

# **The University of Utah COVID-19 Respiratory Management and Critical Care Reference Guide v5.0**

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# COVID-19 AIRWAY MANAGEMENT ALGORITHM

## PROCEDURE

### Organize

**In Room:** Personnel, Pre-oxy & Intubation packs, RSI Medications, Glidescope

**Outside Room** (door closed): Airway cart, US, RN#2, Runner, EM PharmD

**Set-up:** viral filter Pre-oxy and Vent circuits, wall suction system with tight seal on canister, BP cuff set to q3 min (opposite arm from pulse ox)

### Optimize

**Vitals:** correct hypotension, hypoxemia, acidosis

**Maximize Oxygenation:** NC or NRB to 10LPM, HFNC to 60LPM, CPAP to 5mmHg (with a good seal)

**Positioning:** Optimize airway anatomy using wedge or reclined position, consider self-proning

**Agitation:** consider anxiolytic, Ketamine (15-30mg) Slow IV push



### Induction & Intubation

#### Perform a Time Out

**Meds:** Administer RSI meds, wait 1 minute

- o BVM only if excellent seal is maintained
- o Anticipate significant hypoxemia

**Order of events:** 1) Remove viral filter/in-line capnography from mask AND BVM, 2) Intubate and inflate ETT cuff FIRST then ventilate

## POST-INTUBATION

### Post-Tube

**Confirm ETCO<sub>2</sub>** and secure ETT

**Transfer to vent:** Remove BVM then connect ETT to vent with viral filter

- o CLAMP tube if patient is not paralyzed

**RN Care:** Send ABG, place OGT, restraints and foley catheter

### Vent Settings

#### ARDSNet Lung Protective Strategy

- TV 6 cc/kg IBW and FiO<sub>2</sub> 1.0
- Pplat <30
- PEEP based on BMI:
  - o <35: PEEP 10
  - o 35-50: PEEP 12
  - o >50: PEEP 15



### Access & Monitoring

Bring US into room

- Confirm lung sliding
- If hemodynamically unstable:
  - o Place left-sided multi-lumen IJ CVC and left-sided arterial line
- Obtain CXR after ETT, lines and OGT in place

**Clean up** (Note: don and doff PPE per hospital policy)

In room: Glidescope stylet and any soiled reusable items - Red Biohazard bag (sealed and left in room).



# COVID-19 AIRWAY MANAGEMENT ALGORITHM

## Pre-Oxygenation

**\*\* All pre-oxygenation techniques to be performed under clear plastic drape \*\***

- 1) COVID Pre-oxy Kit: NIPPV mask with viral filter, BVM with in-line ETCO<sub>2</sub>, and PEEP valve
- 2) Apneic CPAP with excellent two-hand BVM mask seal with viral filter in place
- 3) Minimal pressure BVM with excellent two-hand facemask seal with viral filter

## RSI Medications

### Sedative:

- o **Etomidate** - 5-40 mg (half dose in shock)
- o **Ketamine** - 1 mg/kg (first line for asthma/COPD, max dose 200 mg)

### Paralytic:

- o **Rocuronium** - 1.2 mg/kg (max dose 100 mg, IBW)
- o **Succinylcholine** - 1.5 mg/kg (max dose 300 mg)

### Push-dose Pressor:

- o **Phenylephrine** - Push 1-2 mL (100 mcg/mL in pre-made syringe)
- o **Epinephrine** - Push 1-2 mL (10 mcg/mL in pre-made syringe)

## Post-Intubation Medications

### Sedation:

- o **Fentanyl** -
  - Initial Infusion Rate: 1 mcg/kg/hr (max 200 mcg/hr)
  - Bolus: 50-100 mcg q5min x3; increase infusion rate after 3 boluses
- o **Propofol** -
  - Infusion: 10-60 mcg/kg/min
  - Bolus (avoid in hypotension): 0.25-0.5 mg/kg

### Push-dose Anxiolytic/Agitation:

- o **Ketamine** - 20 mg slow IVP q1hr PRN; can consider infusion
- o **Midazolam** - 4 mg IVP q4hr PRN
- o **Lorazepam** - 2-4 mg IVP q4hr PRN
- o **Haldol/Droperidol** - 5-10 mg/1.25-5mg x1 (Prolongs QTc)

## Vasopressors

**Norepinephrine:** First-line therapy for shock

- o 0.01-1 mcg/kg/min

**Vasopressin:** Not used for monotherapy; add to NE after 0.2 mcg/kg/min

- o 0.04 units/min (not titrated)

**Epinephrine:** Watch for tachydysrhythmias

- o 0.01-1 mcg/kg/min

**Dobutamine:** Reserved for cardiogenic shock

- o 0.5-20 mcg/kg/min

# UUED COVID-19 Intubation Plan

V5.0 Updated 5/5/2020

Height (inches)	Height (cm)	ETT depth
5' 0"	60	152
5' 2"	62	157
5' 4"	64	163
5' 6"	66	168
5' 8"	68	173
5' 10"	70	178
6' 0"	72	183
6' 2"	74	188
6' 4"	76	193

Patient Height: \_\_\_\_ Weight: \_\_\_\_ IBW: \_\_\_\_ BMI: \_\_\_\_

Max Personnel in Rm: 4 Recommended ETT Depth: \_\_\_\_

**\*See back of sheet for pre-calculated medication doses\* \*UU Critical Care Medicine Cards\***

Pre-Oxygenation			
#1: COVID Pre-Ox kit (NIPPV mask w/ viral filter & BVM with in-line ETCO2 & PEEP valve)			
#2: Apneic CPAP w/ excellent two-hand BVM mask seal with filter in place			
#3: <i>Minimal pressure BVM</i> with excellent two-hand facemask seal w/ viral filter & under plastic drape.			
Dose Order	Medication		Notes
	Etomidate	5-40 mg, see dosing chart	Half dose in shock
	Ketamine	1 mg/kg, see dosing chart 20 mg slow IVP for anxiolysis	First line for asthma/COPD/Agitation • Max dose = 200 mg
	Rocuronium	1.2 mg/kg, see dosing chart	Max dose = 100 mg, IBW
	Succinylcholine	1.5 mg/kg, see dosing chart	Max dose = 300 mg
	Push Dose Phenylephrine	100 mcg/mL pre-made syringe	IV push 1-2 mL (100 - 200 mcg)
	Push Dose Epinephrine	10 mcg/mL pre-made syringe	IV push 1-2 mL (10 - 20 mcg)
	Norepinephrine drip	0.01-1 mcg/kg/min	See critical care medication cards
Post Intubation Sedation/Paralysis			
Dose Order	Medication		Notes
	Fentanyl drip and boluses	Initial bolus: 50-100 mcg FIRST Infusion: 1 mcg/kg/hr, start rate Bolus: 50-100 mcg q 5min PRN X 3	Use 1 <sup>st</sup> for agitation/vent compliance • S/p 3 boluses, consider rate 25-50 mcg rate increase, max rate or 200 mcg/hr
	Propofol drip and boluses	Infusion: 10-60 mcg/kg/min Bolus: 0.25-0.5 mg/kg	Fent and/or ketamine PRNs prior to rate increase, avoid propofol boluses, if possible
	Ketamine IV push <b>OR</b>	0.5-1 mg/kg	May use REMAINDER from intubation vial
	Midazolam IV push <b>OR</b>	4 mg IVP q4hr PRN	Vent management or agitation
	Lorazepam IV push	2-4 mg IVP q4hr PRN	Vent management or agitation
	Haldol or Droperidol IVP/IM	Haldol: 5-10 mg Droperidol: 1.25-5 mg	Caution with mult QTc prolonging drugs May repeat X 1
	Vecuronium IV Push	0.1 mg/kg q1hr PRN vent compliance	Max dose = 10 mg, S/p sedation optimized!
Vasopressors			
Dose Order	Medication		Notes
	Norepinephrine drip	0.01-1 mcg/kg/min	See critical care medication cards
	Vasopressin	0.04 units/min	Do not titrate
	Epinephrine drip	0.01-1 mcg/kg/min	See critical care medication cards
	Dobutamine	Cardiogenic shock 0.5-20 mcg/kg/min	See critical care medication cards Only AFTER norepi OR epi initiated
Ventilator Settings			
	Likely ARDS	Volume Control 6 mL/kg IBW Check Plateau Pressure	Mechanical Ventilation Order Panel Mech Vent Box-ARDS Protocol
	In-line suction proximal to filter, End-Tidal Distal to Filter. Keep filter in place or clamp ETT prior to disconnection		
	Confirm lung sliding w/ US <b>AND</b> order an ABG 30-60 minutes after intubation		
	Place <b>LEFT</b> Internal Jugular Multi-Lumen Central Line, <b>LEFT</b> radial arterial line, and OGT		
	1-view Chest X-Ray, <i>after all of the above complete</i>		
	Empiric Abx: Doxycycline 100 mg per OG (or IVPB if OG not available) <b>AND</b> Ceftriaxone 2 g <b>OR</b> Cefepime 2 g IVPB		

