

Treatment of Covid-19 Viral Pneumonia

- Standard, supportive care for viral pneumonia
- Avoidance of any emerging novel, unproven treatment
- Oxygen supplementation
- Inhaled respiratory medications for wheezing and cough
- Avoidance of treatments for respiratory failure used to avoid intubation and mechanical ventilation. These include heated, high-flow oxygen and non-invasive ventilation. Both have increased risk to health care workers because of a substantial increase in aerosol generation from the patient.
- Mechanical ventilation principles are the same as for treating viral pneumonia, acute lung injury, and acute respiratory distress syndrome (ARDS). Rescue extra-corporeal membrane oxygenation (ECMO) may be considered (and was used widely in China).
- Corticosteroids are not recommended.

Treatment of Covid-19 Viral Pneumonia (continued)

- Exceptions for corticosteroid use for treatment of asthma and COPD
- Antibiotics to treat secondary bacterial pneumonias (observed at a fairly high rate in the WHO China report from Wuhan).
- Inhalation drugs used to improve oxygenation

Prostacyclines (epoprostenol)

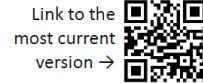
Nitric oxide

- Imaging studies

CT scanning is the most useful, and findings may precede onset of symptoms and + viral RNA testing. Most severe findings usually occur 9-10 after onset of symptoms.

Lung ultrasound may also have some benefit.

A Seattle Intensivist's One-pager on COVID-19



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Nomenclature

Infection: Coronavirus Disease 2019 a.k.a. COVID-19
Virus: SARS-CoV-2, 2019 Novel Coronavirus
NOT "Wuhan Virus" NOT "China Virus"

Biology

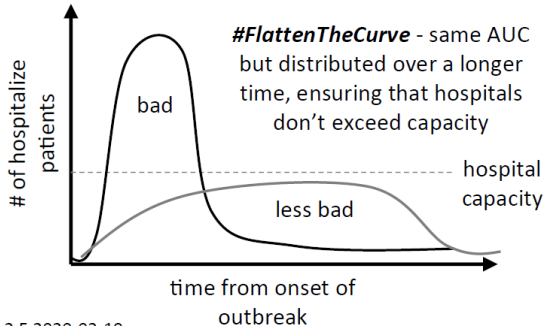
- [30 kbp, +ssRNA](#), enveloped coronavirus
- [Likely zoonotic infection](#); source/reservoir unclear ([Bats?](#) / [Pangolins?](#) → people)
- Now spread primarily **person to person**;
 - [Can be spread by asymptomatic carriers!](#)
- Viral particles [enter into lungs via droplet nuclei](#)
 - CDC/WHO recommend AIRBORNE isolation
- [Viral S spike binds to ACE2](#) on type two pneumocytes
- [Effect of ACE/ARB is unclear](#); [not recommended](#) to change medications at this time.
- Other routes of infection (contact, enteric) possible but unclear if these are significant means of spread

Epidemiology

- Attack rate = [30-40%](#) (China)
- $R_0 = 2-4$
- Case fatality rate (CFR) = 2.3% ([China](#))
- Incubation time = [3-14 days \(up to 15 days\)](#)
- Viral shedding – [median 20 days](#) (max 37 days)
- Breakdown of disease severity
 - **80%** Non-severe (mild pneumonia)
 - **15%** Severe (hypoxia, respiratory distress)
 - **5%** Critical (respiratory failure)

Disease clusters: SNFs, Conferences, other

Strategies: contact tracing, screening, social distancing



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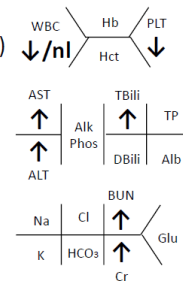
Diagnosis/Presentation

Symptoms

- 65-80% **cough**
- 45% **febrile** on presentation (85% febrile during illness)
- 20-40% dyspnea
- 15% URI symptoms
- 10% GI symptoms

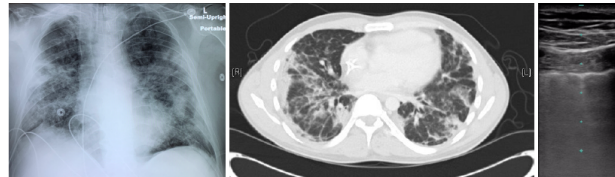
Labs

- CBC: [Leukopenia](#) & [lymphopenia](#) (80%+)
- BMP: \uparrow BUN/Cr
- LFTs: \uparrow AST/ALT/Tbili
- \uparrow D-dimer, \uparrow [CRP](#), \uparrow LDH
- \uparrow IL-6, \uparrow Ferritin
- \downarrow Procalcitonin
 - *PCT may be high w/ superinfxn *



Imaging – (imaging is NOT diagnostic)

- [CXR](#): hazy [bilateral](#), [peripheral](#) opacities
- [CT](#): [ground glass opacities](#) (GGO), crazy paving, consolidation, *rarely may be unilateral*
- [POCUS](#): numerous B-lines, pleural line thickening, consolidations w/ air bronchograms



Isolation

- Phone call is the best isolation (e.g. move to telemed)
- Place patient in mask, single room, limit/restrict visitors

Precautions

- [In correct sequence](#): **STANDARD + CONTACT** (double glove) + either **AIRBORNE** (for aerosolizing procedures: intubation, extubation, NIPPV, suctioning, etc) or **DROPLET** (for everything else; *ideally* airborne)
- N95 masks must be fit tested; wear eye protection
- PPE should be donned/doffed with trained observer
- Hand hygiene: 20+ seconds w/ soap/water or alcohol containing hand gel

Treatment

- Isolate & send PCR test early (may take **days** to result)
- GOC discussion / triage
- Notify DOH, CDC, etc
- **Fluid sparing** resuscitation
- Avoid NSAIDs; use acetaminophen/paracetamol for fever
- \pm empiric antibiotics
- Intubate early under controlled conditions: **RSI**, no bagging, **VL**, have suction & capnography connected to avoid circuit breaks.
- Avoid HFNC or NIPPV (aerosolizes virus) unless **individualized** reasons exist (e.g. COPD, DNI status, etc); consider **helmet mask** interface (if available) if using NIPPV; avoid nebulizers
- Mechanical ventilation for ARDS
 - [LPV](#) per ARDSnet protocol
 - 7 P's for good care of ARDS patients: e.g. [PEEP/Paralytics/Proning](#)/inhaled [Prostacyclins](#), etc
 - ? High PEEP ladder may be better
 - ? ECMO in select cases (unclear who)
- Consider using POCUS to monitor/evaluate lungs
- Investigational therapies: consider [clinical trial enrollment](#)
 - [Remdesivir](#) - not approved; [used investigationally](#)
 - Hydroxychloroquine (HCQ) – available; limited evidence
 - Chloroquine (CQ) – available; limited evidence
 - Tocilizumab – available; investigational for pt in **shock**
 - [Lopinavir/ritonavir](#) – available; [recent negative RCT](#)
 - Oseltamivir - **not** recommended (no evidence of efficacy)
 - [Corticosteroids](#) – **not** recommended (? harmful)

Prognosis

- **Age** and **comorbidities** (**DM**, **COPD**, **CVD**) are significant predictors of poor clinical outcome; admission **SOFA** score also predicts mortality.
- Lab findings predict mortality (\uparrow d-dimer, ferritin, troponin, cardiac myoglobin)
- Expect prolonged MV (median)
- Watch for complications: Secondary infection (VAP), **Cardiomyopathy**

