163 (27.0)	32/65 (49.2)	121/946 (12.8)
Female sex — no./total no. (%)	459/1096 (41.9)	386/923 (41.8)	73/173 (42.2)	22/67 (32.8)	437/1029 (42.5)
Smoking history — no./total no. (%)					
Never smoked	927/1085 (85.4)	793/913 (86.9)	134/172 (77.9)	44/66 (66.7)	883/1019 (86.7)
Former smoker	21/1085 (1.9)	12/913 (1.3)	9/172 (5.2)	5/66 (7.6)	16/1019 (1.6)
Current smoker	137/1085 (12.6)	108/913 (11.8)	29/172 (16.9)	17/66 (25.8)	120/1019 (11.8)
Exposure to source of transmission within past 14 days — no./total no.					
Living in Wuhan	483/1099 (43.9)	400/926 (43.2)	83/173 (48.0)	39/67 (58.2)	444/1032 (43.0)
Contact with wildlife	13/687 (1.9)	10/559 (1.8)	3/128 (2.3)	1/41 (2.4)	12/646 (1.9)
Recently visited Wuhan‡	193/616 (31.3)	166/526 (31.6)	27/90 (30.0)	10/28 (35.7)	183/588 (31.1)
Had contact with Wuhan residents‡	442/611 (72.3)	376/522 (72.0)	66/89 (74.2)	19/28 (67.9)	423/583 (72.6)
Median incubation period (IQR) — days§	4.0 (2.0–7.0)	4.0 (2.8–7.0)	4.0 (2.0–7.0)	4.0 (1.0–7.5)	4.0 (2.0–7.0)
Fever on admission					
Patients — no./total no. (%)	473/1081 (43.8)	391/910 (43.0)	82/171 (48.0)	24/66 (36.4)	449/1015 (44.2)
Median temperature (IQR) — °C	37.3 (36.7–38.0)	37.3 (36.7–38.0)	37.4 (36.7–38.1)	36.8 (36.3–37.8)	37.3 (36.7–38.0)
Distribution of temperature — no./total no. (%)					
<37.5°C	608/1081 (56.2)	519/910 (57.0)	89/171 (52.0)	42/66 (63.6)	566/1015 (55.8)
37.5–38.0°C	238/1081 (22.0)	201/910 (22.1)	37/171 (21.6)	10/66 (15.2)	228/1015 (22.5)
38.1–39.0°C	197/1081 (18.2)	160/910 (17.6)	37/171 (21.6)	11/66 (16.7)	186/1015 (18.3)
>39.0°C	38/1081 (3.5)	30/910 (3.3)	8/171 (4.7)	3/66 (4.5)	35/1015 (3.4)
Fever during hospitalization					
Patients — no./total no. (%)	975/1099 (88.7)	816/926 (88.1)	159/173 (91.9)	59/67 (88.1)	916/1032 (88.8)
Median highest temperature (IQR) — °C	38.3 (37.8–38.9)	38.3 (37.8–38.9)	38.5 (38.0–39.0)	38.5 (38.0–39.0)	38.3 (37.8–38.9)
<37.5°C	92/926 (9.9)	79/774 (10.2)	13/152 (8.6)	3/54 (5.6)	89/872 (10.2)
37.5–38.0°C	286/926 (30.9)	251/774 (32.4)	35/152 (23.0)	20/54 (37.0)	266/872 (30.5)
38.1–39.0°C	434/926 (46.9)	356/774 (46.0)	78/152 (51.3)	21/54 (38.9)	413/872 (47.4)
>39.0°C	114/926 (12.3)	88/774 (11.4)	26/152 (17.1)	10/54 (18.5)	104/872 (11.9)

Clinical Characteristics of Coronavirus 2019 in China, NEJM, Feb 2020

Table 1. Clinical Characteristics of the Study Patients, According to Disease Severity and the Presence or Absence of the Primary Composite End Point.*