\* Modified & reproduced with permission from the original document "DHMC ED Intubation/Initial Critical Care Modified MAR March 23, 2020" Created by Matthew Roginski, MD, MPH

# UUED COVID-19 Intubation Plan

V5 Updated 5/5/2020 (Shortages)

Height (inches)	Height (cm)	ETT depth
5' 0"	60	152
5' 2"	62	157
5' 4"	64	163
5' 6"	66	168
5' 8"	68	173
5' 10"	70	178
6' 0"	72	183
6' 2"	74	188
6' 4"	76	193

Patient Height: \_\_\_ Weight: \_\_\_ IBW: \_\_\_ BMI: \_\_\_

Max Personnel in Rm: 4 Recommended ETT Depth: \_\_\_

*\*See back of sheet for pre-calculated medication doses\* \*UU Critical Care Medicine Cards\**

## Pre-Oxygenation

#1: COVID Pre-Ox kit (NIPPV mask w/ viral filter & BVM with in-line ETCO2 & PEEP valve)

#2: Apneic CPAP w/ excellent two-hand BVM mask seal with filter in place

#3: *Minimal pressure BVM* with excellent two-hand facemask seal w/ viral filter & under plastic drape.

Dose Order	Medication	Notes
	Etomidate	5-40 mg, see dosing chart
	Ketamine	1 mg/kg, see dosing chart 20 mg slow IVP for anxiolysis
	Propofol	1-2 mg/kg, see dosing chart
	Midazolam (Versed)	4-10 mg, see dosing chart
	Rocuronium	1.2 mg/kg, see dosing chart
	Succinylcholine	1.5 mg/kg, see dosing chart
	Vecuronium	0.2 mg/kg, see dosing chart
	Push Dose Phenylephrine	100 mcg/mL pre-made syringe
	Push Dose Epinephrine	10 mcg/mL pre-made syringe
	Norepinephrine drip	0.01-1 mcg/kg/min

## Post Intubation Sedation/Paralysis

Dose Order	Medication	Notes
	Fentanyl drip and boluses	Initial bolus: 50-100 mcg FIRST Infusion: 1 mcg/kg/hr, start rate Bolus: 50-100 mcg q 5min PRN
	Propofol drip and boluses	Infusion: 10-60 mcg/kg/min Bolus: 0.25-0.5 mg/kg
	Ketamine IV push	0.5-1 mg/kg
	Lorazepam IV push	2-4 mg IVP q4hr PRN
	Midazolam IV push	4 mg IVP q4hr PRN
	Haldol or Droperidol IVP/IM	Haldol: 5-10 mg Droperidol: 1.25-5 mg
	Hydromorphone IV push	0.5-2 mg IV q2hr PRN
	Vecuronium IV Push	0.1 mg/kg q1hr PRN vent compliance

## Vasopressors

Dose Order	Medication	Notes
	Norepinephrine drip	0.01-1 mcg/kg/min
	Vasopressin	0.04 units/min
	Epinephrine drip	0.01-1 mcg/kg/min
	Dobutamine	Cardiogenic shock 0.5-20 mcg/kg/min

## Ventilator Settings

Concern ARDS	Volume Control 6 mL/kg IBW Check Plateau Pressure	Mechanical Ventilation Order Panel Mech Vent Box-ARDS Protocol
In-line suction proximal to filter, End-Tidal Distal to Filter. Keep filter in place or clamp ETT prior to disconnection		
Confirm lung sliding w/ US <b>AND</b> order an ABG 30-60 minutes after intubation		
Place <b>LEFT</b> Internal Jugular Multi-Lumen Central Line, <b>LEFT</b> radial arterial line, and OGT		
1-view Chest X-Ray, <i>after all of the above complete</i>		
Empiric Abx: Doxycycline 100 mg per OG (or IVPB if OG not available) <b>AND</b> Ceftriaxone 2 g <b>OR</b> Cefepime 2 g IVPB		

Weight (kg)	Weight (lbs)	Etomidate (mg)	Etomidate Half Dose (mg)	Ketamine Induction (1 mg/kg)	Midazolam Induction (0.15 mg/kg)	Midazolam Induction (0.1 mg/kg)	Succinylcholine Paralytic (1.5 mg/kg)	Vecuronium Paralytic (0.2 mg/kg)	Ht	Ht (in)	IBW (kg)	Rocuronium (1.2 mg/kg)	Propofol Induction (1-2 mg/kg)
40	88	10 mg	5 mg	40 mg	6 mg	4 mg	60 mg	8 mg	5'	60	48	50 mg	50-100 mg
45	99	10 mg	5 mg	45 mg	7 mg	4.5 mg	70 mg	9 mg	5'1"	61	50	60 mg	50-100 mg
50	110	15 mg	7.5 mg	50 mg	7.5 mg	5 mg	75 mg	10 mg	5'2"	62	52	60 mg	50-100 mg
55	121	15 mg	7.5 mg	55 mg	8.5 mg	5.5 mg	80 mg	11 mg	5'3"	63	54	65 mg	50-100 mg
60	132	20 mg	10 mg	60 mg	9 mg	6 mg	90 mg	12 mg	5'4"	64	56	65 mg	50-100 mg
65	143	20 mg	10 mg	65 mg	10 mg	6.5 mg	100 mg	13 mg	5'5"	65	60	70 mg	60-120 mg
70	154	20 mg	10 mg	70 mg	▼▼▼	▼▼▼	110 mg	14 mg	5'6"	66	62	70 mg	60-120 mg
75	165	20 mg	10 mg	75 mg			120 mg	15 mg	5'7"	67	64	75 mg	60-120 mg
80	176	20 mg	10 mg	80 mg			120 mg	16 mg	5'8"	68	66	80 mg	60-120 mg
85	187	20 mg	10 mg	85 mg			130 mg	17 mg	5'9"	69	68	80 mg	70-140 mg
90	198	30 mg	15 mg	90 mg			140 mg	18 mg	5'10"	70	71	85 mg	70-140 mg
95	209	30 mg	15 mg	95 mg			140 mg	19 mg	5'11"	71	73	85 mg	70-140 mg
100	220	30 mg	15 mg	100 mg			150 mg	20 mg	6'	72	75	90 mg	70-140 mg
105	231	30 mg	15 mg	105 mg			160 mg	▼▼▼	6'1"	73	77	90 mg	80-160 mg
110	242	30 mg	15 mg	110 mg			170 mg		6'2"	74	80	95 mg	80-160 mg
115	253	30 mg	15 mg	115mg			170 mg		6'3"	75	82	95 mg	80-160 mg
120	264	30 mg	15 mg	120 mg			180 mg		6'4"	76	84	100 mg	80-160 mg
125	275	30 mg	15 mg	125 mg			190 mg		6'5"	77	87	▼▼▼	80-160 mg
130	286	30 mg	15 mg	130 mg			190 mg		6'6"	78	89		80-160 mg
135	297	40 mg	20 mg	135 mg			200 mg		6'7"	79	91		80-160 mg
140	308	▼▼▼	▼▼▼	140 mg			210 mg (2nd vial)		6'8"	80	94		80-160 mg
145	319			145 mg			220 mg		6'9"	81	96		100-200 mg
150	330			150 mg			220 mg		6'10"	82	98		▼▼▼
155	341			155 mg			230 mg		6'11"	83	100		
160	352			160 mg			240 mg		7'	84	103		
165	363			165 mg			250 mg						
170	374			170 mg			250 mg						
175	385			175 mg			260 mg						
180	396			180 mg			270 mg						
185	407			185 mg			280 mg						
190	418			190 mg			280 mg						
195	429			195 mg			290 mg						
200	440			200 mg			300 mg						

