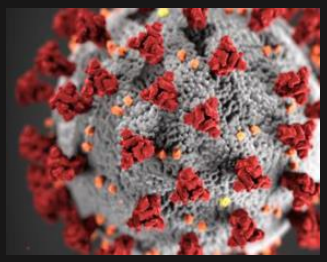
Joint Trauma System Clinical Practice Guideline

Special Edition v1.0

Management of COVID-19 in Austere Operational Environments

(Prehospital & Prolonged Field Care), 14 Apr 2020



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It is based upon the best information available at the time of publication. It is designed to provide information and assist decision making. It is not intended to define a standard of care and should not be construed as one. Neither should it be interpreted as prescribing an exclusive course of management. It was developed by experts in this field. Variations in practice will inevitably and appropriately occur when clinicians take into account the needs of individual patients, available resources, and limitations unique to an institution or type of practice.

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Intended Scope and Audience

This guideline is aimed at the provider operating in an austere, limited resource setting. Providers have varying levels of knowledge, training, and experience in basic critical care concepts. It is not intended to be all inclusive, but to spur further thinking and identify areas where resource limitations or known disease specific caveats change usual practice. The management strategy described is designed for a 24-hour hold of a single critically ill patient and is tailored to the equipment and medications typically available in austere operational settings (Role 1 and Expeditionary Role 2).

Guiding Principles

1) Our primary mission remains the same! We must maintain the ability provide damage control resuscitation and damage control surgery in support of combat operations!
2) Prevention of transmission to medical personnel is a mission critical consideration for austere teams as there is generally minimal skill redundancy.
3) Primary capability limitations include manpower, oxygen supply, type/quantity of ventilators, type/quantity of medications, and type/quantity of personal protective equipment.
4) Care of the critically ill COVID-19 patient is GOOD medical care plus appropriate disease transmission-based precautions to mitigate further spread.
5) Use of telemedicine to minimize exposure and to push critical care expertise as far forward as possible should be part of the operational plan.

Key Assumptions

1) Most providers operating in austere locations have equipment geared towards combat casualty care, not care for patients in severe respiratory failure.
2) Oxygen supply is generally limited to a few portable oxygen tanks and oxygen concentrators not designed to provide high volume oxygen support.
3) Laboratory and radiologic evaluation capabilities are generally minimal to non-existent.
4) Local and international supply lines have been significantly affected by COVID-19, with limited resupply or delivery of disease specific supplies (e.g. testing kits and viral filters).
5) Time to medical evacuation, will be significantly prolonged given the global nature of this crisis, lockdown over sovereign airspaces, and the need to limit impact to military air assets.
6) Most austere locations consist of relatively small camps (usually less than 100-300 personnel) with a younger, healthier population; however, military reservist and civilian support personnel may fall into high risk categories. As such, based upon current epidemiology, planning should account for 1-3 critically ill patients at each austere location.

Key Definitions

1) Quarantine: Separation and restriction of movement (ROM) of people who were exposed to a contagious disease but without symptoms of illness. These people may have been exposed to a disease and do not know it, or they may have the disease but do not show symptoms. This is a command function that is medically supported.
2) Isolation: Separation of sick people with a confirmed or high index of suspicion (i.e. patient under investigation) of having a contagious disease from people who are not sick. This is a medical function requiring command support.
3) Patient Under Investigation (PUI): A patient with signs and symptoms consistent with known possible presentations of COVID-19 with potential exposure to the virus. Potential exposure to the virus is defined as close contact with known or other suspected cases and/or travel through regions

with widespread sustained transmission of COVID-19. In areas where COVID-19 is already widespread, symptoms alone may make the diagnosis of "PUI." Confirmatory testing has not yet been performed or was initially negative but with continued high index of suspicion for COVID-19. All PUIs must be isolated.

4) Contact Spread: Spread of disease via direct contact with an infected patient or contaminated surface. Contact Precautions aim to mitigate this method of transmission.
5) Droplet Spread: Spread of disease via relatively large liquid particles that settle from the air quickly (within a few feet). Droplet Precautions aim to mitigate this method of transmission.
6) Airborne Spread: Spread of disease via small liquid particles (aerosols) that remain aloft for prolonged periods of time and may travel longer distances. Airborne Precautions aim to mitigate this method of transmission.

Key References

1) Alhazzani W, et al. Surviving Sepsis Campaign: Guidelines on the Management of Critically Ill Adults with Coronavirus Disease 2019 (COVID-19). Crit Care Med. Pre-print ahead of publication.
2) Brewster DJ, et al. Consensus Statement: Safe Airway Society principles of airway management and tracheal intubation specific to the COVID-19 adult patient group. Medical Journal of Australia. Pre-print ahead of publication.
3) Interim US Guidance for Risk Assessment and Public Health Management of Persons with Potential Coronavirus Disease 2019 (COVID-19) Exposures: Geographic Risk and Contacts of Laboratory-confirmed Cases: Center for Disease Control (CDC); 2020 [updated March 22, 2020].
4) Matos RI, et al. DoD COVID-19 Practice Management Guide: Clinical Management of COVID-19. 23MAR2020.
5) U.S. Army MEDEVAC Critical Care Flight Paramedic. Standard Medical Operating Guidelines (CY20 Version). Published January 2020.

Actions on Identification of a COVID-19 Patient under Investigation (PUI)

1) Personal Protective Equipment Considerations
    a. CDC recommends enhanced droplet precautions. Cover mucosal surfaces (eyes, nose, and mouth) and provide skin contact precautions.
    b. N95 masks DO NOT work properly with facial hair; shaving is strongly recommended for anyone participating in care.
    c. Personal Protective Equipment (PPE) should be donned/doffed per CDC instructions, and following proper technique minimizes the risk of self-inoculation during doffing of PPE.
    d. If possible, have a trained observer watch donning and doffing to guard against accidental exposure of medical personnel.
    e. The following procedures carry a significantly higher risk of aerosolizing the virus and thus risk to providers:
        i. Tracheal Intubation
        ii. Extubation (accidental or planned)
        iii. Bag-Valve Mask Ventilation
        iv. Any disconnection of the ventilator circuit
        v. Tracheal suctioning without in-line suction
        vi. Tracheostomy (and Cricothyroidotomy)
        vii. Cardiopulmonary Resuscitation (before intubation and connection to ventilator circuit)
        viii. Surgical Procedures involving the face, neck, or thorax.
    f. Levels of PPE (based upon risk of disease and risk of procedure)

i. Minimum: face covering, eye protection glasses, gloves, and makeshift gown. Note: for patients with low probability of disease and where direct contact with the patient, their secretions, or other bodily fluids is low, gowns may not be required (mirroring conventional droplet precautions).
ii. Routine Care: surgical mask or N95 mask, face shield (either standalone or with mask) and eye protection, gloves, gown (surgical or contact), head covering.
iii. Aerosol Generating Procedures: N95 mask (with or without surgical mask covering) with face shield or hood/face shield (e.g. CBRNE pro-mask) along with gown and gloves. Some type of disposable head covering is also highly recommended.

g. Conservation of PPE
i. COVID-19 can survive on various surfaces for up to 96 hours or longer.
ii. Use cloth face covering when risk is low to conserve supply of surgical face masks and N95 masks needed for high risk procedures.
iii. Doff PPE in a manner that allows for it to be easily donned again without contacting contaminated surfaces.
iv. For re-use of surgical face masks or N95 masks: while wearing gloves, store the mask in a bag in a dry, shaded/indoor area for 72h prior to using again. DO NOT use bleach or UV radiation (i.e. sunlight) to 'sterilize' the N95 – this will degrade mask effectiveness.
v. Eye protection glasses and face shields should be cleaned with a diluted bleach solution between uses.
vi. NIOSH recommends the following for extended use and re-use of N95 respirators:
1. N95 maintain their effectiveness for at least 8h of continuous or intermittent use.
2. N95 masks should be discarded following aerosol generating procedures (e.g. intubation) or when visibly contaminated with bodily fluids.
3. Consider using a large face shield that sits in front of the mask, wear a surgical mask over-top of the N95, or masking the patient to minimize contamination.
4. Perform hand hygiene with soap and water or an alcohol-based hand sanitizer before and after touching or adjusting the mask.

2) Quarantine (Asymptomatic Personnel with Identified Exposure)
a. While separate berthing for quarantined individuals is optimal, living space is generally limited in austere settings. As such, berthing with individual rooms should provide adequate protection to allow quarantined individuals to remain in their room.
b. Individuals placed on quarantine per CDC screening guidelines are instructed to stay in their room and conduct self-observation for the development of any symptoms.
c. Teammates should check on the status of the quarantined individual several times daily and bring them food, water, and comfort items as needed.
d. Social distancing is strictly enforced when the individual needs to use the bathroom for toilet and hygiene. They should not use the gym, MWR, or any other common areas while under quarantine.
e. Depending on risk to force and mission requirements, mission critical personnel (including medical personnel) could be allowed to work with a cloth face covering and thoroughly clean both face covering and workspace at least daily. Early engagement of nonmedical leadership in such decision making is essential.

3) Isolation (Symptomatic Personnel)
a. Patients Under Investigation (PUI) MAY NOT leave isolation berthing unless instructed to do so by medical personnel.
b. When outside of the isolation berthing, PUI will be required to wear a cloth face covering and clean hands with soap and water or alcohol based hand sanitizer.

c. No visitors allowed within the isolation berthing.

4) Initial Medical Evaluation
   a. Pre-designate a provider as the COVID attending provider. This provider should perform all evaluations and procedures to limit exposure to other medical personnel in order to maintain combat casualty care capability. Balance the provider skillset and experience with potential impact on medical support for combat operations. The designated attending provider may not be the most experienced provider, but can consult with teammates as needed for management, procedures, and nursing care.
   b. All patients presenting to medical personnel with any complaint should be screened for typical COVID-19 symptoms (fever, cough, dyspnea, gastrointestinal complaints) and risk of exposure. If symptoms and risk of exposure conduct evaluation as PUI.
   c. If PUI presents to a provider other than the designated COVID attending provider, the patient should be provided a cloth face covering (or surgical mask) and escorted to pre-designated COVID treatment area.
   d. If possible, all evaluations and treatment of PUI should be done outside the combat casualty care facility to mitigate potential for contamination of the facility.
   e. Medical personnel performing the evaluation should wear the best available PPE (see Appendix B), balancing the supply of PPE with the threat of patient interaction.
   f. Examination should include full vital signs including pulse oximetry, work of breathing assessment, pulmonary auscultation, skin temperature, and capillary refill.
   g. Ancillary Tests:
      i. Minimum:
         1. If febrile and in malaria endemic area: Binax Now rapid malaria testing
      ii. Better (Above +):
         1. Ultrasound (pulmonary + cardiac)
         2. If dyspnea/hypoxia - iStat ABG or VBG
         3. 12-Lead ECG
         4. Rapid Flu Testing
         5. Rapid Dengue Testing
      iii. Best (Above +):
         1. Chest X-Ray
         2. Respiratory Pathogen Film Array (i.e. Biofire)
         3. COVID-19 PCR Testing
         4. Other laboratory testing listed DoD COVID19 PRACTICE MANAGEMENT GUIDE
   h. Identifying Patients at Risk for Deterioration:
      i. Among patients with mild symptoms and normal resting SpO2, the risk of deterioration is increased in those presenting with dyspnea (even if mild), desaturation on exercise testing, and epidemiologically increased risk of hospitalization and mortality (age over 45, cardiovascular disease, pulmonary disease). These patients should be monitored closer and potentially considered for evacuation sooner.
      ii. Exercise Test: Have the patient jog or walk in place for 3 minutes. Inability to complete the test or desaturation below SpO2 <94% confers a higher risk for clinical deterioration. This is an un-validated triage test used by several New York hospitals during the pandemic to help gauge the need for closer monitoring.
   i. Consideration of Alternative Diagnoses:
      i. If a patient has known risk for or exposure to COVID-19, the patient should be managed as a PUI regardless of the differential diagnosis. This does not mean, however, that

alternative and/or comorbid diagnoses are impossible. Multiple sources have reported that COVID-19 patients can be co-infected with other pathogens.

ii. Life threatening alternative diagnoses (e.g. pulmonary embolism, pneumothorax, acute myocardial infarction, etc.) should always be considered and managed according to standard practices for diagnosis and treatment.

j. Most austere locations will be unable to test for COVID-19 using RT-PCR assay. However, if testing does become available, the following should be considered:

i. The false negative rate for COVID-19 RT-PCR assay is likely to be significant enough to merit a minimum period of isolation (or quarantine) regardless of test result, especially if the pre-test probability for COVID-19 remains high. For example, a patient with typical symptoms for COVID-19, with recent travel and/or exposure to another sick individual, should be managed as having COVID-19 regardless of a negative test.

ii. Testing priority should be guided by the CDC priority for testing balanced against operational priorities. For example, a patient with mild symptoms and no high-risk factors for decompensations, may not warrant immediate testing. However, if combatant command determines that the individual is mission critical, the testing may be considered a higher priority. If negative, the patient may be released from strict isolation while following strict social distancing practices, wearing a face covering, and thoroughly cleaning their workplace.

k. Given significant resource constraints in an austere environment (specifically the limited duration of oxygen supply and lack of advanced critical care capabilities) coordination for evacuation to a higher level of care should be initiated as soon as possible, even if the patient does not necessarily need evacuation immediately. Given limited number and availability of evacuation platforms, it may take more than 24 hours to execute a mission, underscoring the importance for early evacuation coordination.

l. Appendix A describes a tiered Medical Condition flowchart (MedCon) developed for standardization of terminology across an AOR and between medical providers, medical planners, and operational leadership.