Characteristic	All Patients (N=1099)	Disease Severity		Presence of Primary Composite End Point†	
		Nonsevere (N=926)	Severe (N=173)	Yes (N=67)	No (N=1032)
Symptoms — no. (%)					
Conjunctival congestion	9 (0.8)	5 (0.5)	4 (2.3)	0	9 (0.9)
Nasal congestion	53 (4.8)	47 (5.1)	6 (3.5)	2 (3.0)	51 (4.9)
Headache	150 (13.6)	124 (13.4)	26 (15.0)	8 (11.9)	142 (13.8)
Cough	745 (67.8)	623 (67.3)	122 (70.5)	46 (68.7)	699 (67.7)
Sore throat	153 (13.9)	130 (14.0)	23 (13.3)	6 (9.0)	147 (14.2)
Sputum production	370 (33.7)	309 (33.4)	61 (35.3)	20 (29.9)	350 (33.9)
Fatigue	419 (38.1)	350 (37.8)	69 (39.9)	22 (32.8)	397 (38.5)
Hemoptysis	10 (0.9)	6 (0.6)	4 (2.3)	2 (3.0)	8 (0.8)
Shortness of breath	205 (18.7)	140 (15.1)	65 (37.6)	36 (53.7)	169 (16.4)
Nausea or vomiting	55 (5.0)	43 (4.6)	12 (6.9)	3 (4.5)	52 (5.0)
Diarrhea	42 (3.8)	32 (3.5)	10 (5.8)	4 (6.0)	38 (3.7)
Myalgia or arthralgia	164 (14.9)	134 (14.5)	30 (17.3)	6 (9.0)	158 (15.3)
Chills	126 (11.5)	100 (10.8)	26 (15.0)	8 (11.9)	118 (11.4)
Signs of infection — no. (%)					
Throat congestion	19 (1.7)	17 (1.8)	2 (1.2)	0	19 (1.8)
Tonsil swelling	23 (2.1)	17 (1.8)	6 (3.5)	1 (1.5)	22 (2.1)
Enlargement of lymph nodes	2 (0.2)	1 (0.1)	1 (0.6)	1 (1.5)	1 (0.1)
Rash	2 (0.2)	0	2 (1.2)	0	2 (0.2)
Coexisting disorder — no. (%)					
Any	261 (23.7)	194 (21.0)	67 (38.7)	39 (58.2)	222 (21.5)
Chronic obstructive pulmonary disease	12 (1.1)	6 (0.6)	6 (3.5)	7 (10.4)	5 (0.5)
Diabetes	81 (7.4)	53 (5.7)	28 (16.2)	18 (26.9)	63 (6.1)
Hypertension	165 (15.0)	124 (13.4)	41 (23.7)	24 (35.8)	141 (13.7)
Coronary heart disease	27 (2.5)	17 (1.8)	10 (5.8)	6 (9.0)	21 (2.0)
Cerebrovascular disease	15 (1.4)	11 (1.2)	4 (2.3)	4 (6.0)	11 (1.1)
Hepatitis B infection¶	23 (2.1)	22 (2.4)	1 (0.6)	1 (1.5)	22 (2.1)
Cancer‖	10 (0.9)	7 (0.8)	3 (1.7)	1 (1.5)	9 (0.9)
Chronic renal disease	8 (0.7)	5 (0.5)	3 (1.7)	2 (3.0)	6 (0.6)
Immunodeficiency	2 (0.2)	2 (0.2)	0	0	2 (0.2)

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Table 2. Radiographic and Laboratory Findings.*