ED gurney = 74 inches (6'2")  
Hospital bed = 82 inches (6'10")

# COVID-19 Intubation Pre-entry Checklist: Regular ED

## Outside room (on standby w/ **RN #2 +/- PharmD**)

### **Airway cart** (*never bring in room!*)

- EZ-IO
- Direct laryngoscope backup (Mac 3 & 4 + handle)
- Supraglottic airway device
- OP/Nasal Airways
- Clippers for facial hair

### **Critical Care Cart**

- Multi-Lumen central line kit
- Radial Art-Line Kit
- Arterial line set up (including cord)
- Needle decompression kit (*only to be used under plastic drape*)

## Provider (Intubating provider in Room. If resident or APC, attending provider will be at doorway)

- COVID Pre-Oxygenation Pack (clear plastic bag)
  - \***Only for patients without advanced airway (SGA or ETT) already in place\***
    - NIPPV Mask w/ **HumidVent Viral Filter** pre-applied
    - BVM w/ in-line **End-Tidal CO2** stem & **PEEP** Valve pre-applied
- COVID Intubation Pack (white plastic bag)
  - ETT x2 (7.5 & 7.0)
  - ETT Securing Device
  - End-Tidal Colorimetric Capnography
  - Flexible Stylet
  - Bougie
  - Plastic Sheet
  - SGA (LMA or iGel)
  - BioHazard Bag
- Video Laryngoscope w/ Mac & hyper-angulated blades, rigid stylet, & Bougie
- Sterile Gloves (consider half-size up as these will replace outer gloves)

## RN #1:

- RSI Meds
  - Per physician, see induction med dosing for etomidate, ketamine, **OR** midazolam
  - Per physician, see dosing chart for succinylcholine **OR** rocuronium dosing
- Post-intubation meds
  - Fentanyl infusion bag
  - Propofol infusion bottle
  - PRN agitation medications, per physician request
- Antibiotics, per physician request
  - Ceftriaxone 2 g **OR** Cefepime 2 g IV push
  - PLUS**
  - Doxycycline 100mg PO/OGT or (IV if NPO)
- Hemodynamic Support PRN (physician request only)
  - PRE-MADE push dose syringes: phenylephrine **OR** epinephrine (in Omnicell)
  - Norepinephrine infusion pre-mixed (in Omnicell)
- RN CritCare Kit
  - OGT, ABG syringe, foley, restraints

## RT:

- Vent w/ viral filters on patient's right side
- Suction equipment

# COVID-19 Intubation Pre-entry Checklist: Respiratory Unit

## Intubation Room 4

- OP/NP Airways
- VL device w/ HyperAngled & MAC blades, rigid stylet, Bougie & ETT holder
- Vent (on patient's right side to facilitate left sided lines)
- WALL Suction & Portable Suction w/ *Viral Filter*
- Vent
- IV-Pump
- Multi-Lumen Central line kit
- Radial Art-Line Kit & Arterial Line tubing
- Needle Decompression kit
- IV fluid
- Clippers for facial hair
- RN supplies (Restraints, Foley, ABG syringe, OG tube with syringe, lube and tape)

## Outside room (on standby w/ **RN #2 +/- PharmD**)

- Airway cart (*Never bring into the room!*)
- EZ-IO
- Direct laryngoscope backup (Mac 3 & 4 + handle)
- Push-dose, premade phenylephrine **OR** epinephrine syringe **AND/OR** norepinephrine infusion, pre-mixed (*upon MD request, from Omnicell*)

## Provider (Intubating provider in room. If resident or APC, attending provider will be at doorway):

- COVID Pre-Oxygenation Pack** (clear plastic bag)
  - \*Only for patients without advanced airway (SGA or ETT) already in place.*
  - NIPPV Mask w/ **Viral Filter** pre-applied
  - BVM w/ in-line **End-Tidal CO2** stem & **PEEP** Valve pre-applied
- COVID Intubation Pack** (white plastic bag)
  - ETT x2 (7.5 & 7.0)
  - ETT Securing Device
  - End-Tidal Colorimetric Capnography
  - Flexible Stylet
  - Bougie
  - Plastic Sheet
  - SGA (LMA or iGel)
  - Red-Biohazard Bag
- Sterile Gloves** (consider half-size up as these will replace outer gloves)

## RN 1:

- RSI Meds
  - Per physician, see induction med dosing for etomidate, ketamine, **OR** midazolam
  - Per physician, see dosing chart for succinylcholine **OR** rocuronium dosing
- Post-intubation meds
  - Fentanyl infusion bag
  - Propofol infusion bottle
  - PRN Agitation medications, per physician request
- Antibiotics, per physician request
  - Ceftriaxone 2 g **OR** Cefepime 2 g IV push **PLUS**
  - Doxycycline 100 mg PO/OGT or (IV if NPO)
- Hemodynamic Support PRN (physician request only)
  - PRE-MADE push dose syringes: phenylephrine **OR** epinephrine **AND/OR** norepinephrine infusion pre-mixed (in Omnicell)
- RN CritCare Kit
  - OGT, ABG syringe, Foley, Restraints



# COVID-19 Pre-Oxygenation & Intubation Packs & Critical Care Cart Contents

## **COVID Pre-Oxygenation Pack**

**\*\*Only** For pre-oxygenation of patients without advanced airway (SGA or ETT) already in place

1. NIPPV Mask w/ **Humid-Vent Viral Filter** pre-applied
2. BVM w/ in-line **End-Tidal CO2** stem & **PEEP** Valve pre-applied

## **COVID Intubation Pack**

1. ETT x2 (7.5 & 7.0)
2. ETT Securing Device
3. End-Tidal Colorimetric Capnography
4. Flexible Stylet (rigid stylet is in VL basket)
5. Bougie
6. 10cc Syringe
7. 2x Lube pack
8. Clear Plastic Drape (use as face-shield for bagging/exchanging LMA)
9. SGA (LMA or iGel)
10. Biohazard Bag (for any non-disposable blade/stylets after intubation)

## **COVID Critical Care Cart** (stage outside Rm if not in CampCovid4)

1. Multi-Lumen Central line kit + 3 sterile flushes + 3x needless luer caps
2. Radial Arterial line kit, wiring, pressure bag & tubing
  - Kit includes: Chloraprep, Scalpel (or scissors), 20gu arrow kit, Needle drivers, 3-0 suture
3. Needle Decompression Kit (*for use under plastic drape only*)
  - Kit includes: 12gu 3in AngioCath & 3-2way stopcock
4. OP/NP Airways
5. RN supplies
  - OGT, Foley, ABG syringe, Restraints



# CRITICAL CARE IN COVID-19

**Appropriate PPE for all COVID Patients** - Refer to Pulse for guidelines

## Respiratory Failure

Oxygen Therapy Progression: (surgical mask over the patient!!) <sup>7,8</sup>

- **NC** --> **NRB** --> **HFNC** (up to 60LPM at 100%) <sup>9-12</sup>

Mechanical Ventilation:

- Goals: **SpO<sub>2</sub>>90%** or **PaO<sub>2</sub> 60-80 mmHg**
- Volume Control: **6mL/kg** (predicted body weight)
- Plateau Pressure < 30
- PEEP per ARDS protocol

Proning: Consider early in non-intubated or intubated/paralyzed pts <sup>13</sup>