5) Isolation Berthing Location Considerations

a. Most austere locations have group berthing with shared ventilation, making the practice of 'self-isolation' impractical. While individual berthing with separated bathrooms is optimal, patient isolation cohorts may be the best option available with limited space.

b. Berthing should be able to expand to hold multiple patients of varying severity and allow adequate comfort for all patient categories (mild, moderate, and severe illness).

c. Berthing ventilation (i.e. environmental control units) should face away from any gathering areas and common walkways.

d. Berthing entrances should be well marked (e.g. "Isolation Area - No Unauthorized Access!") and include posted guides on proper PPE procedures.

e. Consider location relative to bathrooms and areas traversed to get to the bathrooms. If available, designate bathrooms for isolated patients only. If there is engineering support, a pit toilet can be constructed. Disposable water bottles should be used as urinals. Large and deep ammo-cans (e.g. those used with heavy weapon systems) can be lined with a small trash bag and placed under a chair with a hole in the seat to make a bed-side commode. Ensure that waste is appropriately handled given the potential for spread of disease via fecal matter.

f. Consider designating a critical care area within or near the isolation area separate from the main medical facility / aid station. Additionally, consider the route that must be traversed in order to transport the patient to an evacuation platform.

6) Preparation of Isolation Berthing
    a. Do not move PUI to isolation berthing before preparation is complete.
    b. All non-isolated personnel occupying the space must vacate.
    c. Allow PUI (while wearing a surgical mask) to gather personal belongings from lodging and move into isolation berthing.
        i. Personal hygiene items
        ii. Bed sheets and clothing
        iii. Electronic devices + chargers
    d. If PUI is unable to retrieve items, personnel with mask + gloves (at minimum) should retrieve any essential items.
    e. Basic medical items remain in isolation berthing at all times:
        i. Oral Thermometer with box of sheaths
        ii. Pulse Oximeter(s)
        iii. Alcohol Based Hand Sanitizer
        iv. Stethoscope(s)
        v. Manual Blood Pressure Cuff(s)
        vi. Box of Surgical Masks
        vii. 14 day supply of 500mg APAP
    f. PPE Box (for providers, prepositioned outside isolation berthing):
        i. Min 3x Gowns (either surgical or yellow contact precaution gowns)
        ii. Min 3x N95 Masks
        iii. Min 6x Surgical masks
        iv. Min 3x Face shields AND/OR Cleaned Eye Pro
        v. Min 3x Surgical caps OR bouffant caps
        vi. Box of gloves
        vii. Tub of Disinfectant Wipes
        viii. Spray Bottle of 0.5% Bleach
        ix. Paper Towels (for cleaning)
        x. Trash Bags
    g. Life Support Items
        i. Hydration: Water bottles and Gatorade
        ii. Food: MREs, meal supplement drinks, Pop-Tarts, etc.; Provide hot-meals as able
        iii. Hygiene: Box of wet-wipes. Encourage use of portable urinals (e.g. empty water bottles). If the bathroom must be shared with non-isolated personnel OR if a designated bathroom traverses common areas, the PUI should be escorted by personnel wearing PPE while themselves wearing a mask. The escort will instruct anyone inside the bathroom to vacate prior to use. All surfaces used by the PUI must be cleaned with 0.5% bleach solution.
        iv. Trash: Small trash receptacle with small bag inside isolation berthing. Large receptacle double bagged will be placed immediately outside the isolation berthing. Biohazard Sign will be placed on top. Only medical personnel or designated non-essential/non-high risk personnel will dispose of this trash to minimize risk to others. PUI will be instructed to tie off small bags and place in large container daily. Consider the local population access to trash – bury (preferred) or burn (downwind of any populated area) following approved policy for biohazardous waste.
7) Continued Monitoring Considerations
    a. At minimum, pulse oximetry and temperature will be documented every 12 hours. COVID attending provider will determine the need for more frequent evaluations.

   b. Once a patient meets MedCon2 criteria or higher, continuous monitoring is recommended as their risk of rapid decompensation rises significantly.
   c. The Prolonged Field Care Vital Sign spreadsheet provides a framework for recording frequent assessments and interventions (see JTS Documentation in Prolonged Field Care CPG).
   d. Consider using video chat (e.g. WhatsApp) to obtain vital signs and perform visual assessment of patient to minimize exposure in MedCon1. Patients can take their own pulse oximetry reading and temperature at pre-determined intervals or cohort patients in isolation berthing can do it for each other.
   e. If concerning signs or symptoms develop, the COVID attending provider performs an in-person exam using the best available PPE.
8) Command and Control Considerations
   a. Notification of both medical and operational leadership chains is imperative and should occur soon after identification of a PUI.
   b. More official notification in a 5Ws format should be drafted and submitted to the command surgeon (or appropriate designee).
   c. If MedCon2 or higher risk category, begin coordination for potential evacuation to a higher echelon of care as soon as possible.
   d. Identify potential close contacts of PUI, screen for symptoms, and manage according to CDC guidelines for high risk exposure.

Providing Medical Care to a COVID-19 Patient Under Investigation (PUI)

1) Oxygen Supply Considerations
   a. The SAROS portable oxygen condenser can provide up to 3 Lpm of 100% O2. However, when unplugged, its battery only lasts for 30 minutes on continuous flow.
   b. SAROS can be daisy-chained together to provide higher flow, approximating 5-6 Lpm. A suction Y-adapter can be used to connect several condensers together (see Appendix E).
   c. Ventilators waste less oxygen. A full D-cylinder providing 15 Lpm of 100% O2 via disposable oxygen tubbing will last less than 30 minutes. The same tank providing 100% FiO2 through a ventilator (connected via green high pressure hosing) will provide 30-45 minutes of O2 even with high minute ventilation rates. Anything that can be done to reduce minute ventilation (e.g. sedation and/or paralysis) and oxygen consumption (titrate FiO2 down to absolute minimum to attain SpO2 88-92%) will extend oxygen supplies.
   d. If transporting patient to an evacuation pick-up site is necessary, bring DOUBLE the oxygen you expect to need because transport might be delayed.
2) Ventilator Considerations
   a. Minimum requirement for an effective ventilator in severe hypoxic respiratory failure:
      i. Must be able to provide Positive End-Expiratory Pressure (PEEP)
      ii. Must allow for titration of tidal volume and respiratory rate
      iii. Must be able to provide supplemental oxygen greater than room air (>21% FiO2)
   b. EMV+731 transport ventilators (see Appendix F) are readily available in many military medical equipment sets and are certified to function at high altitude cabin pressures. IMPACT 754 ventilators are sufficient, but do not provide Pressure Control - Inverse Ratio Ventilation capability (discussed below).
   c. Hamilton T1 transport ventilators (see Appendix F) provide specialized support options, but are not yet certified for use at high altitude.
   d. SAVe II rescue ventilators (see Appendix F) is an option with limited PEEP (10 cm H2O) and minute ventilation (8 Lpm) capability. Oxygen reservoir tubing for the air intake is essential

for maintaining adequate oxygenation using these devices (use the oxygen reservoir tubing that comes with the device). If this is the only device available at your location, arrange transfer someplace with more advanced ventilators as soon as possible.

e. SAVe I rescue ventilator has no adjustability and cannot provide PEEP. DO NOT manage critically ill COVID-19 patients with this device. Manual ventilation with a Bag-Valve-Mask (BVM), PEEP valve, and supplemental oxygen will be more effective.

3) Personnel Considerations
   a. Minimize the number of personnel required to provide care to the PUI. Establish a priority list of who will be available to assist. Ensure that the rest of the team can maintain the combat casualty care capability.
   b. In cases where evacuation may be delayed, establish work-rest cycles, allowing for adequate time to hydrate, eat, and sleep (an exhausted provider is theoretically more likely to contract the illness). For example, a q8hr shift with 30 to 60 minute overlaps on either end with 3 providers, would potentially allow for 14 hour breaks per person. This has been shown to reduce PPE waste, minimize provider exhaustion, and accidental exposures.
   c. Ambulatory PUIs ("walking wounded") can potentially assist in monitoring and providing care to more seriously ill patients.
   d. Consider having someone (not directly involved in care and not exposed) act as a runner to the main medical facility for additional supplies (e.g. medications) and other tasks.
4) Suggested Equipment for Severe COVID-19 Patient
   a. Equipment on Standby:
      i. 1x Litter Stanchion Pair
      ii. 1x Conventional NATO or Talon Litter
      iii. 1x Padding (mattress pad, inflatable sleeping pad, or Warrior Evacuation Litter Pad)
      iv. 3x Blankets or large pillows (for proning/offloading pressure points)
      v. 1x Roll of 550 Cord for hanging drips (or similar)
      vi. 1x Power strip(s) and extension cord(s)
      vii. 1x EMV+731 with IRV capability + charger
      viii. 1x Portable suction unit (e.g. Laerdal or IMPACT) with charger and extra battery
      ix. 1x Oxygen Generator Field Portable (i.e. SAROS) with charger and extra battery
      x. 1x D-cylinder (only move in one at a time) with regulator and wrench and high pressure tubing (for hook-up to EMV+731)
      xi. Cardiac Monitor providing at least 3-lead monitoring, non-invasive blood pressure monitoring, and pulse oximetry (better models include invasive monitoring, EtCO2, and cardioversion/defibrillation capability)
      xii. Infusion Pumps with extra battery and charging cables (alternatively, dial-a-flow drip devices or drip calculations can be used; see Appendix C)
      xiii. Ensure IV tubing in serviceable condition and compatible with pumps
      xiv. Ultrasound (phased array and linear probes)
      xv. Glidescope and rigid intubating stylet
      xvi. iStat with several cartridges (minimum of blood gas analysis)
      xvii. Urinalysis dipsticks
   b. Pre-packaged Bundles and Kits
      i. Intubation Kit:
         1. 1x Bag Valve Mask
         2. 1x Non-Rebreather Mask
         3. 1x HME-Filter (for BVM)
         4. 1x Color Capnometer (or end-tidal CO2 adapter)

