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To ensure you're reviewing the most up-to-date version, visit: <https://www.evergreenhealth.com/covid-19-lessons>

Protocols & Best Practices for Addressing COVID-19 in the Hospital Setting

Compiled by EvergreenHealth Hospitalists

The information presented here is intended for use by physicians and hospital staff and should not be considered medical advice. Please contact your healthcare provider with any healthcare questions.

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ANTICIPATING & PREPARING for COVID

- **Recognize your burn rate on PPE supply.** Your facility may use more personal protective equipment (PPE), oxygen equipment, and isolation rooms than initially anticipated. Based on your facility's protocols, determine daily burn rate of gloves, surgical masks, N-95 masks, and gowns for a patient in isolation using this [CDC calculator](#).
- **N95 fit.** Fit test all staff in advance if possible. A proper fitting can take 30 minutes.
- **Understand aerosol-generating procedures (AGPs).** Ensure staff understand which procedures generate aerosols and increase viral transmission risk. Testing with a nasopharyngeal swab is an AGP, for example. Consider creating a dedicated AGP team and a dedicated procedure room for AGPs. Use appropriate isolation status and PPE for AGPs. [Here](#) is a good review of AGP's.
- **Establish cleaning protocols.** Identify appropriate cleaning solutions and establish cleaning protocols of the environment. Build in additional time to clean rooms and radiology facilities. Cleaning protocols should include non-patient care areas, such as employee break rooms or charting areas, where workplace transmission may occur.

- **Prepare for flexible staffing.** Staff will become ill, quarantined, and may have difficulty getting to work. Child care for staff families is a consideration. Solicit additional manpower early and create a “surge plan” for times of higher volume. Have a process ready for emergency credentialing. Develop policy on sick leave. Some departments may shoulder more workload than others: critical care nursing, respiratory therapy, housekeeping, intensivists, hospitalists. Expect critical care staffing to be impacted the most.
- **Identify telemedicine and video capabilities.** Consider virtual clinical services to reduce PPE use. Determine documentation and billing procedures. For instance, our organization adopted the use of the BlueJeans app to facilitate virtual visits.
- **Recognize that hospital length of stay will increase** due to slow recovery from respiratory issues and disposition considerations when COVID+ patients are ready for discharge.
- **Disposition of COVID+ patients may be challenging.** Are there unconventional beds in the community with nursing capability where patients can convalesce, to free up hospital beds? The Seattle region offers these resources on the county level.
- **Understand how you will you manage scarce resources,** such as ICU beds and ventilators. Crisis standards are intended to be applied regionally and ideally are built on existing triage and disaster management protocols in your state. Please refer to:
 CHEST: [Too Many Patients: A Framework to Guide Statewide Allocation of Scarce Mechanical Ventilator During Disasters](#)
 Northwest Healthcare Response Network/ Washington state DOH: [Scarce Resource Management & Crisis Standards of Care](#)
- **Collaborate with experienced providers.** Connect with clinicians in experienced centers. Additional resources include CDC conference calls, regional critical care grand rounds, professional society online resources and webinars. Know how to access your state and federal guidelines, which are updated frequently.
- **Communications among providers.** Consider how ongoing changes to clinical practice can be communicated efficiently to providers. Establish regular communication within your service group by conference call or other appropriately distanced format. Review new guidelines, address concerns, generate strategies.

DEVELOP INFECTION CONTROL SYSTEMS

- **Negative airflow.** Building engineers can determine which rooms and units can be converted to negative airflow.
- **Cohorting.** If feasible, care for COVID-positive patients on separate closed units.
- **Create clear donning and doffing circuits.** Designate clear donning / doffing circuits so cross-contamination NEVER occurs between clean and dirty PPE. Clearly designate donning areas with clean masks, gowns, and gloves. Clearly designate where dirty supplies should be

doffed and collected without contaminating clean supplies. Train all staff to safely don and doff PPE.