Paralysis: For vent dysynchrony and/or refractory hypoxemia

\***ECMO Consult** for refractory hypoxemia despite conventional therapies

## Fluid Therapy

Conservative Fluid Strategy:

- Daily I/O's
- No Maintenance IV fluids
- Diuresis as tolerated

## Hemodynamics

Lines:

- Reserve for patients in shock and obtain prior to proning
- Central and arterial; left sided IJ and left radial preferred

Pressors:

- NE first choice; add Vaso when NE dose >0.2mcg/kg/min

Refractory Shock:

- Evaluate cardiac function with bedside TTE; consider Dobutamine
- ECMO Consult for refractory cardiogenic shock
- Hydrocortisone 50mg q6hr for septic shock

## Therapeutics

Pneumonia Antibiotics: (If concerned about bacterial co-infection)

- Ceftriaxone and Doxycycline
- Cefepime, Vancomycin and Doxycycline for DRIP Score >3
- If cultures negative, consider stopping abx after 48-72 hrs

COVID-Specific Treatments:

- Assess clinical trial eligibility PRIOR to starting specific therapies
- Refer to Pulse for treatment guidelines

## ICU Checklist

FASTHUGSBLT:

**FEEDS** - start trophic feeds early (10mL/hr)

**ACTIVITY** - PT for ALL patients

**SEDATION** and Analgesia - assess daily and minimize when possible

**THROMBOPROPHYLAXIS** - All patients unless contraindicated

**HEAD OF BED** - Elevated >30 degrees (Reverse Trendelenberg if prone)

**ULCER** - PPI or H2 Blocker daily for all intubated patients

**GLUCOSE MONITORING** - as indicated, consider for 24hrs at admission

**SPONTANEOUS BREATHING TRIAL** (and sedation vacation)

- Assess DAILY; Perform SBT if PEEP <10 and FiO<sub>2</sub> <50% with SpO<sub>2</sub>>90% and no other contraindications

**BOWELS** - Regimen on all patients

**LINES/TUBES/DRAINS** - assess need for indwelling devices daily

**TABLETS** - Review medications daily and discontinue as indicated



# COVID-19 QUICK FACTS

## Nomenclature and Epidemiology

**Virus:** SARS-CoV-2 (Severe Acute Respiratory Syndrome Coronavirus 2)

- Single-stranded RNA enveloped virus transmitted via resp droplets

**Disease:** COVID-19 (coronavirus disease 2019)

**Incubation Period:**<sup>14</sup>

- 95% develop symptoms by 11.5 days (Range: 1-13d, Median: 5d)

**Disease Severity:**<sup>15,23</sup>

- *Mild-Moderate:* 81%
- *Severe:* 14% - dyspnea, hypoxemia
- *Critical:* 5% - respiratory failure, shock

**Estimated Case Fatality Rate:**<sup>16</sup>

- 0.32% in patients <60yo
- 6.4% in patients 60-79yo
- 13.4% in patients >80yo

## Poor Prognostic Factors

- Age >65yo
- Comorbidities (*DM, COPD, CVD, HTN, Cancer*)
- Respiratory failure requiring intubation
- Neutrophil to Lymphocyte Ratio >3.13<sup>17</sup>
- LDH > 245u/L
- Ferritin > 300 ug/L
- CRP > 100mg/L
- D-Dimer > 1000ng/mL<sup>18</sup>
- IL-6 < 80pg/mL

## Common Laboratory Findings<sup>19-22</sup>

Na	Cl	BUN↑	} Gluc
K	HCO <sub>3</sub>	Cr↑	
TP	AST↑	LDH↑	} TBili↑
Alb	ALT↑	AP	
		WBC ↓/nml	} Hg Hct
		Plt ↓	

## Criteria for Permissive Hypoxemia<sup>24-28</sup>

*\*\* Decision to intubate is at the discretion of the provider\*\**

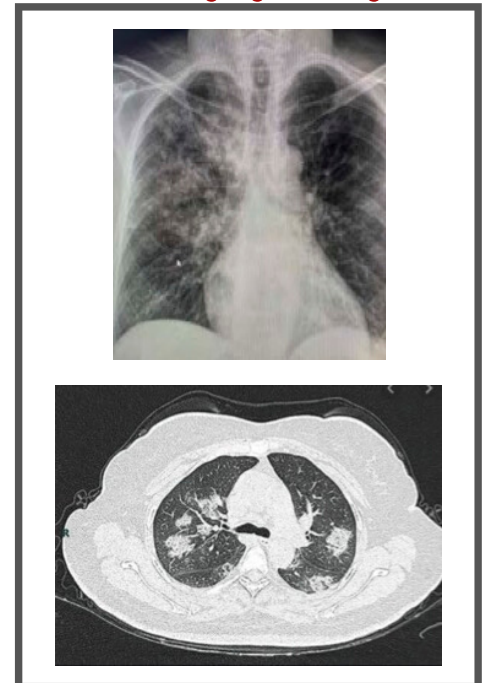
### Patient:

- Absence of encephalopathy of any degree
- Absence of significant comorbidities
- Able to self-prone
- Absence of persistent chest pain
- Supplemental oxygen able to maintain SpO<sub>2</sub> >85% and PaO<sub>2</sub> >55
- ROX Index ( $[SpO_2/FiO_2]/RR$ )
  - >2.85 at 2hrs
  - >3.47 at 6hrs
  - >3.85 at 12hrs (Positive Predictive Value > 80%)

### Labs:

- Lactate <3.0
- P:F>200
- Eucapnia (PaCO<sub>2</sub> 40±3)