Variable	All Patients (N=1099)	Disease Severity		Presence of Composite Primary End Point	
		Nonsevere (N=926)	Severe (N=173)	Yes (N=67)	No (N=1032)
Radiologic findings					
Abnormalities on chest radiograph — no./total no. (%)	162/274 (59.1)	116/214 (54.2)	46/60 (76.7)	30/39 (76.9)	132/235 (56.2)
Ground-glass opacity	55/274 (20.1)	37/214 (17.3)	18/60 (30.0)	9/39 (23.1)	46/235 (19.6)
Local patchy shadowing	77/274 (28.1)	56/214 (26.2)	21/60 (35.0)	13/39 (33.3)	64/235 (27.2)
Bilateral patchy shadowing	100/274 (36.5)	65/214 (30.4)	35/60 (58.3)	27/39 (69.2)	73/235 (31.1)
Interstitial abnormalities	12/274 (4.4)	7/214 (3.3)	5/60 (8.3)	6/39 (15.4)	6/235 (2.6)
Abnormalities on chest CT — no./total no. (%)	840/975 (86.2)	682/808 (84.4)	158/167 (94.6)	50/57 (87.7)	790/918 (86.1)
Ground-glass opacity	550/975 (56.4)	449/808 (55.6)	101/167 (60.5)	30/57 (52.6)	520/918 (56.6)
Local patchy shadowing	409/975 (41.9)	317/808 (39.2)	92/167 (55.1)	22/57 (38.6)	387/918 (42.2)
Bilateral patchy shadowing	505/975 (51.8)	368/808 (45.5)	137/167 (82.0)	40/57 (70.2)	465/918 (50.7)
Interstitial abnormalities	143/975 (14.7)	99/808 (12.3)	44/167 (26.3)	15/57 (26.3)	128/918 (13.9)
Laboratory findings					
Median Pao_2:Fio_2 ratio (IQR)†	3.9 (2.9–4.7)	3.9 (2.9–4.5)	4.0 (2.8–5.2)	2.9 (2.2–5.4)	4.0 (3.1–4.6)
White-cell count					
Median (IQR) — per mm^3	4700 (3500– 6000)	4900 (3800–6000)	3700 (3000–6200)	6100 (4900– 11,100)	4700 (3500– 5900)
Distribution — no./total no. (%)					
>10,000 per mm^3	58/978 (5.9)	39/811 (4.8)	19/167 (11.4)	15/58 (25.9)	43/920 (4.7)
<4000 per mm^3	330/978 (33.7)	228/811 (28.1)	102/167 (61.1)	8/58 (13.8)	322/920 (35.0)
Lymphocyte count					
Median (IQR) — per mm^3	1000 (700–1300)	1000 (800–1400)	800 (600–1000)	700 (600–900)	1000 (700–1300)
Distribution — no./total no. (%)					
<1500 per mm^3	731/879 (83.2)	584/726 (80.4)	147/153 (96.1)	50/54 (92.6)	681/825 (82.5)
Platelet count					
Median (IQR) — per mm^3	168,000 (132,000–207,000)	172,000 (139,000–212,000)	137,500 (99,000–179,500)	156,500 (114,200–195,000)	169,000 (133,000–207,000)
Distribution — no./total no. (%)					
<150,000 per mm^3	315/869 (36.2)	225/713 (31.6)	90/156 (57.7)	27/58 (46.6)	288/811 (35.5)
Median hemoglobin (IQR) — g/dl‡	13.4 (11.9–14.8)	13.5 (12.0–14.8)	12.8 (11.2–14.1)	12.5 (10.5–14.0)	13.4 (12.0–14.8)
Distribution of other findings — no./total no. (%)					
C-reactive protein ≥10 mg/liter	481/793 (60.7)	371/658 (56.4)	110/135 (81.5)	41/45 (91.1)	440/748 (58.8)
Procalcitonin ≥0.5 ng/ml	35/633 (5.5)	19/516 (3.7)	16/117 (13.7)	12/50 (24.0)	23/583 (3.9)
Lactate dehydrogenase ≥250 U/liter	277/675 (41.0)	205/551 (37.2)	72/124 (58.1)	31/44 (70.5)	246/631 (39.0)
Aspartate aminotransferase >40 U/liter	168/757 (22.2)	112/615 (18.2)	56/142 (39.4)	26/52 (50.0)	142/705 (20.1)
Alanine aminotransferase >40 U/liter	158/741 (21.3)	120/606 (19.8)	38/135 (28.1)	20/49 (40.8)	138/692 (19.9)
Total bilirubin >17.1 μmol/liter	76/722 (10.5)	59/594 (9.9)	17/128 (13.3)	10/48 (20.8)	66/674 (9.8)
Creatine kinase ≥200 U/liter	90/657 (13.7)	67/536 (12.5)	23/121 (19.0)	12/46 (26.1)	78/611 (12.8)
Creatinine ≥133 μmol/liter	12/752 (1.6)	6/614 (1.0)	6/138 (4.3)	5/52 (9.6)	7/700 (1.0)
D-dimer ≥0.5 mg/liter	260/560 (46.4)	195/451 (43.2)	65/109 (59.6)	34/49 (69.4)	226/511 (44.2)
Minerals§					
Median sodium (IQR) — mmol/liter	138.2 (136.1–140.3)	138.4 (136.6–140.4)	138.0 (136.0–140.0)	138.3 (135.0–141.2)	138.2 (136.1–140.2)
Median potassium (IQR) — mmol/liter	3.8 (3.5–4.2)	3.9 (3.6–4.2)	3.8 (3.5–4.1)	3.9 (3.6–4.1)	3.8 (3.5–4.2)
Median chloride (IQR) — mmol/liter	102.9 (99.7–105.6)	102.7 (99.7–105.3)	103.1 (99.8–106.0)	103.8 (100.8–107.0)	102.8 (99.6–105.3)

