A SEATTLE INTENSIVIST’S GUIDE TO COVID-19

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)
- **R0 = 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

**Diagnosis/ Presentation**

**Symptoms** reflecting recent US experience

- 50-80% cough
- 45% febrile on presentation (85% febrile during illness)
- 20-40% dyspnea
- 15% UGI 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: ↑ ALT/AST/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); **improved 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)

**Prognosis**

- **Age** (see figure) and comorbidities (DM 7.3%, COPD 6.3%, HTN 6%, CVF 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)

**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)
- Oseltimab - not recommended (no evidence of efficacy)

**FlattenTheCurve** - same AUC but distributed over a longer time, ensuring that hospitals don’t exceed capacity

**SOFA score also predicts mortality.**

- China CDC vs US CDC