5. 1x 7.0 ETT
6. 1x 8.0 ETT
7. 1x Size 4 iGel LMA (or standard LMA)
8. 1x Glidescope Sheath Size 4
9. 1x Glidescope Sheath Size 3
10. 1x Glidescope Stylet
11. 1x Cricothyroidotomy Kit
12. 1x Direct Laryngoscope
13. 1x Mac Blade Size 3 or 4
14. 1x Miller Blade Size 2
15. 1x Flexible Stylet
16. 1x 10mL Syringe
17. 1x Tube Securement device (e.g. trach tie)
18. 1x Airway Introducer (Bougie)
19. 1x 18fr Salem Sump NG/OGT
20. 1x 60mL Toomey Syringe
21. 1x OPA (useful as bite block or if difficulty with mask ventilation)
22. 1x Tongue Depressor
23. 1x Yankauer with Suction Tubing
24. 1x Large Hemostat for clamping ETT

ii. Ventilator Care Bundle:
1. 1x In-line Suction adapter (if available)
2. 1x End-Tidal CO2 adapter (if available)
3. 2x HME-Filter (for Ventilator)
4. 1x Ventilator Tubing

iii. Central Line Placement Kit (If within scope of practice):
1. Appropriately sized Surgical Gloves
2. 2x Chloraprep or Providone-Iodine Swabs
3. 1x Needleless Port (aka Posi-Flow valves)
4. 1x Cordis Introducer Kit x 1
5. 1x Large Clear Occlusive Dressing (i.e. Tegaderm)
6. If available, substitute Cordis with triple-lumen catheter or place smaller single lumen catheter through introducer port of Cordis. Include extra needleless ports for these catheters.

iv. Arterial Line Placement Kit (If within scope of practice):
1. Appropriately sized Surgical Gloves
2. 2x Chloraprep or Providone-Iodine Swabs
3. 2x ARROW Radial Arterial Line ‘Dart’
4. 1x VAMP Pressure Transducer Tubing
5. 1x Ultrasound Gel Packet
6. 1x Straight Needle with 0-Silk Suture
7. 2x 4x4 Gauze Packets
8. 1x Pressure Bag 500mL
9. 1x 500mL Normal Saline
10. 1x Large Clear Occlusive Dressing (i.e. Tegaderm)

v. Medication Administration Kit:
1. 4x Peripheral IV Start Kit (IV, alcohol swab, needleless port, tourniquet)
2. 4x Small Clear Occlusive Dressing (i.e. Tegaderm)

3. 4x Primary IV Tubing 10gtt
4. 20x Alcohol Swabs
5. 1x 1" Tape Roll
6. 2x 500mL Normal Saline (for carrier fluid)
7. 2x 250mL Normal Saline (for drips)
8. 4x 100mL Normal Saline (for drips)
9. 2x 1000mL Lactated Ringers (for emergency bolus)
10. 10x 10 mL Syringes
11. 10x 5mL Syringes
12. 20x 10 mL Saline Flush
13. 20x 18g Needles

vi. Foley Catheter Kit (prepacked Chinook or Bard Kit)

vii. Chest Tube Kit (prepackaged Chinook or Bard Kit)
1. 4x 14g by 3.125 inch needles for needle decompression
2. Chest drainage system as well (water seal may preferable over dry seal/Heimlich valve in order to prevent excessive aerosolization)
3. Seldinger technique smaller chest tube kits (e.g. Thal Quick or Cook 14fr catheters) can be used for atraumatic pneumothorax; however, these are more procedurally complicated and not usually available in austere locations

viii. Suggested Medications:
1. Propofol 1000mg/100mL
2. Midazolam 5mg/1mL
3. Ketamine 250mg/5mL
4. Fentanyl 250mcg/5mL
5. Acetaminophen (Ofirmev) 1000mg/100mL
    a. Tylenol PO/PR 975mg
6. Etomidate 40mg/20mL
    a. Rocuronium 50mg/5mL (requires refrigeration)
7. Vecuronium 10mg for reconstitution
    a. Succinylcholine 200mg/10mL (requires refrigeration)
8. Ceftriaxone 1gm for reconstitution
9. Levofloxacin 750mg/150mL 5% Dextrose
10. Norepinephrine 4mg/4mL
11. Epinephrine 1mg/1mL
12. Vasopressin 10 units/1mL
13. Based on experience at Role 2 MTF in Africa, this is the minimum list of medications you need immediately available. Other medications might be considered, if available (e.g. Dexmedetomidine 200mcg/2mL and Hydromorphone 2mg/mL).

5) Clinical Care Considerations
   a. Initial reports suggest that among COVID-19 patients who develop critical illness, rapid decompensation occurs 5-7 days out from onset of symptoms, and ARDS onset within 12 to 48hrs following initial signs of clinical deterioration. Close monitoring during this period is critically important to allow for early intervention.
   b. Airway Management:
      i. Minimize aerosol and direct exposure of medical personnel.
      ii. Best available PPE must be worn for intubation (see Appendix B).

iii. Gauge the need for intubation based upon work of breathing. COVID-19 patients decompensate fairly rapidly – a low threshold for intubation allows more time for preparation and may prevent complications.
iv. If the COVID attending provider does not feel comfortable with placing a definitive airway, consider teleconsultation and/or waiting for arrival of more experienced personnel (e.g. evacuation team). Never try to intubate a patient unless you are confident you can do it.
v. One assistant is sufficient in most cases; an additional assistant can be standing by in the "warm" zone at least 2 meters away wearing appropriate PPE.
vi. Passively pre-oxygenate with 100% O2 for at least 5 minutes. Consider placing a surgical mask on the patient, on top of nasal cannula or NRB mask.
vii. Utilize strict RSI technique – do not use bag-valve-mask ventilation if at all possible. If available, place viral filter in-line during any use of a BVM.
viii. Utilize video laryngoscopy (i.e. Glidescope) if available for intubation to limit direct exposure of the treatment team. If unable to intubate or obtain adequate vocal cord visualization on the first pass, consider the placement of an iGel LMA with viral filter. Ventilate with the BVM and PEEP valve until oxygenation is adequate. Then, consider re-attempting and/or teleconsultation.
ix. Chest X-Ray may not be available or feasible to confirm tube placement. Rely upon EtCO2 and auscultation to confirm placement.
x. General guide for tube size & depth is as follows: M: 8.0ETT @ 25cm at the incisors; F: 7.0ETT @ 23cm at the incisors. In general, place as large of a tube as possible as secretions may be an issue.
xi. If available, place heated humidification device (e.g. Hamilton H900) or heat and moisture exchanger (usually HME-F with microbiological filter) in the INHALATION circuit of the ventilator tubing. If available, place a HEPA filter (microbiological filter) or HME-F in the EXAHALTION circuit of ventilator tubing.

c. Cricothyroidotomy as First Line for Definitive Airway Management:
i. Many medics and similar providers operating independently in far-forward environments are trained to use cricothyroidotomy as their primary definitive airway. While the use of a surgical airway first line is appropriate in patients presenting in-extremis or with the loss of an airway (e.g. severely injured trauma patients, neck/facial trauma), patients with COVID19 generally present with relatively more gradually progressive symptoms with intact native airways.
ii. Early intra-theater transfer to a facility with critical care capabilities is preferable to early cricothyroidotomy whenever possible.
iii. Cricothyroidotomy without the ability to provide mechanical ventilation consumes significant resources (manpower required to bag-ventilate the patient with PEEP, inefficient delivery of oxygen via bag-ventilation, and significant aerosol risk to those providing care).

d. Pharmacologic Treatment:
i. Published guidance includes consideration of systemic corticosteroids in the treatment of COVID-19 related moderate to severe Acute Respiratory Distress Syndrome (ARDS). Discuss with advanced provider via telehealth prior to initiating treatment.
ii. Antimicrobial Therapy (to treat possible bacterial pneumonia co-infection)
1. Consider early use of azithromycin (oral or IV 500mg daily for a minimum of 5 days) for treatment of community acquired pneumonia (CAP) in patients with lower respiratory tract symptoms and fever. Use azithromycin with caution, as it may

cause arrhythmias, particularly in older patients or those with known cardiac problems. QTc monitoring should be performed if possible.

2. For patients with severe symptoms, recommend adding ceftriaxone (IV 2gm q24h is the best option) or ampicillin-sulbactam (IV 3gm q6hr is a better option) or ertapenem (IV 1g q24h is a good option). If critically ill, including levofloxacin (IV 750mg q24h) may have additional benefit in the treatment of bacterial co-infection.
3. There is a lack of high-quality evidence supporting the use of chloroquine (CQ) or hydroxychloroquine (HCQ) plus azithromycin. It may be unsafe. Regardless, typically only oral azithromycin is available in austere settings. Discuss with advanced provider via telehealth prior to initiating treatment with CQ or HCQ.
4. If azithromycin is not available, doxycycline (IV or PO 100mg q12h) can be substituted for empiric treatment of bacterial pneumonia.

iii. Fever management with IV acetaminophen 1000mg every 6 hours (or PO/PR 975mg every 6 hours) as needed for temperature over 38degC.

iv. Sedation and Analgesia:

1. Sedation goal is RASS -1 to -2 (comfortable, transiently responsive to verbal stimulation) and synchronous with the ventilator. Increase sedation and/or add narcotics to improve patient-ventilator synchrony. Use of paralytics is likely to be required for very severe cases (as discussed below).
2. A reference guide for starting and titrating a ketamine drip along with useful adjuncts is provided in JTS Analgesia and Sedation Management during Prolonged Field Care CPG.
3. Ketamine may cause increased secretions which may require more frequent suctioning. If in-line close-circuit suction devices are not available, patients may not tolerate the de-recruitment caused by disconnecting the ventilator for suctioning. This will also increase aerosolization risk. If medication options are limited, consider more frequent dosing of midazolam to decrease the dose of ketamine required and potentially decrease the secretion burden.
4. Combined use of multiple sedatives (i.e. propofol, dexmedetomidine, and/or midazolam) may act synergistically to decrease the total sedative dose required and mitigate the hypotensive effects of propofol. Caution should be used with combined propofol and dexmedetomidine, especially in younger patients with higher vagal tone and thus risk for bradycardia and hypotension.
5. Intermittent or continuous infusions of fentanyl or intermittent hydromorphone (if available) may be useful for analgesia and optimizing ventilator synchrony.
6. Low dose vasopressors may still be necessary to support hemodynamics in the face of deeper sedation and higher PEEP (see Appendix C).

v. Bronchodilation:

1. Use metered-dose-inhalers (MDIs) over nebulized bronchodilators will help to minimize risk for infectious aerosol.
2. If the ventilator tubing does not have a capped inlet for medication administration (aka MDI adapter): clamp the ETT, disconnect the ventilator, and administer the MDI (6 puffs) directly into the INHALATION circuit. Then, reconnect the ventilator and unclamp ETT to insufflate the medication.
3. Magnesium Sulfate 2gm IV over 20 minutes (similar to treatment of an asthma exacerbation) may be a safer alternative for treatment of bronchospasm given the risks of disconnecting the circuit.