Clinical Characteristics of Coronavirus 2019 in China, NEJM, Feb 2020

Highly Transmissible

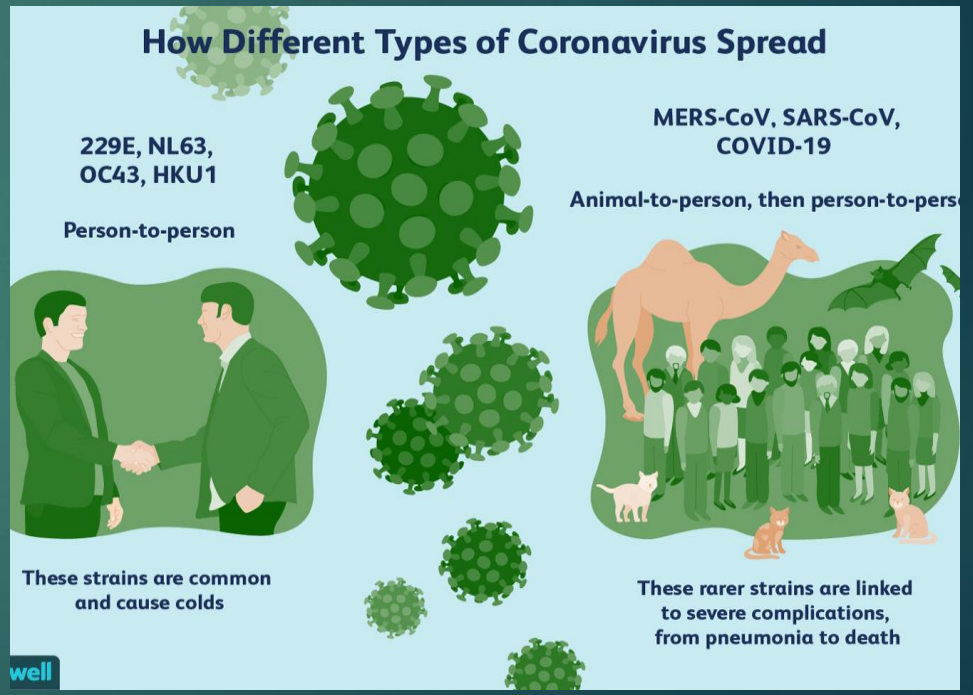
Isolation

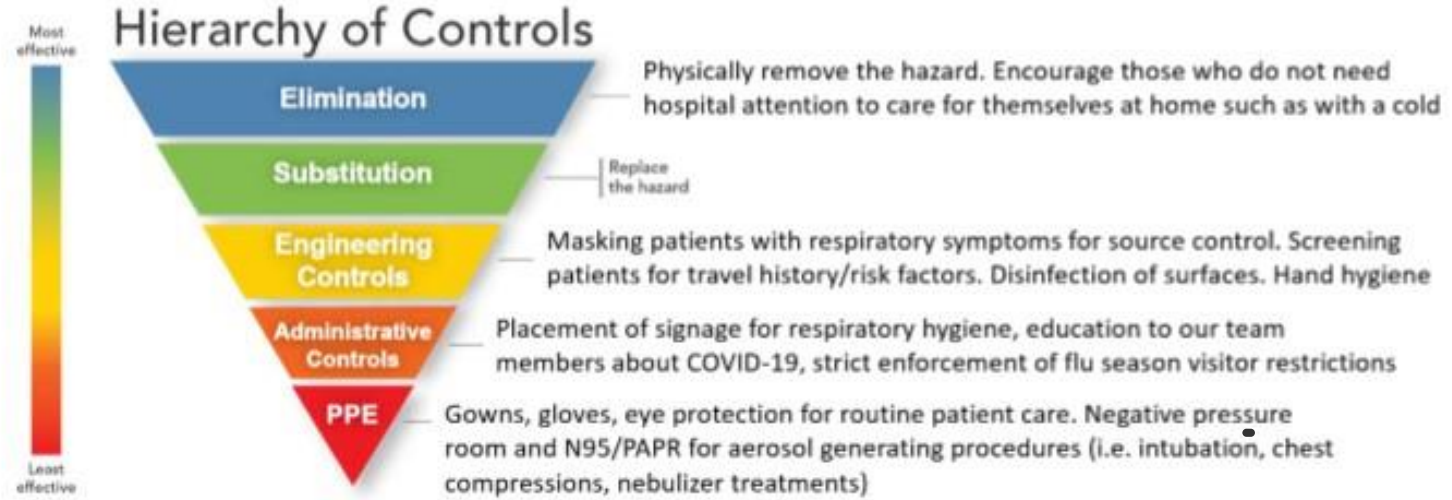
- Eye protection
- Contact
- Droplet

Aerosol Generating Procedures

- Airborne
- N95 or PAPR
- Contact
  - Fluid resistant gowns
- Eye protection

	HCoV-19 half-life (hrs)			SARS-CoV-1 half-life (hrs)		
Material	*median*	*2.5%*	*97.5%*	*median*	*2.5%*	*97.5%*
Aerosols	2.74	1.65	7.24	2.74	1.81	5.45
Copper	3.4	2.4	5.11	3.76	2.43	5.43
Cardboard	8.45	5.95	12.4	1.74	0.827	4.42
Steel	13.1	10.5	16.1	9.77	7.69	12.3
Plastic	15.9	13	19.2	17.7	14.8	21.5





Rationale for Isolation and PPE:

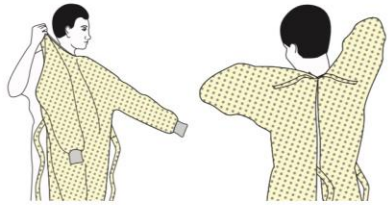
- Based on current evidence, the COVID-19 virus is transmitted via close contact with droplets, just like the flu, and NOT by airborne transmission (WHO, 2020).
- CDC stresses that PPE is the least effective mechanism of control and that health care facilities should focus on consistent application of other control measures as shown above.
- The most important thing we can do to decrease HCW risk of exposure is to immediately place a mask on patients presenting with respiratory symptoms

SEQUENCE FOR PUTTING ON PERSONAL PROTECTIVE EQUIPMENT (PPE)

The type of PPE used will vary based on the level of precautions required, such as standard and contact, droplet or airborne infection isolation precautions. The procedure for putting on and removing PPE should be tailored to the specific type of PPE.