- **Use appropriate Personal Protection Equipment (PPE).** Have clear signage. Use "special droplet & contact precautions" in isolation rooms unless an aerosol-generating procedure is underway or occurred within 45 minutes, in which case "airborne precautions" are used. Understand [CDC guidelines to optimize PPE and equipment use](#). Offer ongoing education regarding safe donning and doffing of PPE. Contamination from doffing PPE may contribute to work-acquired COVID.
- **Conserve supplies.** Be prepared to reuse N95, CAPR/PAPR equipment, and face shields. Create cleaning protocols for reuse of masks and hoods. Understand what solutions adequately kill coronavirus. Alcohol solution may compromise the integrity of N95 masks.
- **"Cluster" patient care.** If safe, cluster patient care to decrease PPE turnover.
- **COVID-pending patients.** Be aware of PPE turnover on patients awaiting COVID testing results while in special isolation precautions.
- **Fomites.** Recognize that transmission among health workers may occur in work rooms, break rooms, eating areas, etc. Determine appropriate cleaning procedures for hard surfaces. Chlorine solution (0.5% for surfaces) may replace scarce wipes.
- **Visitor policy.** Establish a rational and humane visitors policy. Consider compassionate visitation for end of life.

PROTECT HUMAN RESOURCES

- **Workplace transmission.** Establish a process for identifying hospital exposures and monitoring affected staff, patients, and visitors for transmission.
- **Risk assessment in Health Care Workers:** <https://www.cdc.gov/coronavirus/2019-ncov/hcp/guidance-risk-assesment-hcp.html>
- **High risk staff.** Identify staff at higher risk of severe illness from COVID19. Develop policies to mitigate exposure.
- **Task-shifting.** As intensivist manpower becomes scarce, consider enlisting hospitalist help to manage critical patients while intensivists focus on procedures and ventilator management. Credential outpatient internists or subspecialists to help with stable hospital patients. RNs may be called to do respiratory therapy tasks as RT availability may become limited.
- **Develop staff absence policy.** Establish when to test, when it's safe to return to work, paid sick leave policy. Here are [CDC guidelines for healthcare providers returning to work](#) after confirmed or suspected COVID.
- **Monitor morale.** Recognize that low morale may occur in situations where staff feel unsafe or have little or no control. These feelings of helplessness may increase the risk of error.

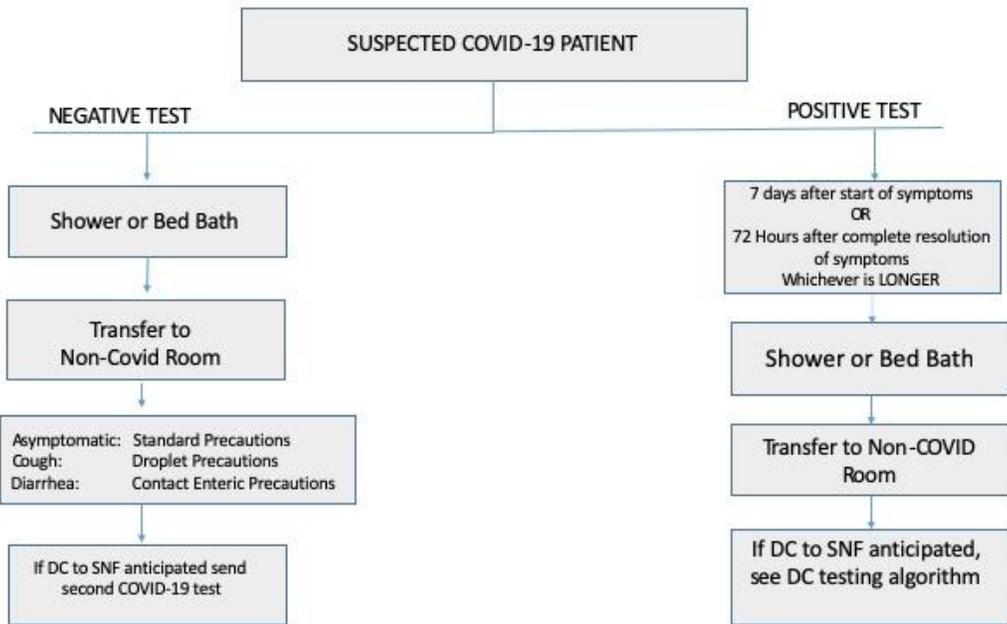
- **Plan for wellness and sustainability.** Recognize signs of acute stress disorder, depression and PTSD. Have systems for checking in with each health care worker. Recognize that health care workers are often very reluctant to demonstrate “weakness” but may benefit significantly from emotional support.
- **Sleeping quarters.** Consider sleeping arrangements for staff wanting to protect families and isolate.
- **Deploy quarantined staff.** Consider using staff isolating at home for telephone follow-ups, communications, journal research, etc.
- **Manage stigmatization.** Recognize that staff – and patients'— families may be stigmatized in the community.