e. Respiratory Care:
    i. Initiate lung-protective ventilation strategy. Use the ARDSnet LOW PEEP table recommended based on most recent expert advice.
        1. Ventilation: Tidal volume 4-6mL/kg ideal body weight (IBW) keeping plateau pressure (Plat) < 30mmH2O is the goal
            a. IBW – Men = 50 kg + (2.3 kg x (height in inches - 60))
            b. IBW – Women = 45.5 kg + (2.3 kg x (height in inches - 60))
        2. Oxygenation: SpO2 88-92% or PaO2 55-80mmHg (Note: ARDSNet recommends SpO2 upper limit of 95%; targeting 92% is reasonable to extend oxygen supplies)
        3. Permissive Hypercarbia (arterial pH > 7.20, venous pH >7.15)
        4. Use ADRSnet protocol (see Appendix D)
    ii. If ETT must be disconnected from the ventilator for ANY reason, clamp the ETT to prevent decruitment and minimize aerosolization of the virus.
    iii. If in-line suction devices are not available, de-recruitment will likely occur with suctioning. Salvage recruitment maneuvers may be necessary.
    iv. On the EMV+731 (mode AC-V), a recruitment maneuver can be done as follows:
        1. Change upper limit of Peak Inspiratory Pressure (PIP) alarm to 50cmH20;
        2. Decrease tidal volume as low as possible (50mL);
        3. Increase PEEP to 30-40cmH20;
        4. Hold for 40 seconds (if signs of hemodynamic instability develop, stop the recruitment maneuver, and resume prior settings);
        5. Increase PEEP to 2cmH20 ABOVE prior PEEP setting;
        6. Increase tidal volume back to prior setting;
        7. Return upper limit of PIP alarm to prior setting;
        8. Monitor for any persistence of hemodynamic instability or persistently high PIP (Although rare, the high PIP encountered during RMs can cause pneumothorax).
    v. The mantra “a dry lung is a happy lung” probably still applies in severe COVID-19 care; over resuscitation is likely to be harmful. Fluid resuscitation should be guided by assessment of volume responsiveness. If available and evacuation is significantly delayed, loop diuretics can be used to attain a net even volume status, providing the patient is hemodynamically stable (i.e. not requiring vasopressor support).
    vi. Management of Oxygenation
        1. Escalate PEEP to 14cmH20 as aggressively as possible as hemodynamics allow to optimize oxygenation, minimize FiO2 needs, and extend oxygen supply.
        2. Use the ARDSNet Protocol LOW PEEP table as a guide for further titration of PEEP. Refer to JTS Acute Respiratory Failure CPG.
        3. Be prepared to start vasopressors and extremely judicious use of IVF to support pre-load in the face of high PEEP (aka PEEP tamponade).
        4. Consider a combination of paralysis and prone positioning early to lengthen duration of available oxygen supply.
        5. Consider Inverse Ration Ventilation (IRV) once patient reaches PEEP 18cmH20 on the LOW PEEP table.
    vii. Management of Ventilation
        1. If blood gas analysis is not available, a general EtCO2 goal of 35mmHg +/- 5, is adequate. However, if blood gas analysis is available (i.e. iStat), recommend obtaining a baseline PCO2 and correlate with EtCO2, especially since the gradient between the two is much wider in patients with significant lung disease (i.e. an EtCO2 of 40 may actually represent a PCO2 of 60 with a pH around 7.24).

2. The manual breath button on the bottom left of EMV+731 allows for manual measurement of plateau pressure (Pplat). The Pplat goal is less than 30cmH2O. In the absence of Pplat, a PIP target of less than 35cmH20 is also reasonable.
3. If Pplat is greater than 30cmH20, decrease set tidal volume by 1 mL/kg steps (generally about 50-80 mL). Titrate set respiratory rate (RR) up increments of 2 bpm to maintain pH and EtCO2 at goal. Avoid RR above 30 bpm given significant risk for breath stacking and auto PEEP.
4. If an iStat with blood gas cartridges are available, consider serial blood gas evaluation (adjusting frequency depending on patient stability).

viii. Reverse Trendelenberg positioning (head of bed up, spine straight) can help offload abdominal pressure from the thorax. This can be extremely helpful in improving the pulmonary compliance in obese patients and/or those with intraabdominal hypertension. Avoid the semi-recumbent position (bent at the waist) as this can worsen these problems instead of helping.

ix. Secretion Management Considerations
1. Increased secretions and mucous plugging of the bronchial tree are extremely common causes for increased oxygen requirement and difficulty with ventilation in patients with respiratory failure.
2. Anecdotal evidence regarding COVID19 patients suggests that secretions are heavier than usual. Additionally, in-line suction (closed system) devices that minimize aerosolization and de-recruitment are not usually available in austere settings.
3. Heated humidification prevents desiccation (drying out) of secretions and promotes ciliary clearance.
   a. Heated-humidification devices are equipment designed to be used along with ventilators (e.g. Hamilton H900).
   b. Heat-Moisture Exchangers (HME) are supplies that fit in-line with the ventilator tubing and trap heat and moisture within the circuit.
   c. Heat-Moisture Exchange Filters (HME-F) are supplies that fit in-line with the ventilator tubing and provide HME and microbiologic filtration.
4. Pharmacologic treatment for secretions generally falls into one of three categories: mucolytics (break up mucous), bronchodilators, or anti-sialagogues (anti-salivation)
   a. Mucolytics:
      i. Pre-treat with albuterol and/or ipratropium for 10-15 minutes
      ii. 20% N-acetylcystine (Mucomyst) as 1-2mL direct instillation into ETT every 6 hours as needed for secretion control
      iii. 3% Saline (Hypertonic Saline) as 5mL direct instillation into the ETT every 12 hours as needed for secretion control
   b. Bronchodilators: Both albuterol and ipratropium will effectively dry up secretions. While ultimately decreasing secretion volume, bronchodilators (particularly ipratropium) may increase the risk of a mucous plug formation. Use with caution.
   c. Anti-Sialagogues: Tend to have the most profound effect on oral secretions with modest effect on pulmonary secretions (and therefore not routinely recommended for COVID-19 patients).
5. Percussive chest physiotherapy is often provided by Respiratory Therapists in Role 3 facilities and higher to facilitate secretion clearance. Manual (with hands) or mechanical (with percussive physical therapy devices, e.g. Theragun) can be used to the same effect.

x. Adjunctive Strategies for ARDS:
    1. There is no single right answer to when or which strategies should be used in severe ARDS. Each may or may not be feasible due to the resource constraints of the austere environment. If unfamiliar with these techniques, obtain teleconsultation guidance.
    2. Pressure Control - Inverse Ratio Ventilation (PC-IRV):
        a. As more of the breath cycle will be spent in inspiration, ventilation may worsen with a transition to PC-IRV.
        b. EMV+731 with the most recent software package has the capability to do PC-IRV. While using AC-P mode, PC-IRV is achieved by increasing the I:E ratio above 1:2 (i.e. 1:1, 2:1, 3:1 and higher).
        c. PC-IRV cannot fully approximate Airway Pressure Release Ventilation (APRV), but is still the best available salvage mode using EMV+731.
        d. Once PEEP is maximized (or limited by peak inspiratory pressure) and oxygenation is still not yet at goal, increase the I:E ratio incrementally.
        e. Tidal volume goals remain the same as with conventional ventilation; adjust cycle time (60/RR) to optimize minute ventilation.
        f. As higher I:E ratios are non-physiologic, PC-IRV may require increased sedation for patient comfort and synchrony.
    3. Paralysis for Patient-Ventilator Synchronization
        a. Adequate depth of sedation is essential prior to starting paralytic; recommend at least RASS -3.
        b. SCCM and DoD PMG on COVID-19 recommend intermittent paralytics over continuous infusions if possible.
        c. Paralysis with Vecuronium:
            i. Bolus (for push-dose or for loading dose of an infusion): IV 5mg to 10mg every 60-90 minutes as needed.
            ii. Infusion: 0.8 to 1.2mcg/kg/min (approx. 80mcg/min for 80kg).
            iii. Without pump: 40mg vecuronium in 250mL bag of normal saline yields 40mg/290mL = 138mcg/mL. For 80mcg/min = 0.58mL/min ~ 1gt every 10 seconds in 10gt tubing.
        d. Monitoring Goal:
            i. Absence of muscle movement and no evidence of spontaneous breathing on the ventilator. If possible, titrate to 2/4 TOF (likely only available for surgical teams).
            ii. Increased HR and BP may suggest undersedation and should be empirically treated with an increased dose of sedation.
            iii. Recommend checking TOF every 2-4 hours until stable, then consider extending to every 6-8 hours.
            iv. Once the patient is stabilized, consider holding the paralytic at least once every 24 hours to provide for assessment of sedation depth.
            v. DO NOT hold sedation until 4/4 TOF twitches unless absolutely necessary (e.g. sudden hypotension). Alternatively, spontaneous respiratory efforts (usually manifested as respiratory rates higher than the set rate) can be used as evidence of adequate reversal of paralytic medication.

4. Prone Positioning
    a. "Awake Self-Proning" with High Flow Nasal Cannula devices has been successfully used to delay or avert intubation. A similar technique can be performed with conventional nasal cannula or face mask devices and may improve oxygen requirements. However, if the patient is unable to tolerate prone positioning (i.e. strong desire to remain in a tripod position), DO NOT force this position upon them.
    b. Reference DoD COVID-19 Practice Management Guide for full details on prone positioning procedures.
    c. Tape eyes shut and ensure all tubes/lines are secured as the greatest risk during prone positioning is the risk of device dislodgement. Re-place ECG electrodes on the patient's back after prone positioning.
    d. Placement of either a central line or additional peripheral access is strongly encouraged PRIOR to prone positioning.
    e. Have push-dose vasopressor medication available during the process of prone positioning and un-positioning, as hypotension invariably occurs given the high degree of PEEP
    f. Proning cycle is generally 16 hours of prone positioning each 24 hours. Match the proning cycle to the daily care plan as much as possible.
    g. Prone positioning may not be feasible or safe during evacuation.

xi. Anticipate Complications
    1. Pneumothorax can occur with higher PIP. Sudden increases in PIP and/or hemodynamic instability can suggest the development of a pneumothorax.
    2. Pneumomediastinum with subcutaneous emphysema can also develop with the use of high PEEP (typically from dissection of air into the adventitia of small bronchi/bronchioles). The development of crepitus across the chest, neck, and/or upper extremities suggests the presence of this condition. Tension physiology from pneumomediastinum is EXCEEDINGLY rare; typically, it is only a cosmetic problem.

f. Oliguria (Low Urine Output)
    i. Oliguria is defined as less than 0.5 mL/kg/hour of urine output (UOP).
    ii. If oliguria does not improve with resuscitation, consider the onset of acute tubular necrosis (ATN), especially if UOP remains low for more than 6 hours. As formal creatinine testing for acute kidney injury (AKI) is not likely to be available (except on select iStat cartridges), consider urine dipstick testing with attention to specific gravity, proteinuria, and hematuria.
        1. An abnormally low (dilute) specific gravity in the setting of oliguria suggests tubular damage and the inability to concentrate urine.
        2. Significant proteinuria can be seen in ATN, however, this is not specific and can be seen in a variety of chronic conditions and can be even be normal in some circumstances.
        3. Hematuria may suggest the presence of myoglobinuria – consider the presence of rhabdomyolysis as a cause of AKI.
    iii. If UOP suddenly declines or stops, flushing the Foley and/or performing a bladder ultrasound scan can help determine if the problem is mechanical (Foley blockage) or organic (true kidney disease).

iv. Once ATN sets in, ***DO NOT AGGRESSIVELY FLUID RESUSCITATE OR DIURESE*** simply to meet UOP goals. Use alternative markers of fluid responsiveness (like blood pressure response to passive straight leg raise) to help determine the need for further fluids and vasopressor medications.

v. Monitor closely for the development of electrolyte disturbances, specifically metabolic acidosis and hyperkalemia. Diuresis for management of hyperkalemia may be appropriate. The JTS Hyperkalemia and Dialysis in the Deployed Setting CPG describes field-expedient techniques for peritoneal dialysis; however, this should be done in concert with teleconsultation. The resource and manpower limitations in the care of a COVID-19 patient make this extremely problematic.

i. Hemodynamics & Monitoring

1. Strongly recommend IV pump over dial-a-flow over drip-chamber titration due the increased personnel requirement to continually monitor/adjust drip-chamber titration.
2. Consider placing the monitor, ventilator, and IV pumps upwind and as far away as possible from the patient to minimize exposure to medical personnel.
3. Establish invasive pressure monitoring early, especially if considering advanced ARDS management techniques and/or evidence of impending distributive shock.
4. If possible, establish central access early in anticipation of the need for continuous vasopressors. Multiple peripheral IVs may also be needed for infusions of sedatives, analgesia, antibiotics, etc. A conventional central venous catheter can be placed through an introducer catheter (i.e. Cordis) to expand the number of available infusion ports. This should be done during the initial insertion under sterile technique.
5. Early reporting on COVID19 patients describes the development of dilated cardio-myopathy with florid cardiogenic shock in severely ill patients. This may be secondary to systemic inflammation, stress, or a direct viral myocarditis. Patients may also develop arrhythmias. Manage arrhythmias as per ACLS guidelines. Distributive shock may be due to Cytokine Storm Syndrome (elicited by the virus) and/or bacterial co-infection leading to distributive shock requiring vasopressor support.
6. An unexpected change in the vital signs trends or hypotension out of proportion to sedation and PEEP should merit evaluation for additional causes of shock. Development of jugular venous distension and cool mottled extremities may indicate cardiogenic shock. Limited transthoracic echocardiography may be useful in discriminating between hypovolemic, cardiogenic, and distributive shock (in personnel trained to perform the assessment).
7. Utilize measures of volume responsiveness (i.e. urine output, pulse pressure variation, and blood pressure response to passive straight leg raise) to help guide the need for further fluid resuscitation. An increase of EtCO2 of >5% OR 3mmHg after passively raising a patients legs up 45 degrees from a fully supine position suggests volume responsiveness.
8. Norepinephrine remains first line vasopressor for all causes of shock. Fixed rate vasopressin infusion (0.04 units/min) is useful as an early adjunct in non-cardiogenic shock; usual practice is to start vasopressin when norepinephrine reaches doses above 12mcg/min. Epinephrine is the second line titratable pressor.
9. Vasopressors should be titrated to a MAP goal of greater than or equal to 65mmHg.