## Common Imaging Findings

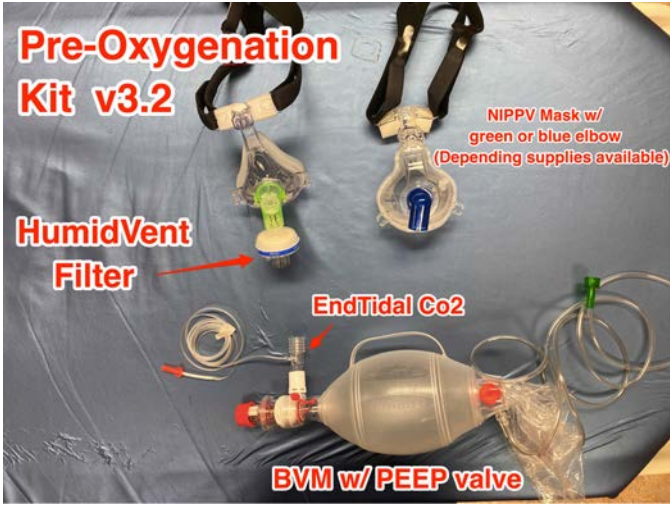




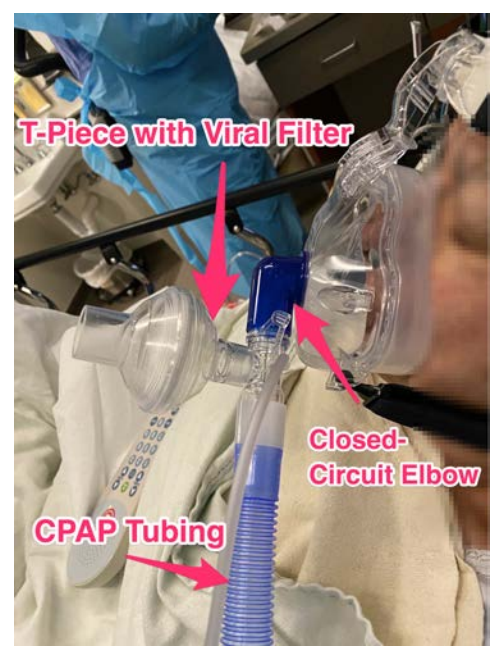
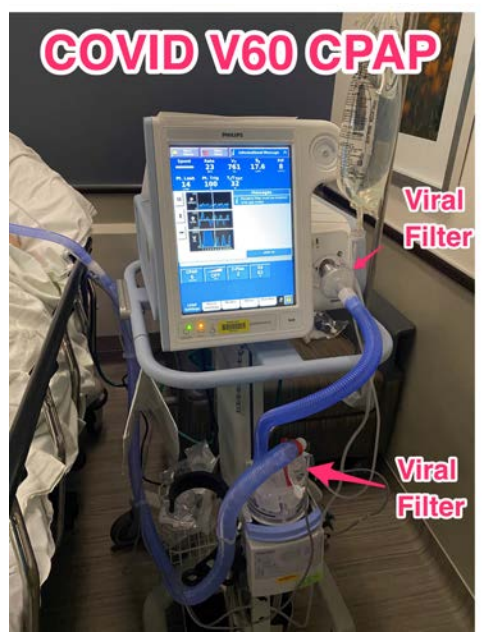
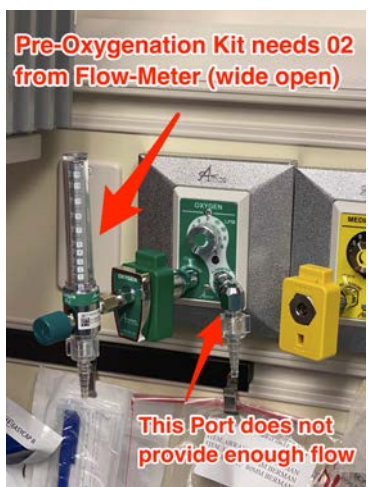
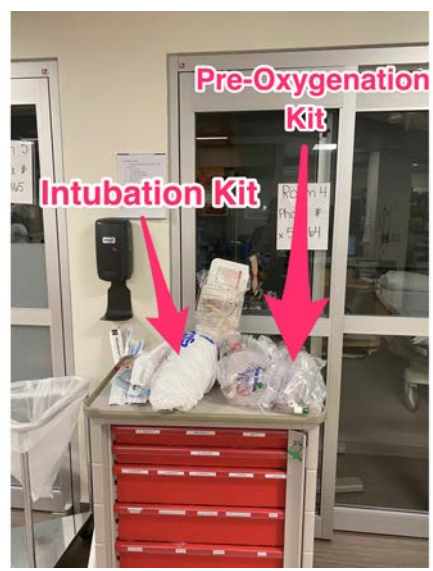
# UUED COVID-19 AIRWAY MANAGEMENT ALGORITHM

## APPENDIX

\* iGel SGA also available



**Pre-Oxygenation & Intubation Kit Contents & Setup**

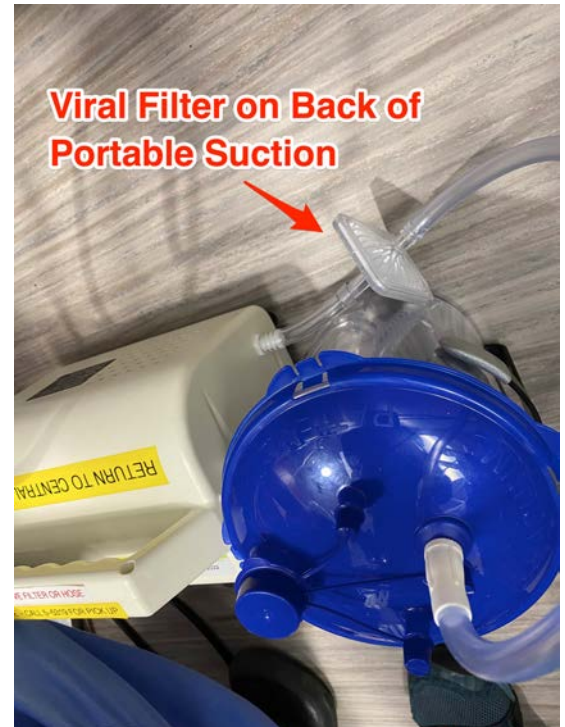


Version 4.0 Last updated: 4/5/2020

\*Note: the curtain depicted in the visual aid above and in any following aids, were later removed from all clinical areas along with any other non-essential items



# UUED COVID-19 AIRWAY MANAGEMENT ALGORITHM

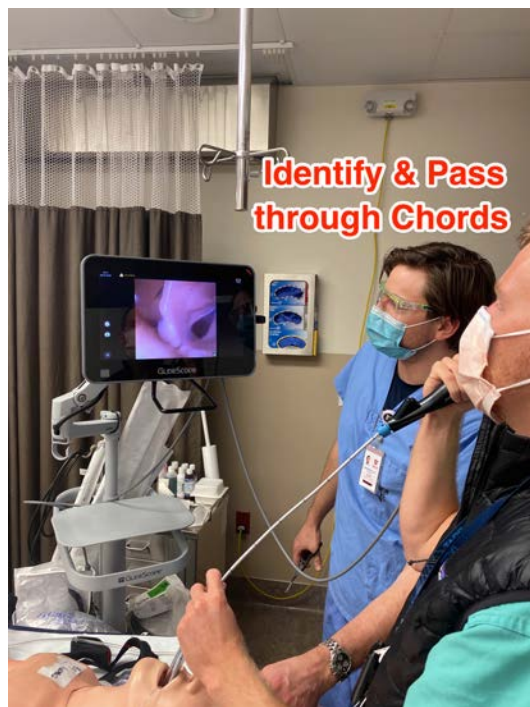


Version 4.0 Last updated: 4/5/2020

\*Note: the pictures above depict a simulation exercise run for provider training. Those not in airborne PPE are moderators for the exercise. In the clinical setting, all providers in the room during a potentially aerosolizing procedure should don airborne PPE



## Method for Sacrificing Disposable Scope for SGA --> ETT Exchange



\*If difficulty advancing ETT over scope tubing, consider inserting VL for relief of pressure & visualization  
\*\*Note: the above visual aids are for demonstration only, this procedure should be performed in full, airborne PPE



# UUED COVID-19 AIRWAY MANAGEMENT ALGORITHM

## Arterial Line Set up & Calibration

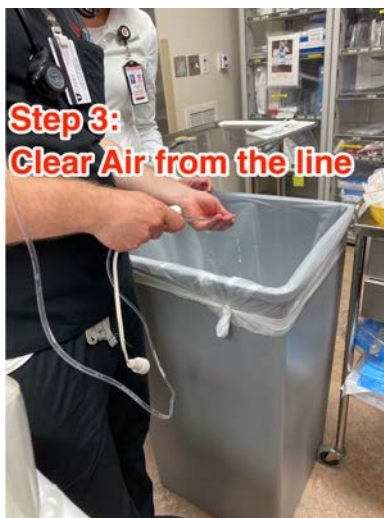


**Step 1: Spike 500ml Bag**



**Step 2: Pressurize Bag**

a) Put 500ml bag into Pressure Cuff



**Step 3: Clear Air from the line**



**Step 4: Pressurize Bag until you see green indicator stripe**

Green Indicator

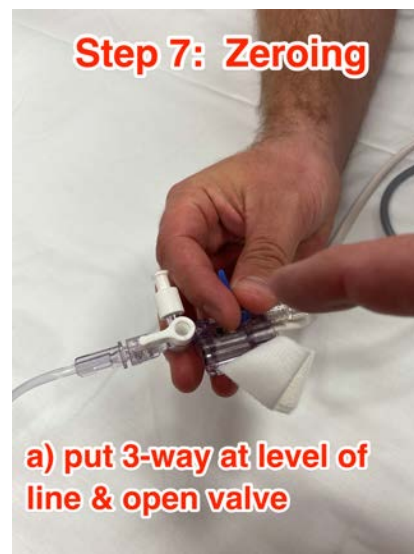


**Step 5: Swap clear cap on 3-way for white cap (in kit)**

White Cap

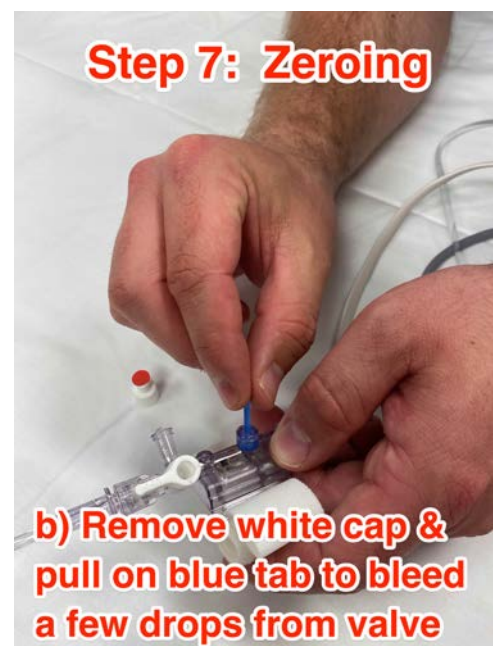


**Step 6: Plug In Wiring**



**Step 7: Zeroing**

a) put 3-way at level of line & open valve



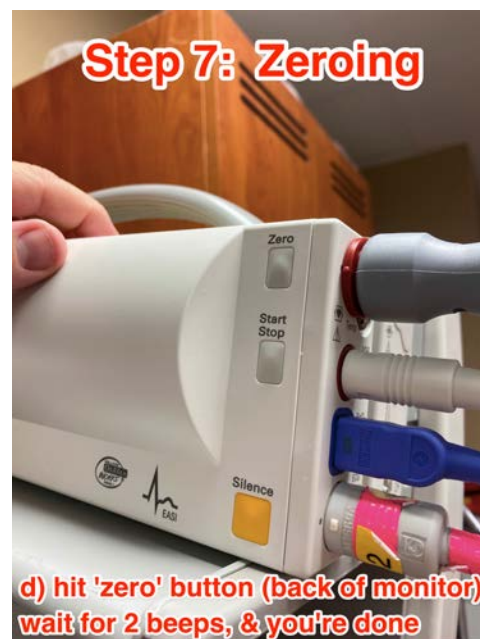
**Step 7: Zeroing**

b) Remove white cap & pull on blue tab to bleed a few drops from valve



**Step 7: Zeroing**

c) close valve & replace cap



**Step 7: Zeroing**

d) hit 'zero' button (back of monitor) wait for 2 beeps, & you're done

# UUHC Mechanical Ventilation Guide for Covid-19 Associated ARDS

## Ventilation Management

- Recommended Initial Settings
  - **MODE:** Volume control ventilation (CMV)
  - **Tidal Volume:** 6 ml/kg of predicted body weight
    - *see chart below*
  - **RATE:** set to patient’s approximate baseline minute ventilation
    - 18 breaths/min if patient not significantly tachypnic/acidotic
  - Plateau pressure < 30
    - Adjust Vt & RR to achieve
- LOW PEEP PROTOCOL:(see below)
  - may decrease PEEP for Pplateau > 30 or hypotension.
  - If not meeting saturation goal for >5 minutes move one cell to the right on the table
- Ventilator target goals:
  - SpO2 90-96% or PaO2 60-80 mmHg
  - pH 7.25-7.45
    - If pH < 7.25 increase RR until achieve pH > 7.25,
      - maximal RR 35 per minute.
    - If pH < 7.15 and RR 35 may increase tidal volume by 1 ml/kg increments until >7.15

### Low PEEP protocol

<b>FIO2</b>	0.3	0.4	0.4	0.5	0.5	0.6	0.7	0.7	0.7	0.8	0.9	0.9	0.9	1.0	1.0
<b>PEEP</b>	5	5	8	8	10	10	10	12	14	14	14	16	18	18	20+

### Prone Positioning

- Prone positioning should be performed provided there are no contraindications (see below)
- Prone patient when P/F < 100 despite PEEP >14 (Discuss resources for prone with charge nurse)
- Paralyze all patients prior to prone and while prone due to extubation risk
- Assess TOF immediately prior to prone
- Support devices and diagnostic procedures should be performed prior to prone
- Ensure adequate sedation using the “Medical ICU Cisatracurium Guideline for ARDS” order set in EPIC for NMB monitoring and sedation protocol
- neuromuscular blockade (NMB) order set sedation order set
- Prone position for 12-16 hours (goal 16 hours per day) then supine position for 6 hours
- Assess need for ongoing prone on a daily basis and continue as needed
- Consider stopping prone positioning when the following conditions are met: P/F > 150, PEEP ≤ 10, FiO2 ≤ 60 or no patient benefit
- Prone positioning protocol found [here on pulse](#):



## **Contraindications To Proning**

- Elevated ICP > 30 mmHg *or* CPP < 60 mmHg
- Massive hemoptysis
- Tracheal Surgery *or* Sternotomy in the previous 15 days
- Serious facial trauma *or* facial surgery in the previous 15 days.
- Cardiac pacemaker insertion in the previous 2 days
- Unstable spine, femur, *or* pelvic fracture
- MAP < 65mmHg, severe hemodynamic instability despite aggressive use of vasopressors
- Active pregnancy with viable fetus
- Anterior chest tube with air leak
- Abdominal surgery with open abdomen
- BMI that interferes with ability to safely prone patient

## **Neuromuscular Blockade**

- All prone patients are to receive continuous NMB
- NMB may be considered when P/F < 100 despite PEEP > 14 in patients not eligible for proning
- NMB may be considered for severe patient-ventilator dyssynchrony
- NMB may be used for up to 48 hours with longer treatment at providers discretion
- Use the “Medical ICU Cisatracurium Guideline for ARDS” order set in EPIC for NMB monitoring and sedation protocol (type cisatracurium into orders)
- Preferred monitoring site is the ulnar nerve, not the facial nerve.
- NMB protocol found [here on pulse](#):

## **Additional Therapies For Refractory Hypoxemia**

### **Recruitment Maneuvers\***

- Rule out pneumothorax prior to a recruitment maneuver
- Change to PS or PC mode of ventilation and reduce PIP to 5
- Increase PEEP to 30 for 40 seconds
- If hemodynamics are stable and PEEP of 30 is ineffective, a recruitment maneuver with PEEP of 35 may be attempted, as long as plateau pressure is <50.
- Return to baseline ventilator mode and increase PEEP by 2 - 4
- Monitor for barotrauma and hemodynamic compromise
- Recruitment maneuvers may be done once every 12 hours

**Inhaled Epoprostenol:** protocol is found [here on pulse](#) (*may not be possible on some ventilators*)

### **Other Recommendations For Ventilated Covid-19 Patients**

- Use conservative fluid strategy with no maintenance fluids and diuresis if able
- Use MDI's for bronchospastic disease
- Do not use nebulized medications except epoprostenol in the closed syringe-circuit system
- Minimize airway suction, use inline suctioning only
- Minimize ABG and use SpO2 to estimate P/F ratio (see attached chart below)

## Predicted Body Weight//Tidal Volume Chart

NIH PREDICTED BODY WEIGHT (PBW) / TIDAL VOLUME CHART															
MALES							FEMALES								
HEIGHT		PBW	4	5	6	7	8	HEIGHT		PBW	4	5	6	7	8
Feet	Inches	Male	ml/kg	ml/kg	ml/kg	ml/kg	ml/kg	Feet	Inches	Female	ml/kg	ml/kg	ml/kg	ml/kg	ml/kg
4' 10"	58	45.4	180	230	270	320	360	4' 7"	55	34	140	170	200	240	270
4' 11"	59	47.7	190	240	290	330	380	4' 8"	56	36.3	150	180	220	250	290
5' 0"	60	50	200	250	300	350	400	4' 9"	57	38.6	150	190	230	270	310
5' 1"	61	52.3	210	260	310	370	420	4' 10"	58	40.9	160	200	250	290	330
5' 2"	62	54.6	220	270	330	380	440	4' 11"	59	43.2	170	220	260	300	350
5' 3"	63	56.9	230	280	340	400	460	5' 0"	60	45.5	180	230	270	320	360
5' 4"	64	59.2	240	300	360	410	470	5' 1"	61	47.8	190	240	290	330	380
5' 5"	65	61.5	250	310	370	430	490	5' 2"	62	50.1	200	250	300	350	400
5' 6"	66	63.8	260	320	380	450	510	5' 3"	63	52.4	210	260	310	370	420
5' 7"	67	66.1	260	330	400	460	530	5' 4"	64	54.7	220	270	330	380	440
5' 8"	68	68.4	270	340	410	480	550	5' 5"	65	57	230	290	340	400	460
5' 9"	69	70.7	280	350	420	490	570	5' 6"	66	59.3	240	300	360	420	470
5' 10"	70	73	290	370	440	510	580	5' 7"	67	61.6	250	310	370	430	490
5' 11"	71	75.3	300	380	450	530	600	5' 8"	68	63.9	260	320	380	450	510
6' 0"	72	77.6	310	390	470	540	620	5' 9"	69	66.2	260	330	400	460	530
6' 1"	73	79.9	320	400	480	560	640	5' 10"	70	68.5	270	340	410	480	550
6' 2"	74	82.2	330	410	490	580	660	5' 11"	71	70.8	280	350	420	500	570
6' 3"	75	84.5	340	420	510	590	680	6' 0"	72	73.1	290	370	440	510	580
6' 4"	76	86.8	350	430	520	610	690	6' 1"	73	75.4	300	380	450	530	600
6' 5"	77	89.1	360	450	530	620	710	6' 2"	74	77.7	310	390	470	540	620
6' 6"	78	91.4	370	460	550	640	730	6' 3"	75	80	320	400	480	560	640

## P/F Ratio Based On SpO2 Chart

SPO2	FIO2														
	0.3	0.35	0.4	0.45	0.5	0.55	0.6	0.65	0.7	0.75	0.8	0.85	0.9	0.95	1
80%	148	127	111	98	89	81	74	68	63	59	55	52	49	47	44
81%	151	129	113	101	91	82	76	70	65	60	57	53	50	48	45
82%	155	132	116	103	93	84	77	71	66	62	58	55	52	49	46
83%	158	136	119	106	95	86	79	73	68	63	59	56	53	50	47
84%	162	139	122	108	97	89	81	75	70	65	61	57	54	51	49
85%	167	143	125	111	100	91	83	77	71	67	63	59	56	53	50
86%	171	147	129	114	103	94	86	79	73	69	64	61	57	54	51
87%	177	151	132	118	106	96	88	81	76	71	66	62	59	56	53
88%	182	156	137	121	109	99	91	84	78	73	68	64	61	58	55
89%	189	162	141	126	113	103	94	87	81	75	71	67	63	60	57
90%	196	168	147	130	117	107	98	90	84	78	73	69	65	62	59
91%	203	174	153	136	122	111	102	94	87	81	76	72	68	64	61
92%	213	182	159	142	128	116	106	98	91	85	80	75	71	67	64
93%	223	191	168	149	134	122	112	103	96	89	84	79	74	71	67
94%	236	202	177	157	142	129	118	109	101	94	89	83	79	75	71
95%	252	216	189	168	151	138	126	116	108	101	95	89	84	80	76
96%	273	234	205	182	164	149	136	126	117	109	102	96	91	86	82

Table 1. Approximate P/F ratios based on SpO<sub>2</sub> and FiO<sub>2</sub>



Select 'CMV' Under Mode



Example Initial Settings

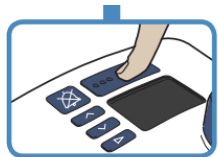
Inspiratory Hold  
(Plateau Pressure  
determination)



Increase FIO2 to  
100%

Confirm (press  
down)

# HIGH FLOW NASAL CANULA: AIRVO 2



1. Switch on Unit, Plug into Oxygen and power



Wait for Warm Up



2. Press and Hold both buttons to make adjustments



3. Press the Mode Button to view settings

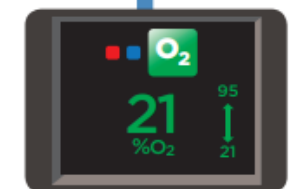
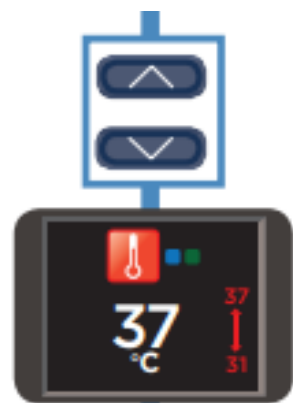
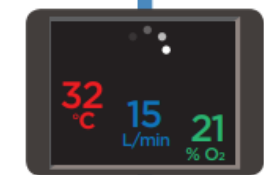
Temp Default: 37 degrees

4. Press the Mode Button for flow: 10 LPM – 60 LPM



5. Set FiO2: 25% to 95% oxygen:  
Changed by increasing or decreasing flowmeter

6. Press the Mode Button and Connect the patient





# Respironics V-60 BiPAP/ CPAP



## New set up Instructions:

1. Connect Oxygen (green hose) to oxygen outlet on wall. Plug in power cord into red outlet. Press Power button in the lower left hand side. ( Note: V60 have a battery and can be hooked up to a tank for travel)
2. Touch Mode tab located toward the bottom of the screen.

### Mode changes

The active ventilation mode is displayed in the upper left corner of the screen. To set or change a mode:



\*The below instructions are for generic set-up. If suspected COVID-19, use **CPAP @max 6mmHg**.

\*\*May consider higher pressures if in negative pressure room & under non-aerosolizing tent without any evidence of mask leak.

3. Pick most appropriate mode:
  - a. S/T (BiPAP): used for Hypercarbia with or without hypoxemia, Set: IPAP, EPAP, rate, FiO2, iTime
  - b. CPAP: used hypoxemia; Set: CPAP level, FIO2
  - c. PCV: Pressure Control Ventilation, differs from S/T mode by having every breath (spont. and set) with a set inspiratory time.
  - d. AVAPS: Not applicable with COVID 19
4. Initial Settings:
  - a. IPAP 15 / EPAP 8, RR 16, FiO2 0.60, iTime: 0.8-1.0
  - b. CPAP 8-12 (Max 6mmHg if suspected COVID-19), FiO2 0.60
5. Press Activate Mode to finalize selection

### 4. Select **Activate Mode** to apply.



6. Driving Pressure Support (PS)= IPAP-EPAP, Vt will be a function of PS and iTime
7. Ideal body weight calculation link: <https://globalrph.com/medcalcs/adjusted-body-weight-ajbw-and-ideal-body-weight-ibw-calc/>
8. Pocket Guide link if interested: <https://philipsproductcontent.blob.core.windows.net/assets/20181016/380db64b908f4c508546a97b014e98c0.pdf>
9. Remember to adjust settings to support patient, do not be afraid of pressure. The level of IPAP will be very close to Peak Inspiratory Pressure.
10. Obtain ABG 30 – 60 minutes after change or initiation and if patients condition changes.

# UUED COVID-19 PPE Guide: Regular ED

## Donning

1. Sanitize hands
2. Put on gloves
  - a. If using PAPR
    - i. Wipe outside & inside of **PAPR** (tubing, hood, mask, motor)
    - ii. Remove gloves → Sanitize hands → Don **Inner gloves**
    - iii. Don **PAPR**
  - b. Otherwise don: **N95 (cover w/ surgical mask) → Goggles → Surgical Cap**
3. Impermeable **Gown** w/ thumbs through thumb holes
4. **Outer gloves**

## Doffing: In-Room (w/ trained staff member observing all steps):

1. Carefully remove plastic drape & slowly fold patient-facing side in on itself. Dispose.
2. Place any re-usable devices in Red Biohazard Bag for processing
3. Sanitize outer gloves
4. Clean equipment w/ Sani wipe → Remove **Outer gloves**
5. Sanitize **Inner gloves** *\*if placing central/art line, don sterile gloves over inner gloves for procedure*
6. Wipe any sealed, un-used supplies with Sani wipe
7. Sanitize hands
8. Wipe **PAPR** (hood, tubing, facemask) or **Face Shield** with Sani-wipes
9. Sanitize Hands
10. *Slowly* pull gown forward & doff together with **inner gloves** → dispose in trash in room
11. Sanitize hands → Exit room

## Doffing: Outside Room (w/ trained staff member observing all steps):

1. Sanitize hands
  - a. If in PAPR:
    - i. Clean outside of **PAPR** (hood, tubing, facemask) w/ wipe
    - ii. Remove **PAPR** (or **surgical cap**)
    - iii. Wipe inside of PAPR & motor
    - iv. Sanitize gloves, remove, & sanitize hands
  - b. *If n95/Goggles/Cap*
    - i. Put on new gloves, remove face shield, & put in paper bag
    - ii. Sanitize gloves, remove gloves, & sanitize hands
    - iii. Remove Cap → Sanitize hands
    - iv. Remove surgical mask (hold at corner, loop & tear band) → Sanitize hands
    - v. Leave N95 on for rest of shift
    - vi. Remove goggles → sanitize hands
2. Wash any exposed skin with soap & water
3. When possible: Take shower & change into clean set of scrubs
4. At end of shift: Remove N95 & label w/ your department, name, date of first use, and tally of days used
  - a. Store in paper bag & plan to re-use after 3 days

# UUED COVID-19 PPE Guide: Respiratory Unit

## Donning *(beginning of Shift)*

1. Sanitize hands
2. Gloves
3. Wipe outside & inside of PAPR (tubing, hood, mask, motor)
4. Remove gloves → Sanitize hands → Don new gloves
5. Turn on **PAPR**, don & adjust
6. Sanitize gloves → dispose of gloves → sanitize hands

## Donning *(entering patient room)*

1. Sanitize hands
2. **Inner Gloves**
3. Impermeable **Gown** w/ thumbs through thumb holes
4. **Outer gloves**

## Doffing: In-Room *(w/ trained staff member observing all steps)*

1. Carefully fold plastic sheeting, folding patient-facing sides inward. Dispose of sheet
2. Place any re-usable devices in Red Biohazard Bag for processing
3. Sanitize **outer gloves**
4. Clean equipment w/ Sani wipe → Remove **Outer gloves**
5. Sanitize **Inner gloves** *\*if placing central/art line, don sterile gloves over inner gloves for procedure*
6. Wipe any sealed, un-used supplies with Sani wipe
7. Sanitize **inner gloves**
8. Wipe PAPR (hood, tubing, facemask) with Sani-wipes
9. Sanitize **Inner gloves**
10. Push US & VL out of room → Exit Room

## Doffing: Outside Room *(w/ trained staff member observing all steps)*

1. Sanitize **inner gloves**
2. Remove gown & inner gloves → Sanitize Hands
3. Don new gloves
4. Wipe outside of PAPR (hood, tubing, facemask), US, VL, & unused supplies w/ sani-wipe
5. Sanitize gloves → remove gloves → sanitize hands
3. Sanitize any exposed skin (neck & wrists). Recommend soap & water, Alcohol gel o.k.
4. After aerosolizing procedure & when possible: Take shower & change scrubs

## Doffing: End of Shift *(w/ trained staff member observing all steps)*

1. Sanitize hands
2. Wipe outside of PAPR (hood, tubing, facemask) w/ sani-wipe
3. Remove PAPR (or surgical cap)
4. Wipe inside of PAPR & motor
5. Sanitize hands
3. Shower

# UUED Non-Aerosolizing Tx of Asthma & COPD Exacerbation

V 5.0 Updated 5/5/2020

## Asthma Exacerbation:

### Mild

1. Albuterol MDI w/ spacer 4 to 8 puffs q20 min x 3, then q1h PRN + QID scheduled

### Moderate

1. Albuterol 4 to 8 puffs w/ spacer q20 min x 3, then q1h PRN + q6h scheduled

*Also consider some of all of the below treatments:*

2. Epinephrine 0.3 mg IM lateral thigh x, then q5min PRN up to 3 total doses
3. Magnesium Sulfate 2 gram IV infused over 30 minutes
4. Dexamethasone 12 mg PO/IM/IV or Solumedrol 125 mg IV

### Severe

1. Albuterol MDI w/ spacer 4 to 8 puffs q20 min x 3, then q1h PRN + q6h scheduled
2. Epinephrine 0.3 mg IM lateral thigh x, then q5min PRN up to 3 total doses
3. MgSO<sub>2</sub> 2g IV in 30 min.

*If not responding to above, consider*

- a. Ketamine 0.1-0.3 mg/kg slow-push over 3min
  - b. Low-Pressure CPAP (max pressure 6mmHg) w/ COVID v60 NIPPV machine
  - c. Terbutaline 0.01 mg/kg q 20 min PRN up to 3 doses, max dose 0.25 mg per dose, max of 0.75 mg per 1 hour period
4. Dexamethasone 12 mg PO/IM/IV or Solumedrol 12 5mg IV

## COPD Exacerbation

### Mild/Moderate

1. Albuterol MDI w/ spacer 4 to 8 puffs q20 min x 3, then q1h PRN + q6h scheduled
2. Doxycycline 100mg PO or IV
3. If known COPD → Dexamethasone 12 mg PO/IM/IV or Solumedrol 125 mg IV

### Severe

1. Albuterol MDI w/ spacer 4 to 8 puffs q20 min x 3, then q1h PRN + q6h sched
2. Doxycycline 100mg IV
3. *\*If neg pressure room:* Low-Pressure CPAP (max pressure 6mmHg) w/ COVID v60 NIPPV machine
4. Dexamethasone 12 mg PO/IM/IV or Solumedrol 125 mg IV

## Nebulized Medications

Nebulized medications may be *considered* in the following patients:

1. Known Asthma/COPD *and*
2. Minimal Improvement following a trial of above algorithm *and*
3. Not clinically appropriate/patient will not tolerate transfer to MICU

Nebulized medications may be administered in the ED *only* if the below criteria can be met:

1. Administered in Respiratory Care Area (ECU or EDR)
  - Under non-aersolizing tent
  - Behind closed door with HEPA filter running
2. Door remains closed for 45min following treatment
3. All personel outside of room in airborne PPE for 1hour following treatment

**\*\* No in-line nebulized medications in ED (RT can provide in-line nebs to intubated patient in ICU neg-pressure room)**



# UUED COVID-19 ED Discharge Protocol:

## Inclusion

- Age <50
- Able maintain oxygen sats >90% on 2L oxygen
- Computer and internet access
- Hemodynamically stable
- No respiratory distress or RR >30
- No high risk co-morbid conditions (asthma/COPD, morbid obesity, immunosuppression, diabetes, pregnancy, social issues/group living)

## Provider:

- RX for DME oxygen (document oxygen sat <88%)
- RX for DME oxygen sat monitor (if past pharmacy hours, will procure from HH)-:
  - ED case management has confirmed there are 20 pulse oximeters at outpatient pharmacy
  - HH has a supply as well
- Review return criteria and home care

## ED Case Management:

- Meet with patient to ensure eligibility
- Set up appointment with community clinics w/in 48 hours
  - 72 hours if Friday d/c with virtual UC as backup option
- Set up oxygen/pulse ox
- Give directions to patient regarding virtual f/u

*Updated 4/9/2020*



# FIGURE 2:

## Univerisity of Utah Emergency Medicine COVID-19 Management Video Tutorials (Click for Link)

Utah EM

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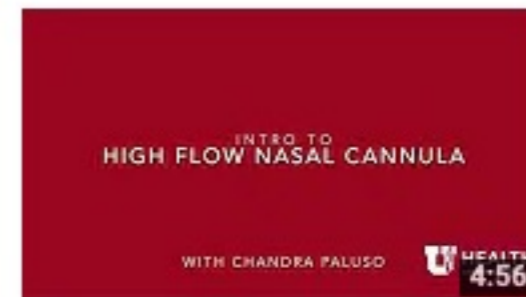
**Utah EM IV Pumps**

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Figure 3: High-Fidelity COVID-19 Airway Simulation





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