COVID-19 UPDATES April 6, 2020

Jorge Mera, MD, FACP Whitney Essex, MSN, FNP-BC Cherokee Nation Health Services





Outline



- Virology
- Epidemiology
- Clinical Manifestations
- Infection Control
- Treatment

Virology

• Virus

- RNA viruses with spike-like surface proteins
- SARS-CoV: Severe Acute Respiratory Syndrome CoronaVirus (2003 outbreak)
- SARS-CoV2: Cause of present coronavirus Pandemic

• Disease

 CoVID-19: Coronavirus disease from SARS-CoV2 discovered in 2019



- Human origin cause human URIs
 - HKU1/NL63/229E/OC43
- Animal Origin
 - SARS-CoV: 2002, China
 - MERS-CoV: 2012, Arabian peninsula
 - SARS-CoV2: 2019, China



Epidemiology

(Lauer et all, Ann Intern Med, 2020)

Transmission

- Droplet is predominant mode of spread
- Contact is secondary
- Airborne ?

Risk of transmission

- One individual transmits it to 0.45% of close contacts^{1,2}
- One individual transmits it to 2.7 individuals

Incubation Period

- 5.1 days from infection to symptoms [2-14 day range]
- 97.5% acquire their symptoms within 11.5 days
- 1% will develop symptoms after 14 days of



^{1.} Burke RM et al. MMWR Morb Mortal Wkly Rep. 2020:69

^{2.} Close contact: a) being within approximately 6 feet (2 meters) of a COVID-19 case for a prolonged period of time; close contact can occur while caring for, living with, visiting, or sharing a healthcare waiting area or room with a COVID-19 case OR b)having direct contact with infectious secretions of a COVID-19 case (e.g., being coughed on)

Epidemiology



Transmission of SARS-CoV2 (R₀)

- R₀ = basic reproduction number
 - The number of cases generated by a single infectious case in a population with in immunity
 - $R_0 \ge 2$ = exponential growth
- R_{0 of SARS-CoV2} = 2.24-3.58

• R₀

•	Measles:		15.0
•	Smallpox:		4.8
•	SARS:		3.0
•	COVID-19:		2.8
•	Ebola:		1.9
•	Seasonal Influenza:	1.3	
•	MERS:		0.8

Why is it spreading faster than SARS

- Survival in surfaces is similar
- Retention in aerosols is similar
- High level early viral shedding from upper respiratory tract
- Asymptomatic transmission has been documented

Epidemiology: Asymptomatic Transmission



• Asymptomatic Transmission has been reported in 6.4% of the Cases in Singapore and 12.6% of the cases in China





Epidemiology: Asymptomatic Transmission

Asymptomatic and Presymptomatic SARS-CoV-2 Infections in Residents of a Long-Term Care Skilled Nursing Facility — King County, Washington, March 2020

Weekly / April 3, 2020 / 69(13);377-381

On March 27, 2020, this report was posted online as an MMWR Early Release.

• Once SARS-CoV-2 is introduced in a long-term care skilled nursing facility (SNF), rapid transmission can occur.

Following identification of a case of coronavirus disease 2019 (COVID-19) in a health care worker, 76 of 82 residents of an SNF were tested for SARS-CoV-2; 23 (30.3%) had positive test results, approximately half of whom were asymptomatic or pre-symptomatic on the day of testing.

□ Symptom-based screening of SNF residents might fail to identify all SARS-CoV-2 infections.



Clinical Manifestations: Risk of Hospitalization

TABLE 2. Hospitalization with and without intensive care unit (ICU) admission, by age group among COVID-19 patients aged ≥19 years with and without reported underlying health conditions — United States, February 12-March 28, 2020*

	Hospitalized without ICU admission, No. (% range [†]) Underlying condition present/reported ⁸		ICU admission, No. (% range*) Underlying condition present/reported ⁸	
Age group (yrs)	Yes	No	Yes	No
19-64	285 (18.1-19.9)	197 (6.2–6.7)	134 (8.5-9.4)	58(1.8-2.0)
265	425 (41.7-44.5)	58 (16.8-18.3)	212(20.8-22.2)	20 (5.8-6.3)
Total ≥19	710 (27.3-29.8)	255 (7.2-7.8)	346 (13.3-14.5)	78 (2.2-2.4)

Key Points

 \diamond Adults > 65 years are:

 \diamond 31% of cases

 \diamond 45% of hospitalizations

- \diamond 53% of ICU admissions
- \diamond 80 % of deaths

* Includes COVID-19 patients aged ≥19 years with known status on underlying conditions.

[†] Lower bound of range = number of persons hospitalized or admitted to an ICU among total in row stratum; upper bound of range = number of persons hospitalized or admitted to an ICU among total in row stratum with known outcome status: hospitalization or ICU admission status.

Includes any of following underlying health conditions or risk factors: chronic lung disease (including asthma, chronic obstructive pulmonary disease, and emphysema); diabetes mellitus; cardiovascular disease; chronic renal disease; chronic liver disease; immunocompromised condition; neurologic disorder, neurodevelopmental, or intellectual disability; pregnancy; current smoker; former smoker; or other chronic disease.

Preliminary Estimates of the Prevalence of Selected Underlying Health Conditions Among Patients with Coronavirus Disease 2019 — United States, February 12–March 28, 2020. MMWR Morb Mortal Wkly Rep 2020;69:382–386.

Clinical Manifestation: Coinfection



- Coinfection with bacteria has been reported between 0-6% but unclear since systematic testing not performed
- Coinfection with other viruses including influenza
- Detection of an alternative viral or bacterial infection does not rule out COVID-19

Chen et al, Lancet; Tav et al, CID. Young et al, JAMA; Wu et al, CID. Han et al, J Med Virol. Zhao et al, CID. Lin et al, Sci China Life Sci. Want et al, CID Mo et al CID, Wu et al CID



Infection Control: Who to Test for COVID-19

1

Hospitalized patients who have fever or respiratory symptoms

Health Care Workers

2

Older adults and individuals with chronic medical conditions: DM, CHF, COPD, CKD, Cirrhosis, Obese Immunosuppressed 3

Patients with fever (subjective or objective) **OR** cough **OR** shortness of breath

Infection Control: Testing for COVID-19



• PCR

- Use only synthetic fiber swabs with plastic shafts. DO NOT use calcium alginate swabs or swabs with wooden shafts¹.
- Nasopharyngeal swab preferred but may also test oropharynx, nasal mid-turbinate.
- Leave swab in place for 2-3 seconds then rotate completely around for 10-15 seconds. If the patient has a productive cough a PCR test should be done on the sputum sample
- Sensitivity 75-80%

Serology

- FDA approved emergency use of first commercial serology test for qualitative detection of IgM and/or IgG (Cellex)
- Finger stick with results in 15 min.
- Nearly 94% positive % agreement with RT-PCR and a 96% negative % agreement with RT-PCR
- Not to be used as the sole basis to diagnose or exclude SARS-CoV-2 infection
- 1. CDC.gov Accessed 3/18/2020
- 2. UW Medicine, COVID-19 Website

Infection Control





Personal Protective Equipment (PPE) for Patients with Suspected or Confirmed COVID-19

Running out of PPE?



¹ Aerosol Generating Procedures: Examples include intubation, non-invasive ventilation, CPR, branchoscopy, open suction, nasotracheal suction, nebs.
¹ Trained Observationi Since some patient room doors do not have a window, observation of doffing may not always be possible.
PPE for Specimen Collection: Nasopharyngoal swabs often generate a strong cough reflex. Standard/Contact/Droplet precautions are recommended.
More Information: For tasting criteria and detailed information about PPE recommendations for suspected or confirmed COVID-19 cases, please visit our UW Mellione CDWD-19 Weblite.

Infection Control: Recommendations for Discontinuing Home Isolation of Symptomatic COVID-19 Positive Patients Individuals with laboratory-confirmed COVID-19 who have symptoms

- Non-test-based strategy (time-since-illness-onset and time-since-recovery strategy):
- At least 3 days (72 hours) have passed *since recovery* defined as resolution of fever without the use of fever-reducing medications **and**
- Improvement in respiratory symptoms (e.g., cough, shortness of breath); and
- At least 7 days have passed since symptoms first appeared.

• Test-based strategy

- Resolution of fever without the use of fever-reducing medications and
- Improvement in respiratory symptoms (e.g., cough, shortness of breath) and
- Negative results of an FDA Emergency Use Authorized molecular assay for COVID-19 from at least two consecutive nasopharyngeal swab specimens collected ≥24 hours apart (total of two negative specimens).
- Should be used for patients discharged from the hospital, patients returning to nursing homes or immunocompromised patients

Individuals with laboratory-confirmed COVID-19 who have not had <u>any</u> symptoms may discontinue home isolation when at least 7 days have passed since the date of their first positive COVID-19 diagnostic test and have had no subsequent illness

Infection Control:



Return to Work Practices and Work Restrictions

- After returning to work, HCP should:
 - Wear a facemask at all times while in the healthcare facility until all symptoms are completely resolved or until 14 days after illness onset, whichever is longer
 - Be restricted from contact with severely immunocompromised patients (e.g., transplant, hematology-oncology) until 14 days after illness onset
 - Adhere to hand hygiene, respiratory hygiene, and cough etiquette in CDC's interim infection control guidance (e.g., cover nose and mouth when coughing or sneezing, dispose of tissues in waste receptacles)
 - Self-monitor for symptoms, and seek re-evaluation from occupational health if respiratory symptoms recur or worsen

Infection Control: Personal Protective Equipment



PPE must include

- Gown
- Nonsterile gloves
- N95 (Mandatory when aerosols are generated)
 - Intubation (Box NEJM 2020)
 - Nebulization
 - Inducing sputum
- Eye protection (Face shield or goggles)

Infection Control: CDC Community Recommendations



Masks for the community

- Virus can spread between people interacting in close proximity
- CDC recommends wearing cloth face coverings in public settings where other social distancing measures are difficult to maintain
- Maintaining 6-feet social distancing remains important to slowing the spread of the virus

Treatment

Day 1-9 disease is probably viral mediated

- Remdesevir: Results are pending
- Favipriavir:
 - 1 open label control study in patients without hypoxemia revealed faster viral clearance and radiologic improvement vs Lopinavir/ritonavir (Cai et al Engineering 2020)
- Hydroxychloroquine (HC)
 - 1 open label study of 36 patients showed higher rates of undetectable viral RNA at day 6 that improved with the addition of azithromycin (Gautret et al International Journal of Antimicrobial Agents)
 - 1 randomized trial of 30 adults in Shanghai reported did not show higher rates of viral clearance (Chen et al. Journal of Zheijiang University 2020)
 - 1 unpublished randomized clinical trial reported symptom and radiological improvement as well as lower likelihood of progression in patients without hypoxemia (Chen)

Day 10 onwards disease is probably immune mediated

- IL-6 receptor blockers
 - Tocilizumab, Sarilumab and siltuximab
- Glucocorticoids
 - Not to be used in non critically ill patients unless there is a separate evidence-based indication (CDC)
 - ARDS: Conflicting evidence
- Plasma from convalescent donors (JAMA March 2020)
 - March 24, FDA announced that convalescent plasma may be collected from recovered COVID-19 patients and considered for emergency administration under a single patient emergency Investigational New Drug application for individual patients with life threateningly severe disease but may be used in individual patients outside of clinical trial.*
 - Hyperimmune globulin from convalescent donors



Conclusions



- How to curb the pandemic:
 - Early detection and isolation
 - Consider everyone with a fever, cough or Shortness of Air as a "Potential COVID Case" and TEST (if available)
 - Isolate cases and quarantine close contacts
 - Isolation at work and at home
- No proven treatment available
- This is a new virus: We are learning every day and need to readily ADAPT and ADOPT

Thank you

Questions?