g. Housekeeping & Prophylaxis
    i. Nutrition:
        1. NG/OGT should be placed early for gastric decompression. If medical evacuation is significantly delayed (greater than 24 hours), consider starting enteral nutrition.
        2. Enteral nutrition is contraindicated in hemodynamically unstable patients (i.e. those on high or increasing doses of vasopressors). Low volume enteral feeding on patients with stable low doses of vasopressors is generally safe.
        3. At a minimum, confirm presence of gastric placement with auscultation over both lung fields and the abdomen along with aspiration of gastric contents. Urinalysis test strips for pH may provide an addition method for field expedient NG/OGT placement confirmation in patients not on acid suppressive therapy.
        4. Ensure presence of normal bowel sounds prior to initiating any enteral feeding. Additionally, enteral feeding is contraindicated in the presence of signs suggesting an acute abdomen and/or gastro-intestinal bleeding.
        5. Goal 25-30kcal/kg/day + 1-1.2gm/kg protein; however, this might be difficult, especially in the absence of formal concentrated tube feeds.
        6. Hypocaloric feeding is acceptable as long as it is accompanied by adequate protein supplementation.
        7. Meal supplement drinks are not sufficient. For example, 1x Muscle Milk Light bottle contains only 150kcal and 28gm protein in 500mL, which is extremely dilute compared to most tube feeding formulations. This potentially increase extra-vascular lung water (especially in the setting of critical illness) with minimal benefit to nutritional status.
        8. A more concentrated alternative is to use commercially available protein powder (with similar caloric/protein content per scoop) at 1/4 the recommended concentration and mix in a blender until no clumps are visible. Administer in small volume boluses (e.g. 60mL via Toomey syringe) as tolerated every 2 to 4 hours to a goal of 1gm/kg/day protein content.
        9. Further recommendations can be found in the JTS Nutritional Support Using Enteral and Parenteral Methods CPG.
    ii. The JTS Nursing Interventions in Prolonged Field Care CPG provides in-depth discussion of the nursing tasks that may be required if evacuation is significantly delayed. Considerations salient to the management of COVID19 are summarized below.
        1. To prevent pressure wounds, turn the patient every 2 hours and pad body prominences at pressure points.
        2. Flush the Foley catheter and clean perineum least every 12 hours.
        3. Provide bed-bath (wet-wipes) at least every 24 hours.
        4. Flush unused ports (both peripheral and central) every 12 hours.
        5. Exchange peripheral IV every 72 hours.
        6. Replace central line dressings every 72 hours (and if saturated).
    iii. If possible, blood sugar checks should be obtained at least every 8 hours, particularly for those with known diabetes mellitus.
    iv. Venous Thromboembolism (VTE) prophylaxis should be given as long as there are no contraindications. Administer 40mg enoxaparin SQ daily (avoid if evidence of renal failure) or 5000 units heparin SQ every 8 hours (err on heparin if there is concern for bleeding). Note that these doses differ from that of a trauma patient.
    v. If pharmacologic prophylaxis is not available, manual ankle plantar/dorsi-flexion range of motion exercises and lower extremity massage every two hours. DO NOT

use ACE wraps. Anecdotal evidence suggests that these patients are at high risk for blood clots, reinforcing the importance of appropriate VTE prophylaxis.

vi. Stress-Ulcer Prophylaxis should be given to all intubated patients as long as there are no contraindications. Ranitidine 50mg IV every 8 hours or 150mg via NG/OGT twice daily. Famotidine 20mg IV every 12 hours or 20mg via NG/OGT twice daily may be used in lieu of ranitidine. It would also be reasonable to use a proton pump inhibitor, if available (e.g. pantoprazole 40mg IV daily or omeprazole 40mg via NG/OGT daily).

vii. Ventilator Associated Pneumonia prevention for intubated patients includes:
    1. Head-of-bed elevation to approximately 30 degrees
    2. Suction the oropharynx as needed
    3. Brush teeth every 12 hours

6) Cardiopulmonary arrest is a difficult topic. In general, Cardiopulmonary Resuscitation (CPR) in an austere environment is not an appropriate use of resources unless the etiology for the arrest is immediately apparent and/or rapidly reversible. Additionally, significant aerosol generation will invariably occur during CPR of a COVID-19 patient. Anticipate providers involved in care will become infected with the disease. It is reasonable during a pandemic to establish medical rules of engagement that discourage providers from performing CPR on infected patients. If CPR is performed, the best available PPE should be donned before any patient contact is made, a surgical mask should be placed over the patient airway until a definitive airway is secured, and the number of personnel involved should be minimized.

Patient Evacuation from Austere Locations

1) Preparation for Medical Evacuation:
    a. Patient Movement should be anticipated for COVID-19 PUIs categorized as MedCon 2 or higher. There is no reason to delay notification request for evacuation.
    b. Ground and Air Medical Transport will depend on local CASEVAC/MEDEVAC notification plan and CASEVAC/MEDEVAC platforms available for transport.
    c. When clinically and operationally feasible and within the provider's scope of practice, obtain central venous access in anticipation of need for multiple infusions, including vasopressors. Obtain at least two peripheral IV's or one peripheral plus one central line access prior to transport, if possible.
    d. Early placement of arterial access secured by suture for invasive pressure monitoring is recommended, if available.
    e. Approximately 15% of hospitalized COVID-19 patients have myocardial injury. Obtain ECG and troponin, if possible. Coordinate the medical management of acute coronary syndrome or myocarditis via teleconsultation prior to transport, if possible.
    f. Patients requiring >3 Lpm oxygen support to maintain oxygen saturations >92% may not tolerate the hypoxic environment of aeromedical evacuation even with cabin altitude restrictions:
        i. Given the concern to avoid any aerosolizing procedures (intubation) emergently in-flight, these patients require pre-flight intubation to safely transport.
        ii. The most experienced provider should perform intubations. Use a video laryngoscope (if available) and rapid sequence induction.
        iii. Minimize people in the room being used for the intubation. Verify all staff have the best available PPE (see Appendix B).

iv. Consider consulting the Advanced Critical Care Evacuation Team (ACCET) DSN 312-429-BURN (2876) before transporting patients on moderate to high ventilator settings (PEEP > 14 and FiO2 > 70%). Refer to JTS Acute Respiratory Failure CPG.
v. If prone ventilation is to be utilized in-flight, it should be initiated on the ground with adequate time to document patient stability and an arterial blood gas before transport. Review prone positioning procedures in the Respiratory Failure CPG.

g. If intubated, an NG/OGT should be placed pre-flight and attached to intermittent suction. Post-pyloric enteric feeds may be continued in-flight using small bolus sizes (30 cc) and given twice hourly.
h. Pre-drawn and pre-mixed medications with primed tubing are examples of time saving measures to be optimized on the patient prior to transport.
i. Prepare patient records for handoff including medical notes, ECGs, laboratory results, and imaging results (if available).
j. Prepare patient belongings and ID/passport to accompany the patient.
k. Place PPE for flight on patient including eye protection and ear protection, and DO NOT forget face covering if not intubated.

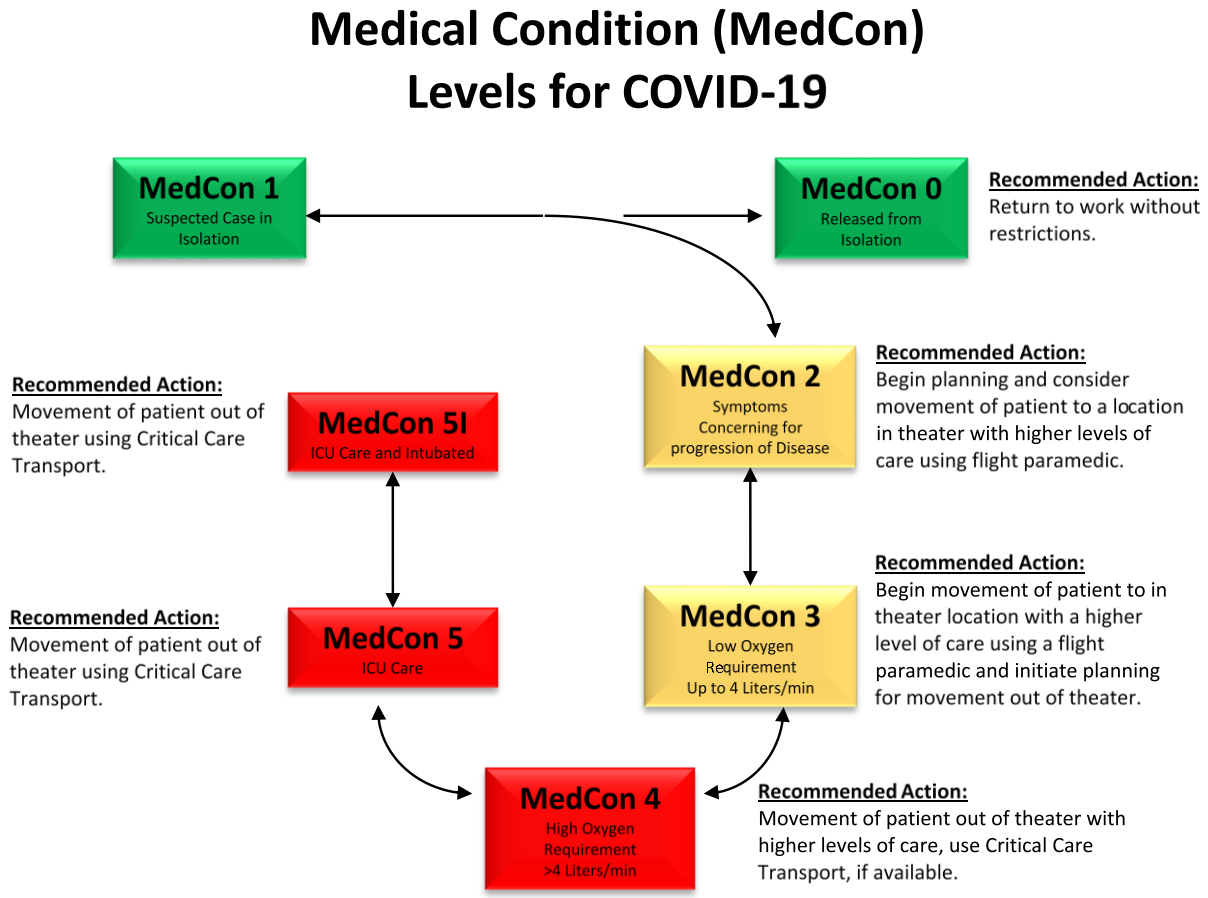
2) Transition of Care for Evacuation
   a. Early patient report allows the evacuation team to prepare any medications and equipment that cannot be provided by the sending facility.
      i. The sending facility medical team should provide contact information when requesting patient movement.
      ii. The evacuation team should contact the Role 1-2 medical team for initial report via approved means.
   b. Handoff to the transport team should include:
      i. Up-to-date COVID-19 status (PUI vs confirmed)
      ii. Current vital signs, exam findings, and recent trends or changes
      iii. Current medication regimen if initiated (including antibiotics and anticoagulants)
      iv. Critical care medication regimen (sedation, analgesia, paralysis, and vasopressors)
      v. Current PPE status, oxygen requirements and ventilator settings
      vi. Any potential COVID-19 related complications identified during management (e.g. heavy respiratory secretions)
   c. Upon evacuation team arrival to receive the patient, handoff report should be repeated with key elements above, including any recent patient changes.
   d. Transition to the evacuation team monitoring and support equipment will present risk of exposure to healthcare team. In an attempt to mitigate this risk, the following steps should be taken:
      i. Personnel should be limited to those directly involved in the care of the patient
      ii. Best available PPE should be worn by everyone involved in the care transition
      iii. ETT clamping technique should be instituted to limit aerosol creation during all ventilator circuit breaks including transfer to evacuation team ventilator
      iv. Sufficient time should be allotted to confirm adequate oxygenation and ventilation prior to departure of the evacuation team.

