A SEATTLE INTENSIVIST'S GUIDE TO COVID-19

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Nomenclature

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

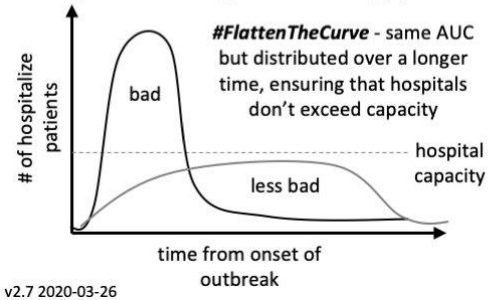
Biology

- 30 kbp, +ssRNA, enveloped coronavirus
- Likely zoonotic infection; source/reservoir unclear (Bats? / Pangolins? → people)
- 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) 1.4% (US)
- 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; home)
  - **15%** Severe (hypoxia, hospital wards)
  - **5%** Critical (respiratory failure; ICU)

Disease clusters: SNFs, conferences, cruise ships, etc.
Strategies: handwashing, social distancing, quarantine



v2.7 2020-03-26

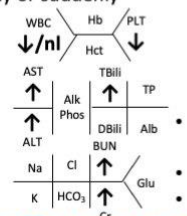
Diagnosis/Presentation

Symptoms reflecting recent US experience

- 50-80% **cough**
- 45% **febrile** on presentation (85% febrile during illness)
- 20-40% **dyspnea**
- 15% URI symptoms (rhinorrhea, odynophagia, etc)
- 10% GI symptoms
- Other**: Myalgia, fatigue, anorexia** (unclear if anosmia is a sx)
- Respiratory failure can occur progressively or suddenly

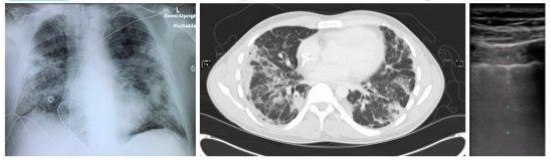
Labs

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



Imaging – (NOT diagnostic, 17% have negative CT on presentation)

- CXR: hazy **bilateral**, **peripheral** opacities,
- CT: peripheral **ground glass opacities** (GGO), reticular markings, , progressive to dense consolidations *rarely may be unilateral*
- POCUS: numerous B-lines, pleural line thickening, consolidations



Isolation

- Phone call is the best isolation (e.g. move to telemed)
- Place patient in mask, single room, limit/restrict visitors
- Move ventilator controls and IV pumps OUTSIDE the room if possible (conserve PPE, reduce exposure, save time)

Precautions

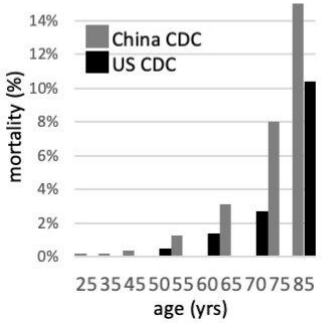
- **In correct sequence: STANDARD** + **CONTACT** (double glove) + either **AIRBORNE** (for aerosolizing procedures: intubation, extubation, NIPPV, suctioning, etc) or **DROPLET** (for everything else; ***ideally*** airborne); improvised cloth masks likely ineffective
- N95 masks must be fit tested;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

Treatment

- Isolate & send PCR test early
- GOC discussion / triage
- **Fluid sparing** resuscitation ± empiric antibiotics
- Intubate early under controlled conditions: **RSI**, no bagging, **VL**, have suction & capnography connected to avoid circuit breaks.
- Avoid NIPPV (aerosolizes virus) consider **helmet** (if available)
- Avoid nebulizers (MDI instead); avoid bronchoscopy
- Mechanical ventilation for ARDS
  - **LPV** per ARDSnet protocol
  - **PEEP**/**Paralytics**/**Proning**/inhaled **Prostacyclins/NO2**, etc
  - ? High PEEP ladder may be better
  - ? ECMO in select cases (unclear who)
- Weaning: consider no PEEP SBT, turn ventilator to standby then pull tube with covering over patient to minimize viral spread
- Consider using POCUS to ***screen for cardiomyopathy***
- Investigational therapies: consider clinical trial, see CDC for details:
  - Remdesivir - not approved; RCT
  - Hydroxychloroquine (HCQ), Chloroquine (CQ) – available; HCQ has greater activity in vitro than CQ. ***Minimal*** data for HCQ+Azithro (reduced viral load in small non RCT study)
  - Tocilizumab – available; investigational for pt in **shock**
  - Lopinavir/ritonavir – available; recent negative RCT
  - Convalescent serum – available by emergency IND
  - Corticosteroids – **controversial** (SCCM yes, WHO/CDC no)
  - Oseltamivir - **not** recommended (no evidence of efficacy)

Prognosis

- **Age** (see figure) and **comorbidities** (**DM** 7.3%, **COPD** 6.3%, **HTN** 6%, **CVD** 10.5%, **cancer** 5.6%) are significant predictors of poor clinical outcome; admission **SOFA** score also predicts mortality.
- High mortality (50-80%) in intubated pt w/ comorbidities
- Lab findings predict mortality (↑ d-dimer, ferritin, troponin, cardiac myoglobin)
- Expect prolonged MV
- Complications: 2° infection (VAP) (31% in Chinese cohort), **Cardiomyopathy** (33% in US cohort)



https://www.grepmed.com/images/7362/criticalcare-coronavirus-cheatsheet-management-diagnosis-sarscov2-covid19