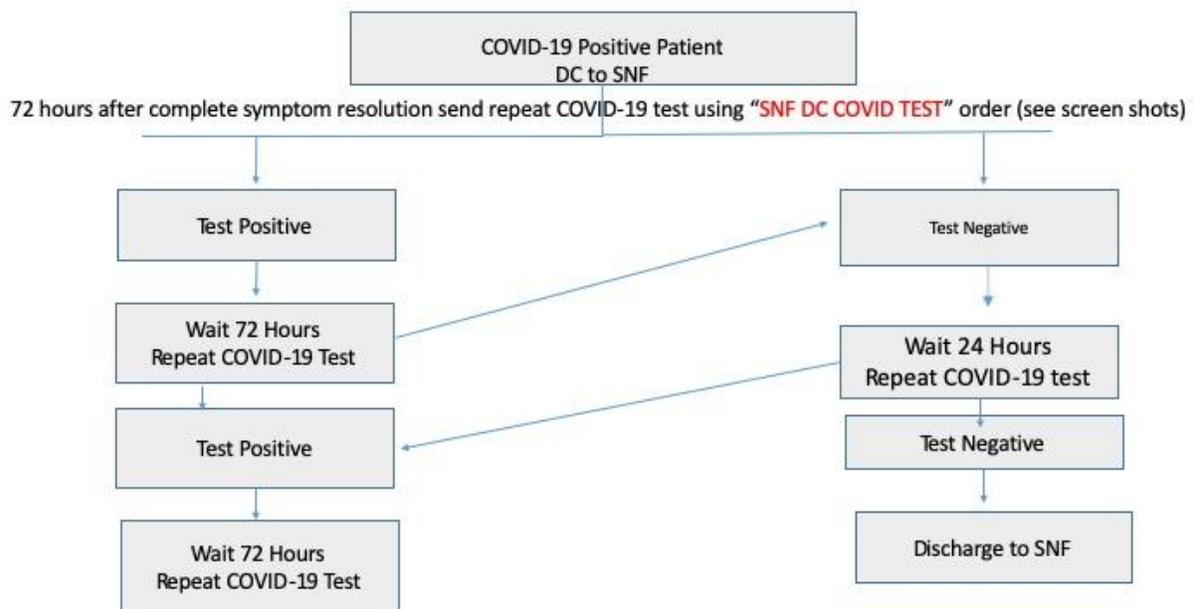
INPATIENT CARE of COVID PATIENTS

- **Presenting story.** Often patients are admitted to the hospital after 7-9 days of symptoms. Some are younger, healthier adults with no obvious comorbidities. Typical picture at presentation includes increasing shortness of breath with cough. Fever is present in about 40% on arrival. About 90% display fever during their inpatient course. Some patients have nausea and/or diarrhea prior to developing respiratory symptoms. Some may lose sense of smell and/or taste. Some may have chills or persistent headache. Many presenting to the hospital have infiltrates on CXR. Even with negative CXR, CT chest can show ground glass opacities, which may be associated with worse prognosis.
- **Venous thromboembolism and stroke** are increasingly-recognized complications of COVID. Recommendations from the American Society of Hematology are [here](#).
- **Common lab findings.** Most have normal WBC but relative lymphopenia, low procalcitonin. Some have mild LFT elevations. CRP and LDH often elevated but nonspecific.
- **False negative** rate for COVID testing is thought to be around 30%. This may vary from lab to lab, and depends on technique with nasopharyngeal swabs. In high pre-test probability patients, admission to an isolation room with repeat testing may be appropriate even if testing is initially negative.
- **Unpredictable course.** Patients may appear stable for days, then develop sudden respiratory decompensation. Others are intubated within hours of arrival. Fevers are cyclical, persistent, and can be very high, up to 39-40 C. Stable patients discharged from the ED or hospital may return for readmission within a few days with hypoxia and/or worsening CXR findings. Consider telephone follow-up calls for discharged patients.
- **Prolonged course.** Course can be more prolonged than other respiratory illnesses, with some patients still requiring supplemental oxygen at 2-3 weeks after diagnosis.
- **Coinfection.** Bacterial co-infection rates are low. Though tendency is to start empiric antibiotics, consider stopping if low procalcitonin, negative sputum culture, or clinical stability. Low percentage of viral co-infection including influenza and other respiratory viruses.

- **Co-morbid cardiac disease.** Be aware that COVID is associated with new cardiomyopathies and cardiovascular collapse with VF arrest.
- **Awake proning** may reduce the need for mechanical ventilation.
- **Recognize social isolation of your patients.** Visitation has been highly restricted per CDC and DOH guidelines. Many patients feel isolated, afraid and alone. They may interact minimally with staff and won't see their family until leaving the hospital. Consider ways to reduce social isolation such as video chat, phone chargers, spiritual care.
- **Counseling patients and families.** Expect to spend more time counseling patients and families. Our teams partner so one physician calls family each day on shared patients.
- **Please refer to COVID Therapeutics for updated information regarding evidence-based therapeutics.** This can be located at <https://www.evergreenhealth.com/covid-19-lessons>
- CDC guidance on [discontinuing isolation in recovered COVID patients](#)

- **SAMPLE DISCHARGE PROTOCOL:**





KEY FEATURES OF THE ICU COURSE:

- **Confirm code status.** On initial contact with the patient and family, confirm code status and address goals of care including decisions regarding ICU admission. Consider sharing palliative care physician [Dr. Laura Johnson's advice](#) regarding critical care decision-making in COVID, with patients and their families.
- **Rapid decompensation.** Many patients who ultimately require critical care will transfer to the ICU within 24 hours of presenting to the ED. Most patients requiring ICU-level care demonstrate bilateral infiltrates on CXR. In decompensating patients, maintain a low threshold to intubate and ventilate. Recognize that bipap is a continuous AGP.
- **Severe ARDS** often develops within 72 hours of presentation. Standard ARDS care includes PEEP ladder, proning, epoprostenol, paralytics, and ECMO.
- **Multisystem organ failure.** In addition to severe respiratory failure, complications of COVID can include shock requiring vasopressors, cardiomyopathy and systolic heart failure, malignant arrhythmias including VF/VT arrest, liver dysfunction, venous thromboembolism and stroke, and renal failure with dramatically elevated CK levels.
- **Potential for recovery.** Successful extubation and other signs of clinical improvement can range from several days to several weeks.
- **For in-depth critical care guidance,** please refer to [Society of Critical Care Medicine: Surviving Sepsis Campaign in COVID-19](#).

ADDITIONAL ONLINE RESOURCES

OVERVIEWS

1. CDC Coronavirus page: symptoms, community resources, US case tracker, info for providers, latest updates

<https://www.cdc.gov/coronavirus/2019-ncov/index.html>

2. Modeling website: international, national and state-specific

<https://covid19.healthdata.org/projections>

3. EM Crit: Excellent overview, includes diagnosis and treatment, discusses meds

<https://emcrit.org/ibcc/covid19/>

4. EB Medicine: Excellent overview, epidemiology, ER and Hospitalist management, “situation summary”, PDF to print

<https://www.ebmedicine.net/topi.../infectious-disease/COVID-19>

MASTER PROTOCOL SITES

1. University of Washington

<https://covid-19.uwmedicine.org/>

2. University of California, San Francisco

<https://infectioncontrol.ucsfmedicalcenter.org/coronavirus>

TRACKERS

1. WHO Daily Situation Reports

<https://www.who.int/.../novel-coronavirus-2.../situation-reports>

2. 1Point3Acres Global tracker

<https://coronavirus.1point3acres.com/>

3. Johns Hopkins Tracker

<https://coronavirus.jhu.edu/map.html>

FOREIGN LANGUAGE RESOURCES - NYC.gov, see “Posters”

<https://www1.nyc.gov/.../health/health-topics/coronavirus.page>

EMERGENCY MEDICINE

1. See Master Protocol Sites above

2. ACEP COVID-19 Resources

<https://www.acep.org/resource/dynamic/79753/78842>

INFECTIOUS DISEASE

1. CDC MMWR page – frequently updated

https://www.cdc.gov/mmwr/Novel_Coronavirus_Reports.html

INTERNAL MEDICINE / CRITICAL CARE

1. Use of Single Ventilator for Multiple Patients

<http://rc.rcjournal.com/content/57/3/399>

2. ECMO in COVID-19

<https://www.else.org/covid19>

3. Society of Critical Care COVID-19 Surviving Sepsis Guidelines

<https://www.sccm.org/getattachment/Disaster/SSC-COVID19-Critical-Care-Guidelines.pdf>

4. Chest - Framework for Scarce Resource Allocation

[https://journal.chestnet.org/article/S0012-3692\(18\)32565-0/fulltext](https://journal.chestnet.org/article/S0012-3692(18)32565-0/fulltext)

5. Characteristics and Outcomes of the First 21 ICU patients at EvergreenHealth

<https://jamanetwork.com/journals/jama/fullarticle/2763485>

OBSTETRICS AND GYNECOLOGY

1. ACOG COVID-19 Practice Advisory - Includes CDC links for many issues and inpatient and outpatient evaluation

<https://www.acog.org/clinical/clinical-guidance/practice-advisory/articles/2020/03/novel-coronavirus-2019>

2. CDC COCA Webinar on Pregnant and Pediatrics (summarized in post labeled OB/PEDIATRICS), audio resource

https://emergency.cdc.gov/c.../calls/2020/callinfo_031220.asp...

PEDIATRICS

1. AAP Early COVID-19 Data/Pedi Epidemiology

<https://pediatrics.aappublications.org/.../peds.2020-0702.ful...>

2. Clinical and CT Differences Between Peds and Adults w COVID-19

<https://onlinelibrary.wiley.com/doi/10.1002/ppul.24718>

RADIOLOGY

1. Society of Italian Radiology: Case Files demonstrating CXR and CT findings

<https://www.sirm.org/category/senza-categoria/covid-19>

2. Lung Ultrasound Findings

<https://link.springer.com/article/10.1007/s00134-020-05996-6>

SURGERY

1. See Master Protocol Sites above

2. ACS Statement on Elective Procedures

<https://www.facs.org/abou.../covid-19/information-for-surgeons>

3. AORN/ACS/ASA/AHA Roadmap for Resuming Elective Surgery

<https://www.aorn.org/guidelines/aorn-support/roadmap-for-resuming-elective-surgery-after-covid-19>

CARDIOLOGY

1. ACC COVID-19 Hub

<https://www.acc.org/latest-in-cardiology/features/accs-coronavirus-disease-2019-covid-19-hub>

GASTROENTEROLOGY

1. Updates from the AGA

<https://www.gastro.org/practice-guidance/practice-updates/covid-19>

2. ASGE Statement on Endoscopy Precautions

<https://els-jbs-prod-cdn.literatumonline.com/.../CoronavirusO...>

OPHTHALMOLOGY - AAO Statement

<https://www.aao.org/hea.../alert-important-coronavirus-context>

PALLIATIVE CARE – Communication tips, support resources

<https://www.capc.org/toolkits/covid-19-response-resources/>

PSYCHIATRY - Resources for Psychiatrists - Discusses telehealth, PPE, and more

<https://www.psychiatry.org/.../covid-19-mental-health-impacts...>

SPECIAL POPULATIONS – INMATES

1. Federal Bureau of Prisons Action Plan

<https://www.bop.gov/mobile/>

2. Statement from King County

<https://www.kingcounty.gov/depts/jails.aspx>

TELEMEDICINE

1. AAP Coding and Billing

Factsheet https://www.aap.org/.../Doc.../coding_factsheet_telemedicine.pdf

2. AAP Telemedicine Resources <https://www.aap.org/.../ma.../telehealth-care/Pages/default.aspx>

3. Health and Human Services - Telehealth Emergency Enforcement Discretions

<https://www.hhs.gov/hipaa/for-professionals/special-topics/emergency-preparedness/notification-enforcement-discretion-telehealth/index.html>

4. CMS Telehealth Guidance

<https://www.cms.gov/Medicare/Medicare-General-Information/Telehealth>

THE INTERNATIONAL EXPERIENCE

1. Keeping the Coronavirus from Infecting Health-Care Workers, Atul Gawande - experience in China, Singapore and Hong Kong

<https://www.newyorker.com/news/news-desk/keeping-the-coronavirus-from-infecting-health-care-workers>

2. Contact Transmission of COVID-19 in South Korea: Novel Investigation Techniques for Tracing Contacts

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7045882/>

3. JAMA Viewpoint regarding China Case Series of the first 72,000 patients (original article in Mandarin)

<https://jamanetwork.com/journals/jama/article-abstract/2762130>

4. Imperial College of London COVID-19 Team - Effect of (NPIs) to reduce COVID- 19 mortality and healthcare demand

<https://www.imperial.ac.uk/media/imperial-college/medicine/sph/ide/gida-fellowships/Imperial-College-COVID19-NPI-modelling-16-03-2020.pdf>

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