Establishing a Plan for Telemedicine

1) Regional Medical Operations Cell should prospectively publish local and regional PACE (Primary-Alternate-Contingency-Emergency) plans for both operational and clinical consultation. Forward-stationed medical teams/medics should test these options PRIOR to needing urgent consultation.

2) Make use of telehealth resources such as the ADVISOR line (833-238-7756), which includes the Virtual Critical Care Consultation (VC3) service. The ADVISOR program is specifically designed for operational virtual health support. Additionally, many VC3 providers have deployed to austere settings before and can help work through the unique problems faced in austere settings. Additional information on ADVISOR can be obtained by emailing dod.advisor_office@mail.mil.
3) Alternatively, contact the following MEDCENs and ask for the on-call critical care staff:
    a. Landstuhl Regional Medical Center, Germany. DSN: 314-590-7141 Intensive Care Unit.
    b. Walter Reed National Military Medical Center, MD. (301) 295-4611, option 4 Command Duty or (301) 295-4810 Emergency Room.
    c. Madigan Army Medical Center, WA. (253) 968-1110 Information Desk.
    d. Brooke Army Medical Center, TX. (210) 916-0808 Emergency Room.
    e. Naval Medical Center Portsmouth, VA. (757) 592-5473 Critical Care, (757) 953-1365 Emergency Room.
    f. Eisenhower Army Medical Center, GA. (706) 787-6938/6019 AOD or (706) 787-6039 Emergency Room.
    g. Travis Air Force Base Medical Center, CA. (707) 423-3040 ICU or (707) 423-3825 Emergency Room.
    h. Tripler Army Medical Center, HI. (808) 433-6661 Information Desk or (808) 433-4032 ICU or (808) 433-3707 Emergency Room.
    i. William Beaumont Army Medical Center, TX. (915)892-6880 House Supervisor or (915) 742-2139 ICU.
    j. Keesler Air Force Base Medical Center, MS. (228) 376-0500 Emergency Room.
4) Always be conscious of the need to maintain patient privacy and operational security.
5) Using a standard telemedicine script will improve communications and recommendations for management (see Appendix H).

Appendix A: Medical Condition Levels



Intent and Implications on Evacuation:

MedCon 1: Mild flu-like symptoms, SpO2 >94% on room air, hemodynamically normal. Overall, there is low likelihood of these patients significantly worsening in the next 24-48hrs. These patients may not need evacuation to higher level of care.

MedCon 2: Progressive symptoms that are concerning based upon provider clinical judgement. This is an "early warning" phase to prepare to evacuate.

MedCon 3: Requiring supplemental O2 to maintain SpO2 >92% at flow rates *not* significantly exceeding oxygen condenser capabilities (i.e. SAROS). While these patents may not necessarily exceed local capabilities, they represent a population at risk of rapid decompensation in the next 24-48hrs.

MedCon 4: Requiring supplemental O2 to maintain SpO2 >92% at flow rates *beyond* condenser capabilities (i.e. need to use D-cylinder oxygen support). These patients exceed the local capabilities for prolonged care of a patient in respiratory failure and/or will deplete oxygen supplies in less than 24 hours. These patients represent a high risk for hemodynamic deterioration and/or emerging requirement for mechanical ventilation.

MedCon 5: Patients requiring advanced airway management up to and including definitive airway placement and/or with continued hemodynamic instability. These patients need urgent medical evacuation with critical care support to Role 3 or higher facilities.

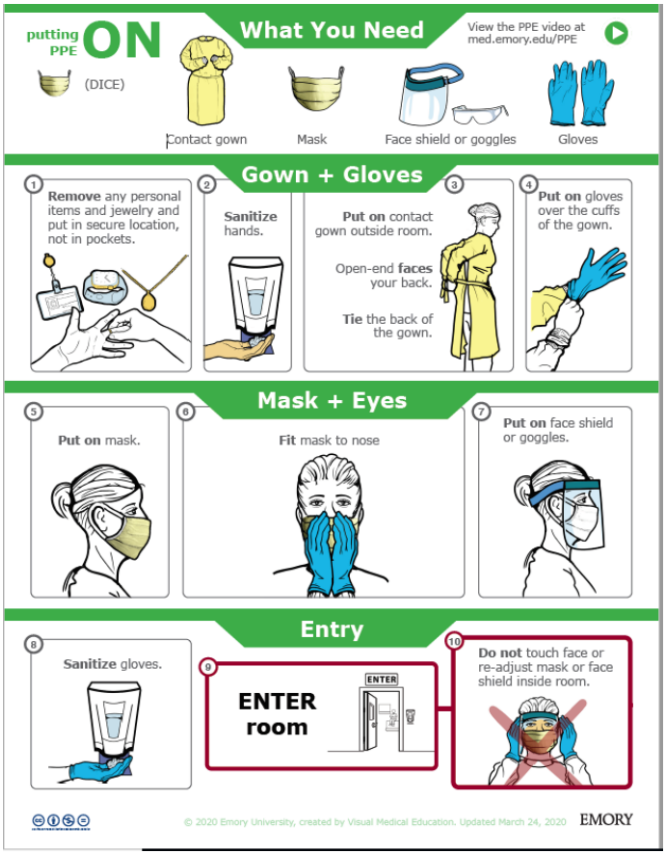
Appendix B: Personal Protective Equipment (Courtesy Emory University CY20)

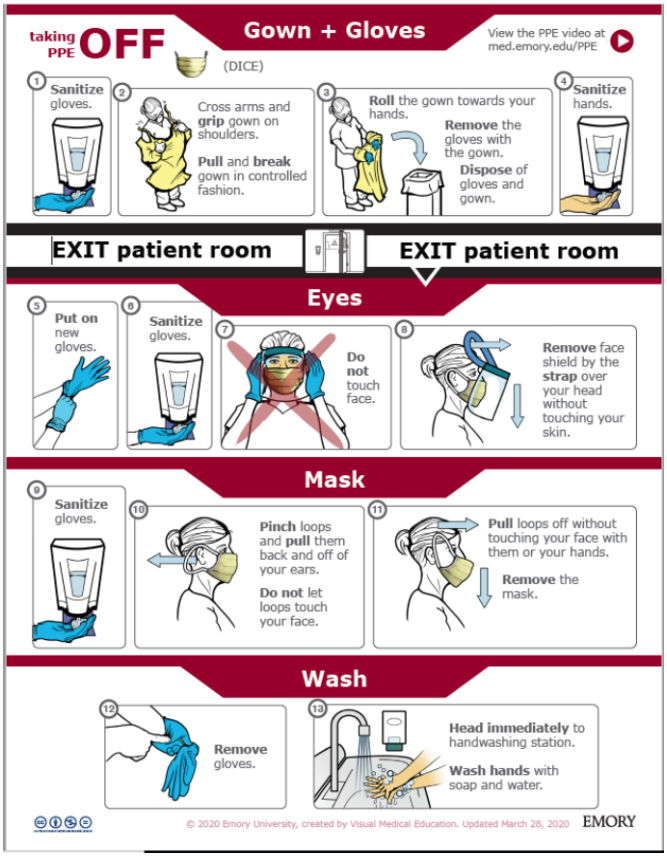
Good	Better	Best	Best of the Best
STANDARD + DROPLET PRECAUTIONS *Don and doff procedures occur in warm areas • **Gloves-single pair** • **Scarf or Balaclava** • **Eye Pro or Goggles** • **Disposable T-Shirt**	**DROPLET + AIRBORNE PRECAUTIONS** *Don and doff procedures occur in warm areas • **Double Gloves** • **Surgical Mask** • **Eye Pro or Goggles** • **Disposable Gown**	**DROPLET + AIRBORNE PRECAUTIONS** *Don and doff procedures occur in warm areas • **Double Gloves** • **N-95 Mask** • **Full Face Shield** • **Disposable Gown** • **Hood or Head Cover**	**DROPLET + AIRBORNE PRECAUTIONS** ** HIGH RISK EXPOSURE TO AEROSOLIZED DROPLETS ** • **Double Gloves** • **Surgical Mask covering** • **N-95 Mask** • **Full Face Shield** • **Tyvek® Suit - Hooded** • **Disposable Foot Covering**

Intubation

RELATIVE RISK / INTENSITY OF EXPOSURE

LOW → **HIGH**





Appendix B: Continued…

Mask Guidance

SURGICAL MASKS

DISCARD MASK IF:

- Contaminated with blood, respiratory or nasal secretions, or other bodily fluids from patients.
- Obviously damaged or hard to breathe through.
- At the conclusion of your shift.

EXTENDED USE:

- Wear mask for ENTIRE shift unless soiled, damaged, or hard to breathe through.
- Do not touch the mask. If you touch or adjust your mask, you must immediately perform proper hand hygiene.
- Leave the patient care area if you need to remove your mask.
- Consider use of a face shield over mask.

REUSE:

- Masks that fasten via ties that are unable to be undone and are torn need to be discarded.
- Masks should be carefully folded so the outer surface is held inward and against itself to reduce contact with the outer surface during storage.
- Keep used masks in a clean, breathable container such as a paper bag between uses. Do not store in a plastic bag. Keep in a clean space outside patient room, such as a wall locker next to patient room or top of the isolation cart. To prevent accidental use of another's mask, label the container:
  - First initial and last name of owner
  - Strap of mask with first initial and last name of owner

Glossary

Extended Use — The practice of wearing the same mask/respirator for repeated close contact encounters with several patients, without removing the mask/respirator between patient encounters.

Reuse — The practice of using the same mask/respirator for multiple encounters with several patients but removing it after each encounter.

N95 RESPIRATORS

Extended and limited reuse of respirators were recommended for conserving respirators during previous respiratory pathogen outbreaks and pandemics.

Use face shield over N95 respirator to reduce surface contamination.

Perform hand hygiene with soap and water or an alcohol-based hand sanitizer before and after touching or adjusting respirator.

DISCARD N95 RESPIRATOR IF:

- Used for aerosol-generating procedure.
- Contaminated with blood, respiratory or nasal secretions, or other bodily fluids from patients.
- Obviously damaged or hard to breathe through.
- Reused (donned/doffed) a maximum of five times.

EXTENDED USE:

Extended use may be implemented when multiple patients are infected with the same respiratory pathogen and patients are placed together in dedicated waiting rooms or hospital wards.

REUSE:

- Keep used respirators in a clean, breathable container such as a paper bag between uses. Do not store in a plastic bag. Keep in a clean space outside patient room such as a wall locker near patient's room or top of the isolation cart. To prevent accidental use of another person's respirator, label the container:
  - First initial and last name of owner
  - Strap of respirator with first initial and last name of owner
- Avoid touching the inside of the respirator. If inadvertent contact with the inside of the respirator, perform hand hygiene as described above.
- Use a pair of clean (non-sterile) gloves when donning a used N95 respirator and performing a user seal check. Discard gloves after the N95 respirator is donned and any adjustments are made to ensure the respirator is sitting comfortably on your face with a good seal.

