

ICU SIMPLE: COVID-19

Priorities

- **Time** - these patients need days to weeks on a ventilator to maintain normal oxygenation while their lungs heal enough for them to maintain themselves without Positive Pressure Ventilation (those not intubated on maximum O₂..if not Short of Breath, ride it out...)
- **Limiting Collateral Damage** - mortality is highest when patients develop a second organ failure. These developments seem independent of what we do, but support what you can
 - Acute Renal Failure - mortality approaches 80%+ from China
 - Cardiomyopathy - unknown incidence, likely extremely high mortality
- **Maintaining Normal Physiology** - ICU care doesn't **fix** problems - ventilators don't fix lung injury, renal replacement therapy doesn't fix the kidneys, etc.
 - Your Objective is to make small adjustments to maintain normal physiology long enough for the body to heal and recover. That's it. The body does the work
- **Palliative Care/ Goals of Care** - patients that have more than 1 organ system failing (see above) or have a "1 liner" that already sounds morbid even without COVID-19 are likely never leaving the hospital - eg, active cancers, immunosuppressed, other confirmed infections, debilitated/active decline before admission, etc.
 - Accelerating the discussion with family/health care proxy ASAP will limit interventions and health care provider exposures and cause less suffering for the patient

Execution

- **Neuro** - Proper sedation. Most patients require high doses unlike most other ICU patients
 - Limit self-extubation, maintain vent synchrony. Patient Safety
 - Consider Cisatracurium infusion for vent dyssynchrony and/or refractory hypoxemia
- **Respiratory** - Time on the vent will be key to allow time for the lungs to heal, go by SpO₂ if able, an Arterial Line will be necessary for the people you are concerned about
 - Higher PEEP seems to be necessary for these patients
 - PaO₂ / FiO₂ (as decimal) ratio (aka, P/F ratio) is useful for determining the severity of hypoxemia/ARDS
 - If > 150 then stick with what you are doing and always use the minimum FiO₂ necessary
 - If < 150 go in order of below until better than 150 (patients seem to improve and worsen randomly from ABG to ABG so keep calm, sometimes no or small changes are best)
 1. 6ml/kg TV based on IBW, no more and RR to achieve ~10L/min ventilation, then titrate based on gas. Hypercapnia is ok. Goal pH at least 7.25. Goal Saturation **88-95%** (PaO₂ 55-80mmHg)
 2. http://ardsnet.org/files/ventilator_protocol_2008-07.pdf

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Lower PEEP/higher FiO₂

FiO₂	0.3	0.4	0.4	0.5	0.5	0.6	0.7	0.7
PEEP	5	5	8	8	10	10	10	12

FiO₂	0.7	0.8	0.9	0.9	0.9	1.0
PEEP	14	14	14	16	18	18-24

Higher PEEP/lower FiO₂

FiO₂	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.5
PEEP	5	8	10	12	14	14	16	16

FiO₂	0.5	0.5-0.8	0.8	0.9	1.0	1.0
PEEP	18	20	22	22	22	24

3. Cisatracurium bolus + infusion to achieve 2/4 TOF, but you won't have monitoring so the goal is vent synchrony
 4. Proning has a mortality benefit in ARDS, but most patients we have seen don't get this bad at all - if they do CALL an ICU attending/fellow for help
 5. VV ECMO - extremely rare need in COVID, CALL someone
- **Cardiac** - MAP goal 60-65, conservative fluid only, try pressors first to limit worsening pulmonary edema
 - Norepinephrine first line
 - After Norepi ~12 mcg/min add Vasopressin 2.4u/hr OR Epinephrine
 - **Renal** - attempt to maintain near even fluid balance
 - Lasix as needed and need output measurements in these patients
 - Monitor electrolytes closely
 - Worsening Cr, K, and Phos are signs of worsening renal function
 - **ID** - ask for help from whoever is following (ID) as needed
 - Some might need or be on ABX for ?secondary infection usually 5-7 days
 - Vancomycin for MRSA needs to check level before 4th dose - nephrotoxic
 - Pip-tazo (zosyn) - nephrotoxic, cefepime, ceftriaxone, azithromycin
 - Give to anyone - Hydroxychloroquine (hcq) for 5 days total= 400 BID, then 400 daily for 4 days, hold for QTc > 500 (if wide complex hold for QTc > 550)
 - Study drugs - will be helped by ID
 - Tocilizumab (needs special labs max 3 doses and you will consent with ID given materials), Sirulimab (1 dose), Remdesivir, Mesenchymal stem cells
 - **Endocrine/GI** - only start TF after patient blood sugars < 200
 - Choose Insulin Sliding scale order
 - After a day, insulin TOTAL *2/3 = daily total NPH dose to split into q6 dosing
 - **PPX** - seem to have high rates of DVT/PE and clotting
 - Enoxaparin preferred - 40mg SubCutaneous daily
 - If CrCl < 30 then switch to heparin BID, consider 7.5k vs standard 5k
 - Famotidine for ulcer PPX
 - **Palliative Care/GOC** - TALK TO THE PATIENT OR FAMILY ASAP for everyone with comorbidities or a second organ system that is failing. Don't Prolong Suffering

Communicate and make plans with nurses, Support THEM however they need, Keep things simple, Know who your backup is when you start your shift.