1. GOWN

- Fully cover torso from neck to knees, arms to end of wrists, and wrap around the back
- Fasten in back of neck and waist



2. MASK OR RESPIRATOR

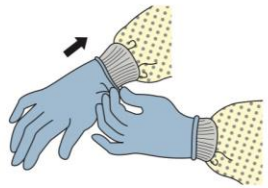
- Secure ties or elastic bands at middle of head and neck
- Fit flexible band to nose bridge
- Fit snug to face and below chin
- Fit-check respirator

3. GOGGLES OR FACE SHIELD

- Place over face and eyes and adjust to fit

4. GLOVES

- Extend to cover wrist of isolation gown



USE SAFE WORK PRACTICES TO PROTECT YOURSELF AND LIMIT THE SPREAD OF CONTAMINATION

- Keep hands away from face
- Limit surfaces touched
- Change gloves when torn or heavily contaminated
- Perform hand hygiene

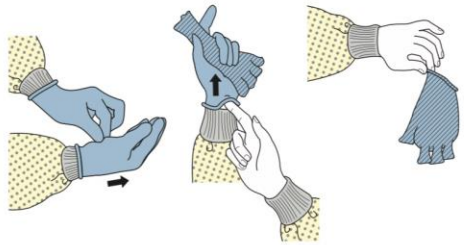
Donning

HOW TO SAFELY REMOVE PERSONAL PROTECTIVE EQUIPMENT (PPE) EXAMPLE 1

There are a variety of ways to safely remove PPE without contaminating your clothing, skin, or mucous membranes with potentially infectious materials. Here is one example. **Remove all PPE before exiting the patient room** except a respirator, if worn. Remove the respirator **after** leaving the patient room and closing the door. Remove PPE in the following sequence:

1. GLOVES

- Outside of gloves are contaminated!
- If your hands get contaminated during glove removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Using a gloved hand, grasp the palm area of the other gloved hand and peel off first glove
- Hold removed glove in gloved hand
- Slide fingers of ungloved hand under remaining glove at wrist and peel off second glove over first glove
- Discard gloves in a waste container



2. GOGGLES OR FACE SHIELD

- Outside of goggles or face shield are contaminated!
- If your hands get contaminated during goggle or face shield removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Remove goggles or face shield from the back by lifting head band or ear pieces
- If the item is reusable, place in designated receptacle for reprocessing. Otherwise, discard in a waste container

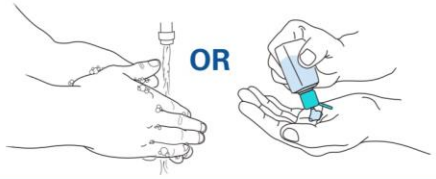
3. GOWN

- Gown front and sleeves are contaminated!
- If your hands get contaminated during gown removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Unfasten gown ties, taking care that sleeves don't contact your body when reaching for ties
- Pull gown away from neck and shoulders, touching inside of gown only
- Turn gown inside out
- Fold or roll into a bundle and discard in a waste container

4. MASK OR RESPIRATOR

- Front of mask/respirator is contaminated — DO NOT TOUCH!
- If your hands get contaminated during mask/respirator removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Grasp bottom ties or elastics of the mask/respirator, then the ones at the top, and remove without touching the front
- Discard in a waste container

5. WASH HANDS OR USE AN ALCOHOL-BASED HAND SANITIZER IMMEDIATELY AFTER REMOVING ALL PPE



PERFORM HAND HYGIENE BETWEEN STEPS IF HANDS BECOME CONTAMINATED AND IMMEDIATELY AFTER REMOVING ALL PPE

CDC

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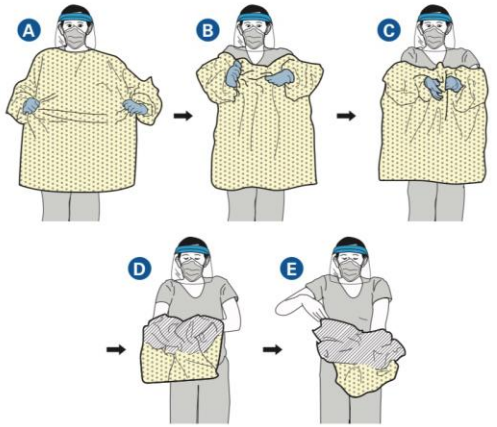
HOW TO SAFELY REMOVE PERSONAL PROTECTIVE EQUIPMENT (PPE) EXAMPLE 2

Here is another way to safely remove PPE without contaminating your clothing, skin, or mucous membranes with potentially infectious materials. **Remove all PPE before exiting the patient room** except a respirator, if worn. Remove the respirator **after** leaving the patient room and closing the door. Remove PPE in the following sequence:

1. GOWN AND GLOVES

- Gown front and sleeves and the outside of gloves are contaminated!
- If your hands get contaminated during gown or glove removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Grasp the gown in the front and pull away from your body so that the ties break, touching outside of gown only with gloved hands
- While removing the gown, fold or roll the gown inside-out into a bundle
- As you are removing the gown, peel off your gloves at the same time, only touching the inside of the gloves and gown with your bare hands. Place the gown and gloves into a waste container



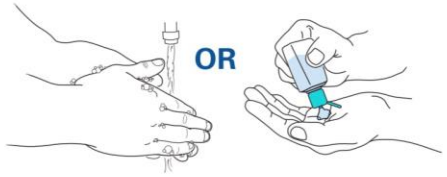
2. GOGGLES OR FACE SHIELD

- Outside of goggles or face shield are contaminated!
- If your hands get contaminated during goggle or face shield removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Remove goggles or face shield from the back by lifting head band and without touching the front of the goggles or face shield
- If the item is reusable, place in designated receptacle for reprocessing. Otherwise, discard in a waste container

3. MASK OR RESPIRATOR

- Front of mask/respirator is contaminated — DO NOT TOUCH!
- If your hands get contaminated during mask/respirator removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Grasp bottom ties or elastics of the mask/respirator, then the ones at the top, and remove without touching the front
- Discard in a waste container

4. WASH HANDS OR USE AN ALCOHOL-BASED HAND SANITIZER IMMEDIATELY AFTER REMOVING ALL PPE



PERFORM HAND HYGIENE BETWEEN STEPS IF HANDS BECOME CONTAMINATED AND IMMEDIATELY AFTER REMOVING ALL PPE

CDC

Doffing

Banner Health

Novel Coronavirus (COVID-19) Patient Evaluation Guide- ALL LOCATIONS (3/8/2020)

Mask (procedure mask) all patients presenting with respiratory symptoms immediately.

ARIZONA			WESTERN DIVISION		
Fever **OR** signs/symptoms of lower respiratory illness (e.g., cough or shortness of breath) **NOT** requiring hospitalization	**AND**	Any person, including health care workers, who has had close contact with a **laboratory-confirmed** COVID-19 patient within 14 days of symptom onset	Fever **OR** signs/symptoms of lower respiratory illness (e.g. cough or shortness of breath)	**AND**	Any person, including health care workers, who has had close contact with a **laboratory-confirmed** COVID-19 patient within 14 days of symptom onset
Fever **OR** signs/symptoms of a lower respiratory illness (e.g., cough or shortness of breath) **NOT** requiring hospitalization in a person with a high-risk occupation[1] **OR** who lives in a congregate setting[2]	**AND**	A history of travel from affected geographic areas* within 14 days of symptom onset	Fever **OR** signs/symptoms of a lower respiratory illness (e.g., cough or shortness of breath) without alternative explanatory diagnosis (e.g., influenza)	**AND**	A history of travel to areas with ongoing community transmission* within 14 days of symptom onset
Fever **AND** signs/symptoms of a lower respiratory illness (e.g., cough or shortness of breath) requiring hospitalization	**AND**	A history of travel from affected geographic areas within 14 days of symptom onset	Severe acute lower respiratory illness (e.g., pneumonia, ARDS) **requiring hospitalization and without alternative explanatory diagnosis** (e.g., influenza)	**AND**	No source of exposure has been identified
Fever **AND** severe acute lower respiratory illness (e.g., pneumonia, ARDS) **requiring hospitalization, radiographic confirmation of bilateral pulmonary infiltrates, & without alternative explanatory diagnosis** (negative influenza testing & respiratory viral panel)	**AND**	No source of exposure has been identified	*Countries or counties/states where sustained community transmission has been identified (e.g., countries with CDC Level 2 or 3 Travel Health Notice and counties/states such as Snohomish County, WA, Solano County, CA, etc.) which can change rapidly. [1] Healthcare personnel, school personnel, childcare worker, jail/prison personnel, or other similar occupation [2] Jail/prison, long-term care facility or nursing home, university, or other similar setting		

NO

- Continue with alternate diagnosis
- Follow transmission-based precautions based on alternate diagnosis

YES

- Place patient in **DROPLET + CONTACT** precautions+ **EYE PROTECTION (procedure mask, gown, gloves, eye protection (goggles or face shield)**
- Private room with door closed, place Enhanced Precautions sign on door
- Perform **aerosol generating procedures** in airborne isolation (negative pressure room)
  - HCW to wear N95 or respirator, with gown, gloves, and eye protection (goggles or face shield) for procedure
- Notify Infection Prevention immediately, Infection Prevention contact list
- Begin completion of Suspect Coronavirus Case Investigation Form
- See lab guidelines for specimen collection instructions. Infection prevention will coordinate testing approval with public health and CDC

Banner Health

Hospital (Inpatient and Observation)

Clinical Features	PLUS	Epidemiologic Risk
Fever OR signs/symptoms of lower respiratory illness (e.g., cough or shortness of breath)	AND	Potential exposure (contact with confirmed case, travel, widespread community transmission, congregate setting, high-risk occupation)
Fever AND severe acute lower respiratory illness (e.g., pneumonia, ARDS), radiographic confirmation of bilateral pulmonary infiltrates, & without alternative explanatory diagnosis	AND	No source of exposure identified

CERNER ORDER: COVID-19 (HIGH RISK)

Rapid Flu/RSV testing (or PCR where available)
Sample type: nasopharyngeal swab

→ Positive
No COVID-19 Testing

If negative, Viral Respiratory PCR Panel
Sample type: nasopharyngeal swab
OR
Lower Resp Tract Multiplex PCR Panel
Sample type: sputum, BAL, bronch wash, or tracheal aspirate (volume: 1 mL)

→ Positive
No COVID-19 Testing

If neg, reflex to Covid19 testing
Sample types: nasopharyngeal/oropharyngeal swab, **AND/OR** sputum, BAL, bronch wash, tracheal aspirate (volume: 1 mL)

Samples collected at order:
2 NP swabs, 1 OP swab, and tracheal aspirate **OR**

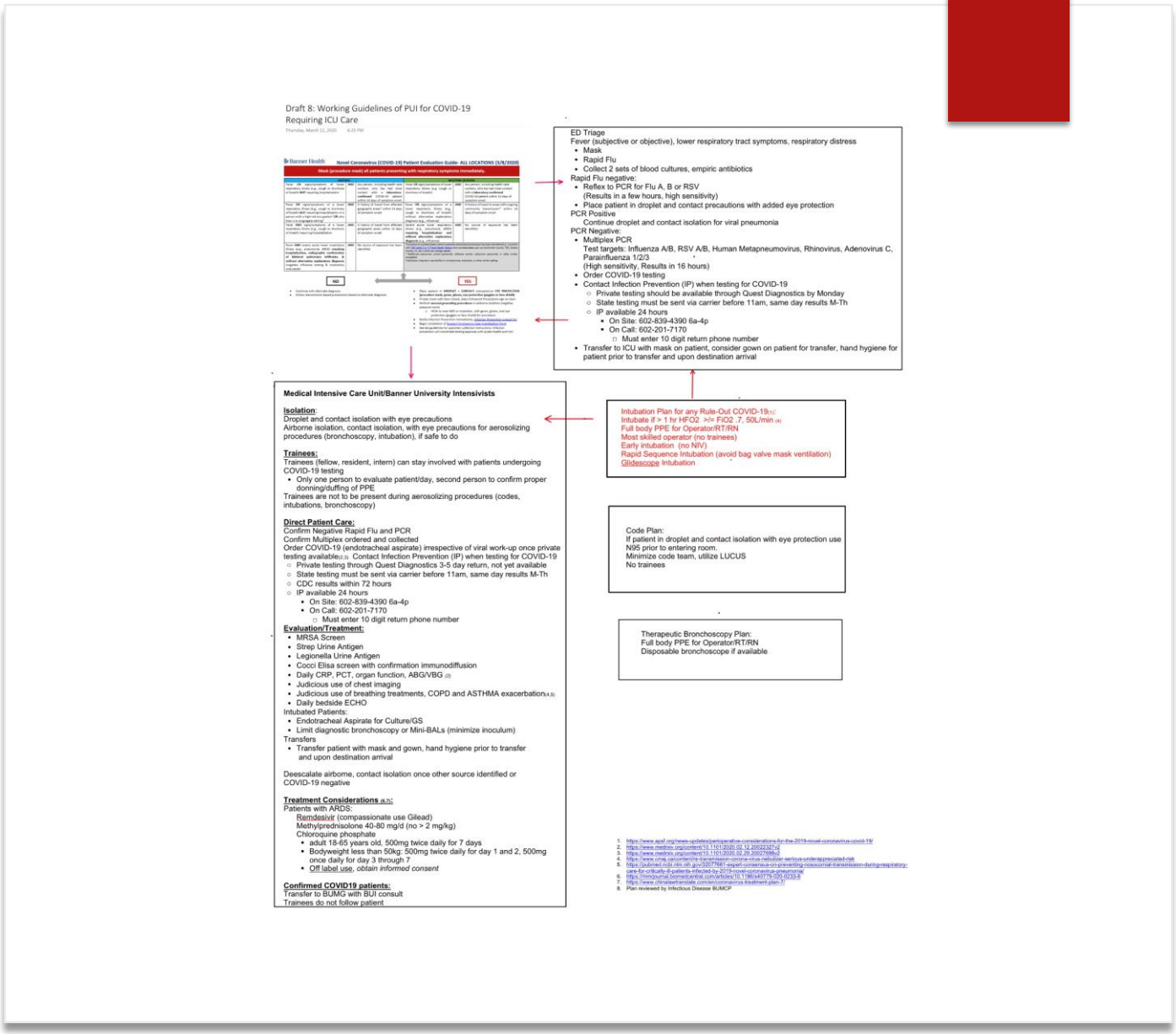
NP swab & tracheal aspirate (need enough volume for both the LR multiplex & COVID-19)

NOTES:
- Lack of fever does **NOT** preclude testing for COVID-19, especially in immunosuppressed patients
- In cases of severe acute lower respiratory illness (e.g., pneumonia, ARDS), studies have shown that samples collected from the lower respiratory tract have a higher rate of detection in comparison to those collected from the naso/oropharynx.
- Also consider testing for Coccidioidomycosis and Legionella

March 12, 2020 PHX 1000

BUI Working Guidelines

- ED process
- ICU process
- ID participation



Draft 8: Working Guidelines of PUI for COVID-19 Requiring ICU Care

Thursday, March 12, 2020 4:25 PM

Banner Health — Novel Coronavirus [COVID-19] Patient Evaluation Guide- ALL LOCATIONS [3/8/2020]

Mask (procedure mask) all patients presenting with respiratory symptoms immediately.

NO

YES

ED Triage
Fever (subjective or objective), lower respiratory tract symptoms, respiratory distress
- Mask
- Rapid Flu
- Collect 2 sets of blood cultures, empiric antibiotics

Rapid Flu negative:
- Reflex to PCR for Flu A, B or RSV
  (Results in a few hours, high sensitivity)
- Place patient in droplet and contact precautions with added eye protection

PCR Positive
Continue droplet and contact isolation for viral pneumonia

PCR Negative:
- Multiplex PCR
  Test targets: Influenza A/B, RSV A/B, Human Metapneumovirus, Rhinovirus, Adenovirus C, Parainfluenza 1/2/3
  (High sensitivity, Results in 16 hours)
- Order COVID-19 testing
- Contact Infection Prevention (IP) when testing for COVID-19
  - Private testing should be available through Quest Diagnostics by Monday
  - State testing must be sent via carrier before 11am, same day results M-Th
  - IP available 24 hours
    - On Site: 602-839-4390 6a-4p
    - On Call: 602-201-7170
      - Must enter 10 digit return phone number
- Transfer to ICU with mask on patient, consider gown on patient for transfer, hand hygiene for patient prior to transfer and upon destination arrival

Medical Intensive Care Unit/Banner University Intensivists

Isolation:
Droplet and contact isolation with eye precautions
Airborne isolation, contact isolation, with eye precautions for aerosolizing procedures (bronchoscopy, intubation), if safe to do

Trainees:
Trainees (fellow, resident, intern) can stay involved with patients undergoing COVID-19 testing
- Only one person to evaluate patient/day, second person to confirm proper donning/duffing of PPE

Trainees are not to be present during aerosolizing procedures (codes, intubations, bronchoscopy)

Direct Patient Care:
Confirm Negative Rapid Flu and PCR
Confirm Multiplex ordered and collected
Order COVID-19 (endotracheal aspirate) irrespective of viral work-up once private testing available[2,3] Contact Infection Prevention (IP) when testing for COVID-19
- Private testing through Quest Diagnostics 3-5 day return, not yet available
- State testing must be sent via carrier before 11am, same day results M-Th
- CDC results within 72 hours
- IP available 24 hours
  - On Site: 602-839-4390 6a-4p
  - On Call: 602-201-7170
    - Must enter 10 digit return phone number

Evaluation/Treatment:
- MRSA Screen
- Strep Urine Antigen
- Legionella Urine Antigen
- Cocci Elisa screen with confirmation immunodiffusion
- Daily CRP, PCT, organ function, ABG/VBG [2]
- Judicious use of chest imaging
- Judicious use of breathing treatments, COPD and ASTHMA exacerbation[4,5]
- Daily bedside ECHO

Intubated Patients:
- Endotracheal Aspirate for Culture/GS
- Limit diagnostic bronchoscopy or Mini-BALs (minimize inoculum)

Transfers
- Transfer patient with mask and gown, hand hygiene prior to transfer and upon destination arrival

Deescalate airborne, contact isolation once other source identified or COVID-19 negative

Treatment Considerations [6,7]:
Patients with ARDS:
Remdesivir (compassionate use Gilead)
Methylprednisolone 40-80 mg/d (no > 2 mg/kg)
Chloroquine phosphate
- adult 18-65 years old, 500mg twice daily for 7 days
- Bodyweight less than 50kg: 500mg twice daily for day 1 and 2, 500mg once daily for day 3 through 7
- Off label use, *obtain informed consent*

Confirmed COVID19 patients:
Transfer to BUMG with BUI consult
Trainees do not follow patient

Intubation Plan for any Rule-Out COVID-19[8]:
Intubate if > 1 hr HFO2 >/= FiO2 .7, 50L/min [4]
Full body PPE for Operator/RT/RN
Most skilled operator (no trainees)
Early intubation (no NIV)
Rapid Sequence Intubation (avoid bag valve mask ventilation)
Glidescope Intubation

Code Plan:
If patient in droplet and contact isolation with eye protection use N95 prior to entering room.
Minimize code team, utilize LUCUS
No trainees

Therapeutic Bronchoscopy Plan:
Full body PPE for Operator/RT/RN
Disposable bronchoscope if available

1. https://www.asnf.org/news-updates/perioperative-considerations-for-the-2019-novel-coronavirus-covid-19/
2. https://www.medrxiv.org/content/10.1101/2020.02.12.20022327v2
3. https://www.medrxiv.org/content/10.1101/2020.02.29.20027698v2
4. https://www.cmaj.ca/content/cmaj-transmission-corona-virus-nebulizer-serious-underappreciated-risk
5. https://pubmed.ncbi.nlm.nih.gov/32077661-expert-consensus-on-preventing-nosocomial-transmission-during-respiratory-care-for-critically-ill-patients-infected-by-2019-novel-coronavirus-pneumonia/
6. https://immunityjournal.biomedcentral.com/articles/10.1186/s40779-020-0233-6
7. https://www.christianitytoday.com/ct/coronavirus-treatment-plan-7/
8. Plan reviewed by Infectious Disease BUMCP

Thank You