Appendix C: Intravenous Medication Drips (Courtesy SMOG CY20)

KETAMINE (KETALAR)

Dosing Range: 15-50mcg/kg/min

MIX 500 mg/500 mL (NS or D5W)
CONCENTRATION = 1 mg/mL

Pt. Weight	Dose	Rate	Micro 60 gtt/mL	Macro 20 gtt/mL	Macro 15 gtt/mL	Macro 10 gtt/mL
kg	mcg/kg/mi	mL/hr	gtt/min	gtt/min	gtt/min	gtt/min
80	15	72	72	24	18	12
	20	96	96	32	24	16
	25	120	120	40	30	20
	30	144	144	48	36	24
	35	168	168	56	42	28
	40	192	192	64	48	32
	45	216	216	72	54	36
	50	240	240	80	60	40

NOREPINEPHRINE (LEVOPHED) OR EPINEPHRINE (ADRENALINE)

Dosing Range: 2-20mcg/min

MIX 4 mg/500 mL (LR or D5W)
CONCENTRATION = 8 mcg/mL

Dose	Rate	Micro 60 gtt/mL	Macro 20 gtt/mL	Macro 15 gtt/mL	Macro 10 gtt/mL
mcg/mi	mL/h	gtt/min	gtt/min	gtt/min	gtt/min
2	15	15	5	4	3
4	30	30	10	8	5
6	45	45	15	11	8
8	60	60	20	15	10
10	75	75	25	19	13
12	90	90	30	23	15
14	105	105	35	26	18
16	120	120	40	30	20
18	135	135	45	34	23
20	150	150	50	38	25

Appendix D: ARDSNET Protocol (Courtesy ARDSnet CY08)

NIH NHLBI ARDS Clinical Network
Mechanical Ventilation Protocol Summary

INCLUSION CRITERIA: Acute onset of

1. $PaO_2/FiO_2 \leq 300$ (corrected for altitude)
2. Bilateral (patchy, diffuse, or homogeneous) infiltrates consistent with pulmonary edema
3. No clinical evidence of left atrial hypertension

PART I: VENTILATOR SETUP AND ADJUSTMENT

1. Calculate predicted body weight (PBW)
   Males = 50 + 2.3 [height (inches) - 60]
   Females = 45.5 + 2.3 [height (inches) -60]
2. Select any ventilator mode
3. Set ventilator settings to achieve initial V_T = 8 ml/kg PBW
4. Reduce V_T by 1 ml/kg at intervals ≤ 2 hours until V_T = 6ml/kg PBW.
5. Set initial rate to approximate baseline minute ventilation (not > 35 bpm).
6. Adjust V_T and RR to achieve pH and plateau pressure goals below.

---

pH GOAL: 7.30-7.45

Acidosis Management: (pH < 7.30)

If pH 7.15-7.30: Increase RR until pH > 7.30 or $PaCO_2$ < 25 (Maximum set RR = 35).

.

If pH < 7.15: Increase RR to 35.

If pH remains < 7.15, V_T may be increased in 1 ml/kg steps until pH > 7.15 (Pplat target of 30 may be exceeded).

May give $NaHCO_3$

Alkalosis Management: (pH > 7.45) Decrease vent rate if possible.

I: E RATIO GOAL: Recommend that duration of inspiration be ≤ duration of expiration.

PART II: WEANING

A. Conduct a SPONTANEOUS BREATHING TRIAL daily when:

1. $FiO_2 \leq 0.40$ and PEEP ≤ 8 OR $FiO_2 \leq 0.50$ and PEEP ≤ 5.
2. PEEP and FiO_2 ≤ values of previous day.
3. Patient has acceptable spontaneous breathing efforts. (May decrease vent rate by 50% for 5 minutes to detect effort.)
4. Systolic BP ≥ 90 mmHg without vasopressor support.
5. No neuromuscular blocking agents or blockade.

OXYGENATION GOAL: PaO_2 55-80 mmHg or SpO_2 88-95%

Use a minimum PEEP of 5 cm H_2O. Consider use of incremental FiO_2/PEEP combinations such as shown below (not required) to achieve goal.

Lower PEEP/ higher FiO2

FiO_2	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

FiO_2	0.7	0.8	0.9	0.9	0.9	1.0
PEEP	14	14	14	16	18	18-24

Higher PEEP/ lower FiO2

FiO_2	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

FiO_2	0.5	0.5-0.8	0.8	0.9	1.0	1.0
PEEP	18	20	22	22	22	24

PLATEAU PRESSURE GOAL: ≤ 30 cm H_2O

Check Pplat (0.5 second inspiratory pause), at least q 4h and after each change in PEEP or V_T.

If Pplat > 30 cm H_2O: decrease V_T by 1ml/kg steps (minimum = 4 ml/kg).

If Pplat < 25 cm H_2O and V_T< 6 ml/ kg, increase V_T by 1 ml/kg until Pplat > 25 cm H_2O or V_T = 6 ml/kg.

If Pplat < 30 and breath stacking or dys-synchrony occurs: may increase V_T in 1ml/kg increments to 7 or 8 ml/kg if Pplat remains ≤ 30 cm H_2O.

B. SPONTANEOUS BREATHING TRIAL (SBT):

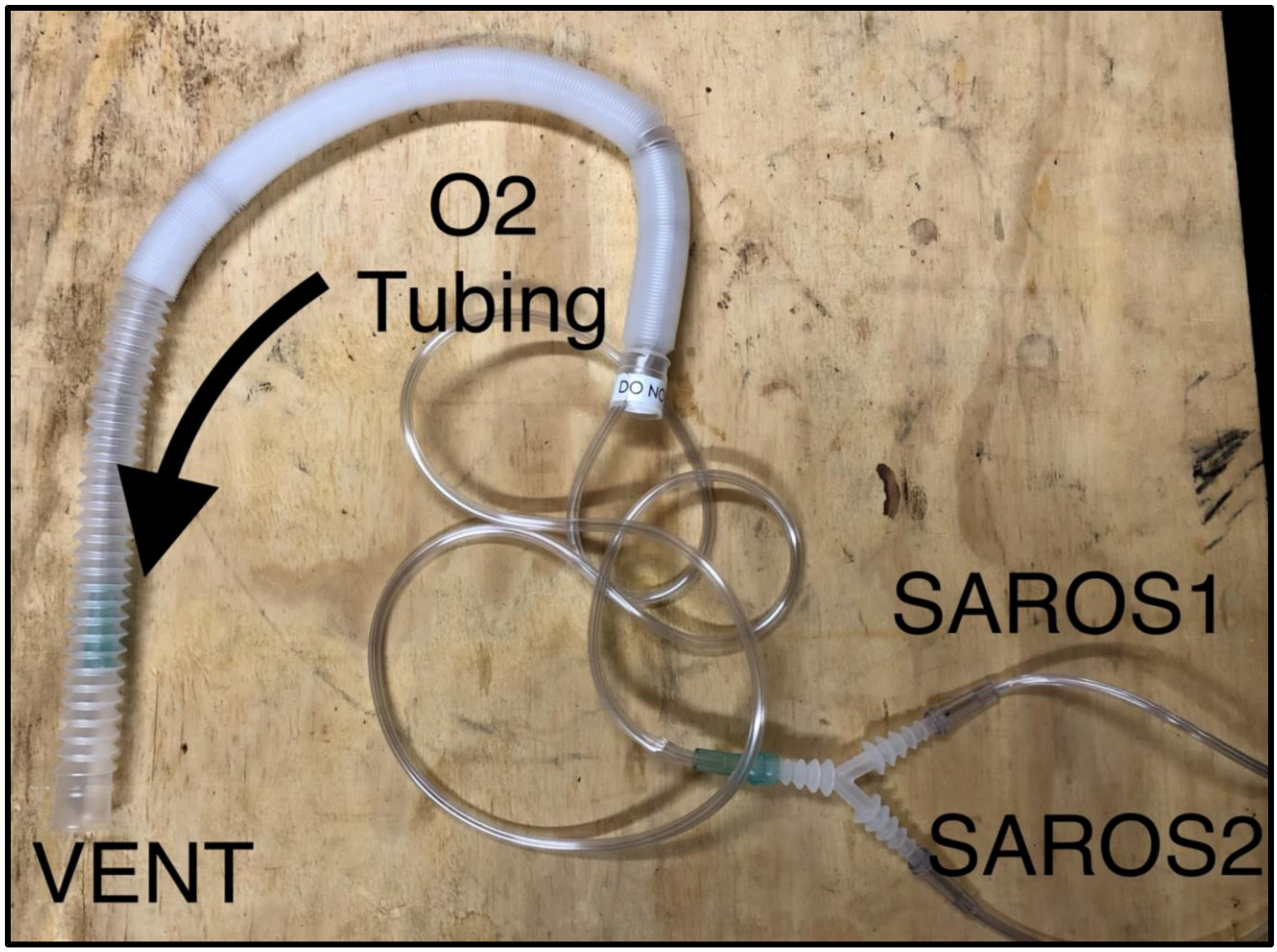
If all above criteria are met and subject has been in the study for at least 12 hours, initiate a trial of UP TO 120 minutes of spontaneous breathing with FiO2 ≤ 0.5 and PEEP ≤ 5:

1. Place on T-piece, trach collar, or CPAP ≤ 5 cm H_2O with PS ≤ 5
2. Assess for tolerance as below for up to two hours.
   a. $SpO_2 \geq 90$: and/or $PaO_2 \geq 60$ mmHg
   b. Spontaneous $V_T \geq 4$ ml/kg PBW
   c. RR ≤ 35/min
   d. pH ≥ 7.3
   e. No respiratory distress (distress= 2 or more)
      - HR > 120% of baseline
      - Marked accessory muscle use
      - Abdominal paradox
      - Diaphoresis
      - Marked dyspnea
3. If tolerated for at least 30 minutes, consider extubation.
4. If not tolerated resume pre-weaning settings.

Definition of UNASSISTED BREATHING
(Different from the spontaneous breathing criteria as PS is not allowed)

1. Extubated with face mask, nasal prong oxygen, or room air, OR
2. T-tube breathing, OR
3. Tracheostomy mask breathing, OR
4. CPAP less than or equal to 5 cm H_2O **without pressure support or IMV assistance.**

Appendix E: Multiple SAROS Connection to Ventilator Intake Reservoir



Each SAROS will create 3Lpm flow into accordion reservoir tubing (theoretically providing up to 6Lpm).

Appendix F: Transport Ventilator Set-Up Guide (Courtesy CSTARS Cy20)

Transport Vent Set Up Guide

***COVID-19* Considerations – 7 April 2020**

A. A standard HME will not suffice for viral filtration. A HMEF (heat-moisture exchanger – filter) provides sufficient bacterial & viral filtration and can be used in place of an HME. If your patient does not already have an HMEF in place, place one prior to putting them on your transport ventilator. HMEFs are intended for extended use and filtration is not degraded over time. Any increase in resistance of gas flow is negligible. A HMEF that does not become visibly soiled can be used for 2-7 days.

B. If you need to exchange the HMEF or anytime there is a circuit break without a HMEF in-line, you must clamp the ET tube.

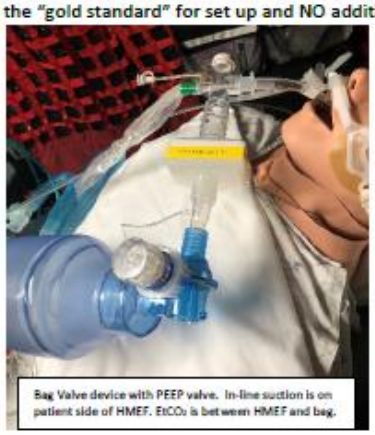
C. Whenever a circuit break is required all members in the area should be wearing full PPE with N95 mask or greater.

Based on availability, transport ventilators should be used with the follow order of preference:

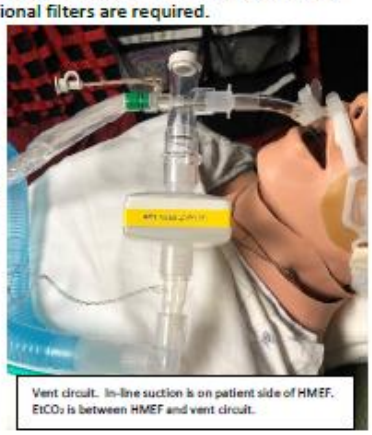
1. Impact 731
2. Impact 754
3. Lung Transport Ventilator (LTV)
4. LP10 (not shown)
5. Hamilton T1 (only ground evac or *Rotary-wing* transport; Not flight approved for fixed or tilt-wing aircraft)
6. SAVE II

D. Set up patient side with an HMEF for manual ventilation (below with and without accoutrements), as well as for a transport ventilator. The below three pictures are the "gold standard" for set up and NO additional filters are required.

Bag Valve device with PEEP valve. HMEF is connected between ETT and bag.



Bag Valve device with PEEP valve. In-line suction is on patient side of HMEF. $EtCO_2$ is between HMEF and bag.



Vent circuit. In-line suction is on patient side of HMEF. $EtCO_2$ is between HMEF and vent circuit.

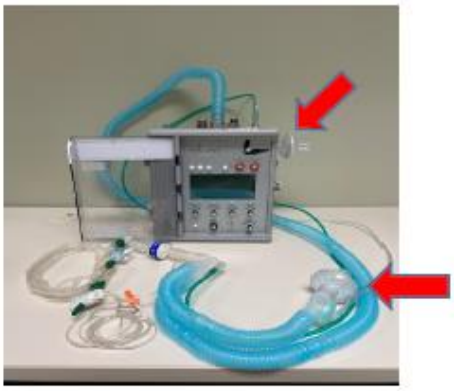
E. **In the event that HMEFs are not available,** the standard bacterial/viral vent filters will be needed. At a minimum, a filter must be placed on the port that entrains room air and the exhalation valve of the circuit. When disconnecting a patient from the ventilator without a HMEF, a standard bacterial/viral filter must be placed between the BVM and ET tube.

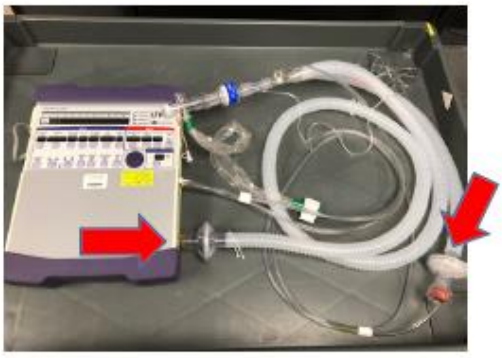
Some examples below:

For the **Impact 731**, place filters on the gas intake and exhalation valve marked by red arrows. It is important to note, that placing a filter on the gas intake (top arrow) will bypass an anti-asphyxiation safety feature. If this filter becomes occluded, a "Fresh Gas Intake Failure" alarm is likely to occur. When this alarm occurs, the patient will no longer be ventilated and will need to be manually ventilated while the vent is reset.

Appendix F: Continued…

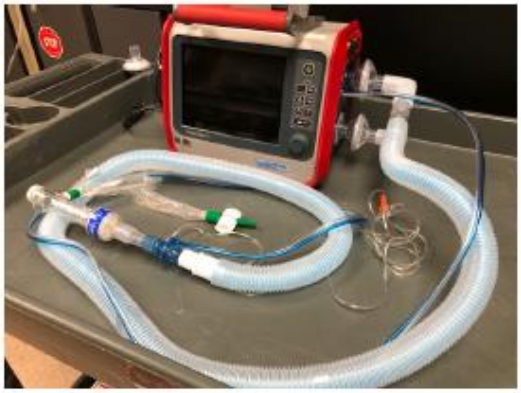
For the **Impact 754 ventilator**, place a filter on the gas intake (top arrow) and at the exhalation valve (bottom arrow). The set up for this ventilator will look identical to that of the Impact 731. The same caution must be taken when placing a filter on the gas intake due to the same risk of blocking gas flow to the ventilator resulting in vent failure.

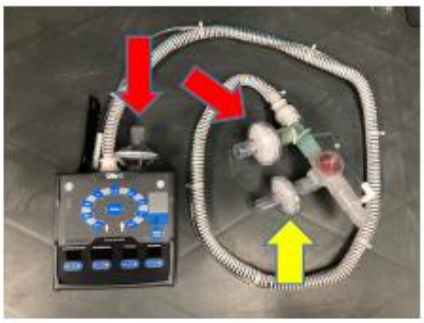




For the **LTV ventilator**, there are some important considerations. Filters should be placed as marked by the red arrows. It is important to understand that a filter cannot be placed where the vent entrains room air, instead a filter is placed between the vent and the beginning of the circuit (left arrow). Also, to place a filter on the exhalation valve (right arrow), you must remove the exhalation valve and place a filter between the valve on the circuit tubing.

For the **Hamilton T1** ventilator, filters need to be placed on the inhalation and exhalation ports, conveniently located right next to each other. (Ground or Rotary-wing only)





For the **SAVE II** ventilator, 3 filters are necessary. The red arrows mark where room air is entrained into the circuit. The yellow arrow shows the exhalation valve. Not only does using this ventilator require more filters, it is also not ideal for managing mechanically ventilated patients requiring complex ventilator settings.

Appendix G: Preparation for Transport Checklist (Courtesy SMOG CY20)

PRE-FLIGHT CHECKLIST

(for Critical Care and Post-Surgical Transfers)

Once the decision is made to transfer a patient and an accepting physician has been obtained, the following steps will be taken to prepare the patient for transport:

Initials	Evaluation Steps
	1. Sending location/physician: _____Accepting location/physician:_____ Flight nurse called: name / time: _____
	2. Anesthesia called: intubation if indicated. ETT secured/marked
	3. Patient meets criteria for en route critical care transport: risk documented by sending physician (POST-OPERATIVE and CC INTRAFACILITY TRANSFER, Pre-Transfer Patient Status Requirements)
	Preparation Steps
	Positioning and Proper Monitoring:
	1. Patient moved to litter (collapsible handles), positioned, padded, strapped, equipment (with necessary attachments) added and secured.
	2. For head-injured patients, a pre-sedation neurologic examination will be performed. GCS and neurological exam documented on the en route care form, suggest placing patient sitting at 30°-45°.(For eye injured patients, fox shield in place. For burn patients, JTS burn sheet initiated.)
	3. Ventilator switched to PMI vent at least 20-30 min prior to flight and set with transfer settings ordered by physician.
	4. IV / IO access verified, patent, and secured.
	5. Arterial line inserted and secured, if indicated. Transducer accessible.
	6. Ventilator tubing checked to be free from obstruction, with $ETCO_2$ and secondary lines attached.
	7. Orogastric or nasogastric tube is inserted (unless contraindicated), placement verified with chest x-ray, and attached to low-intermittent suction.
	8. Chest tubes to water seal/suction (place Heimlich valve for non-atrium chest drainage systems).
	9. Wound vacuum disconnected and stowed.
	10. Foley catheter secured, urine output measured and documented.
	Equipment, Medication, Chart, and Personnel Preparation:
	11. Medications needed for flight prepared and organized.
	12. Flight equipment bag obtained and checked. Backup pulse oximeter readily available.
	13. Complete chart photocopied (including x-ray cd), patient belongings bagged and tagged. Transfer Document, or other theater / unit approved transfer document, has been initiated.
	14. Earplugs and eye protection for patient and flight nurse.
	15. If facility sends medical attendant, attendant must have relevant personal protective equipment. In a combat environment this includes: Uniform, Kevlar, IBA, Weapon, ID Card, and equipment for transport.
	Ventilator Management:
	16. Blood gas (preferably ABG) obtained, 15 min after initial settings and ventilator changes. All efforts will be made to have a documented blood gas within 30 minutes prior to flight time.
	17. Adjust ventilator settings and check O_2 tank for length of flight. Resuscitator bag under patient's head with tubing connected to O_2 source, vent tubing free from obstruction.
	Final Verification:
	18. Transferring Physician, Flight Paramedic, ECCN (or Flight Provider) verbally agrees to flight care plan.
	19. Critical Care Transfer Orders reviewed and signed by transferring physician.(STANDARD ORDER SET for CRITICAL CARE TRANSFERS)
	20. Enroute CC Transfer Document with completed preflight and enroute care data handed over to and confirmed by receiving provider / facility.

Appendix H: Virtual Critical Care (Vc3) Call Script (Courtesy PFC Group CY17)

VIRTUAL CRITICAL CARE CONSULTATION (VC3) GUIDE – 8 July 2017 (v3)
To be used with Prolonged Field Care Card

1. Before calling, E-mail image of the casualty (wounds, environment, etc.), "capabilities" (back of page), & vital signs trends to dod.VC3@mail.mil
2. If call not answered: a) call next number on PACE or b) call back in 5 – 10 min.
3. If unable to provide information due to operational security, state so.

P: Commercial: **+1 (210) 916 – VCCC (8222)**, DSN: **(312) 429 – 8222** **(TELE-CRITICAL CARE CONSULTATION)**
A: Commercial: **+49 6371 – 9464 – 7141**, DSN: **(314) 590 – 7141** **(LRMC ICU, ASK FOR ON-CALL PHYSICIAN)**
C:
E:

This is _____ I am a (job/ position) _____
My best contact info is: _____
YOUR best contact info is (Consultant's number): _____Alternate e-mail: _____

**** PAUSE POINT to CONFIRM CONTACT INFO ****

I have a _____ year–old _____(sex) _____ (active duty/foreign national/OGA,etc.), who has the following:

Mechanism of Injury or known diagnosis(es)

The injury/start of care occurred *hours ago*. Anticipated evacuation time is (*hours* from now):

Injuries/Problems/Symptoms:

Treatments:

He/she is currently (circle) stable/ unstable, getting better/ getting worse/ getting worse rapidly

Known Medication Allergies/Past medical/Surgical history is:

I need help with (*be specific if possible, i.e. "I need help reading this ECG," or "I need help stabilizing this patient," etc.)*

Other Consultants have recommended:

**** PAUSE POINT for Remote Consultant to ask clarification questions ****

VITALS (*current* & *trend* as of): HR BP RR SpO2 $EtCO_2$ Temp

UOP(ml/hr) over (# hours) Mental Status (GCS/ AVPU)

EXAM: Neuro Ext/ MSK

Heart Pulses

Lungs Skin/ Wounds

Abd

LABS: ABG: Lactate: Other:

**** PAUSE POINT for Remote Consultant to ask clarification questions ****

Appendix H: Continued…

Plans/Recommendations		
PRIORITY	**SYSTEM/PROBLEM**	**RECOMMENDATION**
	Neuro or problem #1	
	CV or problem #2	
	Pulm or problem #3	
	GI or problem #4	
	Renal or problem #5	
	Endocrine or problem #6	
	MSK/ Wound or problem #7	
	Tubes, lines, drains or problem #8	
	Prophylaxis/prevention or prob#9	
	Other	

TO-DO/ FOLLOW-UP/TO-STOP	NOTES
1.	
2.	
3.	
4.	
5.	
6.	

**** PAUSE POINT, for Medic/Local Caregiver to ask clarification questions/READBACK****

Available "kit" (supplies, equipment, medications) !! IF POSSIBLE PHOTOGRAPH AND SEND VIA EMAIL BEFORE CALLING !!

Commo: Tempus i2i ID: _____ SAT#/Local Cell# _____

Other (FaceTime, VSee, Skype, WhatsApp ,etc.): _____

IV access: IV Central line IO (location) Other: _____

Monitor: Propaq Tempus Foley Graduated urinal PulseOx only Exam Only

Other: _____

IV Fluids: Plasma-Lyte LR Normal Saline 3% saline Other: _____

Colloids: Hetastarch Albumin Other: _____

Blood products: Whole blood PRBC Plasma FDP Platelets Other: _____

Medications: Antibiotics: name/route/dose _____

Morphine IV/ PO — Other opioid (name/ IV/ PO): _____

Fentanyl IV/ PO (pop) — Ketamine

Midazolam — Diazepam (IV/ PO)

TXA — Other(s): _____

Airway/Breathing: ETT Cric kit LMA BVM O2 Suction (type): _____ Ventilator(model): _____

Miscellaneous: