

# COVID-19

## ICU Refresher Booklet

### Adult Pandemic Education

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## Revision History

Version	Author	Summary of Updates
March 25, 2019	Clinical Transition Education (CTE), Associate Chief Nursing Office (ACNO)	Initial Draft
April 1, 2020		Delete "control severe agitation" as an indication for NMBAs

Please email [CNe-Hub@albertahealthservices.ca](mailto:CNe-Hub@albertahealthservices.ca) for content concerns/updates.



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## A. INTRODUCTION

Welcome and thank you for your willingness to support critically ill Albertans during the coronavirus disease (COVID-19) pandemic.

The exponential growth of COVID-19 in Canada is impacting the health of Albertans. The uptake may influence the accessibility of health services as cases continue to grow, limiting the availability of hospital beds and services. In Canada, 10% of reported cases of been hospitalized, where 6% have been admitted, and 4% required ICU (n=1371) ([Government of Canada website, March 23, 2020](#)). As a result of the pandemic, AHS is asking nurses with previous ICU experience to redeploy back to ICU as necessary to meet the growing demand of specialized health services for Albertans in need.

This information package contains key information pieces to support your transition back to ICU and to care for a COVID-19 patient. Review the information independently, or as directed by your Manager or CNE. While reading, reflect on your past experience in the ICU. Make connections between the information in this package, to previous learnings, while refreshing and advancing your critical care knowledge. Pay particular attention to items requiring you to act, as indicated by this symbol: .

Depending on the length of time that has passed since you last worked in the ICU and the specific needs of your unit, you may receive additional educational supports. Please work with your Manager and Clinical Nurse Educator (CNE) for further direction.

Complete and submit **Returning ICU Nurse Profile** (page 14) to your Unit Manager or CNE to assist planning your transition back to ICU.

Complete and submit **ICU Nurse Skills Self- Checklist** (page 15) to your Unit Manager or CNE to assist planning your transition back to ICU.

You have existing skills and knowledge will be a valuable addition to the ICU team. The expectation is not for you to return to ICU and function independently as a current ICU nurse, but for you to come back and support critical care within your scope of practice. For those that have been out of ICU for less than a year, their functioning within the ICU may be quite different than those away for longer. At no

time would you be expected to perform a skill that you felt was beyond your capabilities and was unsafe.

## B. COVID-19

COVID-19 is an infectious syndrome caused by SARS-CoV-2, a novel coronavirus that has not been previously detected in humans. People have no immunity against the virus, and it has no specific vaccine or treatment.

Though information is rapidly evolving, at this point it is noted that though the vast majority (80%) of patients have only mild symptoms, a small portion develop critical illness, in particular hypoxemic respiratory failure. Older patients and patients with pre-existing conditions (such as hypertension, cardiovascular disease, pulmonary disease, cancer or diabetes) appear to develop more serious illness.

COVID-19 is believed to be spread via respiratory droplets (similar to influenza, MERS, and SARS) and/or contact (e.g. contaminated hands to mucous membranes). Person to person spread has been identified.

- Find the latest novel coronavirus (COVID-19) information on Insite: <https://insite.albertahealthservices.ca/tools/Page24291.aspx>

Sign up for Insite COVID-19 Alerts to get updates to your inbox by clicking on this symbol on the right side of the page. 



## A. INFECTION PREVENTION AND CONTROL

Infection Prevention and Control has developed an overarching recommendation document specific to the COVID-19 pandemic:

<https://www.albertahealthservices.ca/assets/healthinfo/ipc/hi-ipc-emerging-issues-ncov.pdf>

AHS Point of Care Risk Assessment (PCRA) must be applied to patients with suspected COVID-19:

<https://www.albertahealthservices.ca/ipc/hi-ipc-routine-practices-algorithm-cc.pdf>

Patients who meet the case definition of COVID-19 or have laboratory confirmed COVID-19 admitted to the ICU will be cared for using contact and droplet precautions. Use N95 respirators for **aerosol generating medical procedures** (AGMP) which are defined as:

- Intubation and related procedures (e.g. manual ventilation, open endotracheal suctioning)
- Cardio pulmonary resuscitation
- Bronchoscopy
- Sputum induction
- Nebulized therapy
- Non-invasive ventilation (i.e. BiPAP)
- Open respiratory/airway suctioning
- High frequency oscillatory ventilation
- Tracheostomy care
- Nebulized therapy/aerosolized medication administration
- High flow heated humidity oxygen therapy devices (ex. ARVO, Optiflow)

<https://www.albertahealthservices.ca/assets/healthinfo/ipc/hi-ipc-respiratory-additional-precautions-assessment.pdf>

For patients receiving continuous or frequent AGMP (e.g. High flow heated humidity oxygen therapy devices, NIV, tracheostomy with frequent suctioning) healthcare providers should wear N95 masks. In addition, due to the risk of disconnection of endotracheal tube and ventilator, healthcare providers should use N95 masks when providing care to all intubated, presumed or confirmed, COVID-19 patients.

### **Personal Protective Equipment (PPE)**

#### **Donning:**

<https://www.albertahealthservices.ca/assets/Infofor/hp/if-hp-ipc-donning-ppe-poster.pdf>

#### **Doffing:**

<https://www.albertahealthservices.ca/assets/Infofor/hp/if-hp-ipc-doffing-ppe-poster.pdf>

## PPE Checklist Contact and Droplet Precautions

Steps for putting on PPE			Steps for taking off PPE		
<b>1</b>		Clean hands	<b>1</b>		Gloves
<b>2</b>		Gown	<b>2</b>		Clean hands
<b>3</b>		Mask with visor or mask and eye protection	<b>3</b>		Gown
<b>4</b>		Gloves	<b>4</b>		Clean hands
			<b>5</b>		Mask with visor or mask and eye protection
			<b>6</b>		Hand sanitizer or soap and water

- Brush up on your PPE skills using the following online resources:
- Video (12 min): Donning and Doffing (scroll to bottom of page) <https://insite.albertahealthservices.ca/shc/Page6461.aspx>
  - Module: [AHS IPC Personal Protective Equipment Contact and Droplet, COVID-19](#)

## B. THE ESSENTIALS

As some time has passed since you worked at the ICU bedside, some tools have been made to assist you with basic ICU nurse skill concepts and skills:

- Click on the links below for **ICU Quick Tips** supporting daily work in the ICU. These tips may be used during your shifts at the bedside.
- **ICU Worksheet** (sample 1) (page 21)
  - **ICU Worksheet** (sample 2) (page 22)
  - **Beginning of Shift Safety Checks** (page 23)
  - **Adult Patient Assessment** (page 24)
  - **Arterial Lines** (page 26)
  - **Central Lines** (page 27)

## C. ICU TOPICS

Care of the critically ill adult COVID-19 (suspected and confirmed) patient continues to evolve. The AHS critical care community has compiled a living document that adapts prior pandemic knowledge and Influenza-like illness (ILI) guidance to the current COVID-19 crises. The intention of the document is to guide all providers of critical care in Alberta as to the basic care of adult critically ill patients with known or suspected COVID-19 infection. Our goal is to ensure such patients receive optimal, consistent and equitable care throughout the ICUs in Alberta. For the most current document iteration, refer the novel coronavirus (COVID-19) page on Insite, under 'Staff and Physician Resources'.

Direct link: [AHS Care of the Adult Critically Ill COVID-19 Patient](#)

### The Adult Critically Ill COVID-19

The experience ICUs who have cared for COVID-19 patients has provided an insight into what to potentially expect in Alberta. Critically ill adult COVID-19 patients:

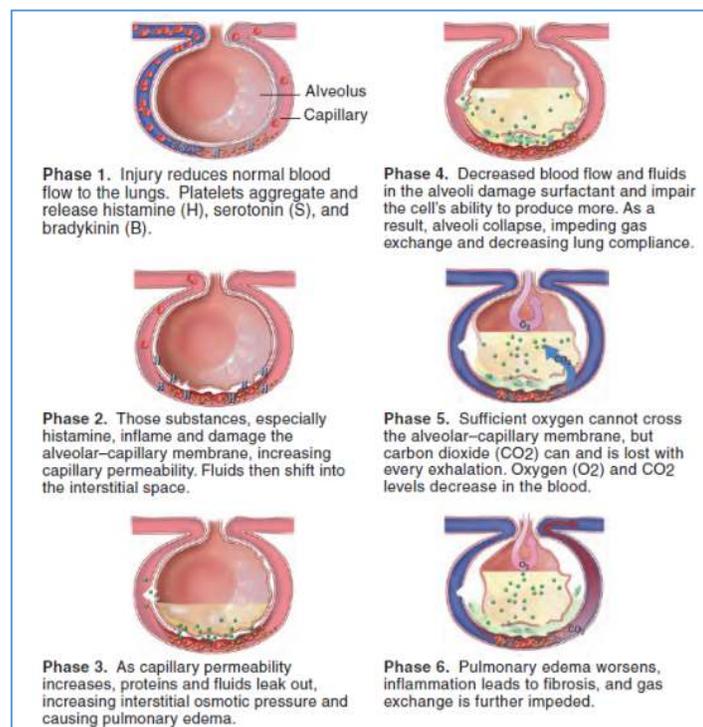
- Develop ARDS
- Frequently require intubation and invasive ventilation

- May benefit from prone positioning
- May benefit from conservative fluid management
- May require specific pharmacological agents:
  - Analgesia
  - Sedation
  - Vasopressors, inotropes
  - Non-depolarizing Neuromuscular Blockade Agents (NMBAs)
- Require consideration in special circumstances (i.e. Code Blue Management)

## 1. Acute Respiratory Distress Syndrome (ARDS)

ARDS, a complex clinical syndrome involving a sudden and potentially life-threatening deterioration in pulmonary gas exchange, is the most severe form of acute respiratory failure. The SARS-COV-2 virus triggers ARDS by directly affecting the epithelium in the lungs. The alveolar-capillary membrane is damaged causing increased capillary permeability and increased alveolar-capillary membrane permeability. The increased permeabilities allow fluid, plasma proteins, and blood to leak out of the vascular compartment into the interstitial and alveolar spaces. A good visual of this concept is to imagine the lung interstitium and alveoli being flooded with fluid (see 'ARDS Pathophysiology' image below). This interstitial and alveolar edema causes respiratory failure due to the lungs inability to remove CO<sub>2</sub> and/or failure to promote O<sub>2</sub> uptake at the alveolar-capillary level.

### ARDS Pathophysiology



Lippincott Manual of Nursing Practice, 10e, 2009

## ARDS Signs and Symptoms

- Increased work of breathing (tachypnea, dyspnea) as there is increased intrapulmonary blood shunting
- Worsening hypoxia with persistently low SaO<sub>2</sub> despite increasing FiO<sub>2</sub> levels
  - The PaO<sub>2</sub>/FiO<sub>2</sub> ratio provides information about the severity of intrapulmonary shunt secondary to lung injury
- Impaired gas exchange with hypercarbia due to impaired ventilation
- Accessory muscle use, exhaustion
- Decreased breath sounds, coarse crackles
- Chest x-ray revealing bilateral infiltrates (“ground glass” appearance), and eventual complete “white-out”
- Arterial blood gases (ABGs) reflecting initial alkalosis followed by acidosis as condition does not improve

**ABG ICU Quick Tip** (page 28)

The management priority for the patients experiencing COVID-19 related ARDS includes promoting gas exchange by optimizing oxygenation and ventilation.

## 2. Respiratory Care

### Non-Intubated Patients

Important non-intubated patient respiratory guidelines for the COVID-19 patient are listed in the [AHS Care of the Adult Critically Ill COVID-19 Patient](#) document.

Principles of particular interest to nursing include:

- Provide oxygen therapy as ordered with continuous SpO<sub>2</sub> monitoring
  - No peak flow monitoring
  - Nebulization should be avoided and used only as an exception
  - Bronchodilator delivery via MDI via spacer is preferred if patients can effectively utilize
  - High flow heated humidity oxygen therapy devices (ARVO, OptiFlow) are not recommended
  - Non-invasive positive pressure ventilation is not recommended
- Principle: minimize aerosolization of respiratory secretions

Non-invasive ventilation (NIV) (e.g. CPAP, BiPAP) may result in aerosilization of respiratory secretions and thus is not recommended for use in suspected or confirmed COVID-19 patients. Further, NIV with hypoxemic respiratory failure or ARDS often fails requiring emergent intubation.

### **Intubation and Mechanical Ventilation**

The hypoxemic respiratory failure and ARDS triggered by the COVID-10 virus often requires intubation and mechanical ventilation.

**Intubation** should be performed in a timely (sooner versus later) and controlled manner (by the most experienced MRHP available) using all optimal infection prevention strategies and should minimise the risk of aerosilization of secretions. Important intubation guidelines for the COVID-19 patient are listed in the [AHS Care of the Adult Critically Ill COVID-19 Patient](#) document.

**Assigning with Intubation ICU Quick Tip** (page 29)

### **Mechanical Ventilation**

ARDS patients require advanced ventilator modes and care to support gas exchange:

- a) Lung protective ventilator strategies that restrict tidal volumes to 6-8 mL/kg of Ideal Body Weight (IBW)
  - *Avoiding larger tidal volumes may decrease barotrauma*
- b) Limit plateau pressures to equal to or less than 30 cmH<sub>2</sub>O (exceptions include conditions where there is additional pulmonary extra-parenchymal restrictive physiology such as large pleural effusions, severe obesity or abdominal compartment syndrome)
  - *Prevents alveolar over-distention*
- c) Permissive hypercapnia
  - *Allowing high carbon dioxide concentration in blood*
- d) Optimal titration of Positive end expiratory pressure (PEEP)
  - *Helps prevent alveolar collapse*
- e) Recruitment maneuvers as tolerated (performed by RT)
  - *Encourages alveolar opening, prevents atelectasis*
- f) If refractory hypoxemia evolves (e.g. PaO<sub>2</sub>/FiO<sub>2</sub> ratio less than 150 after attempting all of the above strategies), consider using non-conventional

modes of ventilation such as APRV, and epoprostenol as per local policy.

- g) If advanced respiratory care has failed to improve oxygenation or can be only accompanied by applying mechanical ventilation that is not lung protective, consider consulting the ECLS Team (Edmonton for Northern Alberta, Calgary for Southern Alberta).

**Mechanical Ventilation Modes and Suctioning ICU Quick Tip (page 30)**

### **Prone Positioning**

Prone positioning may be used in mechanically ventilated patients experiencing COVID-19 induced ARDS by increasing pulmonary capillary perfusion, improving oxygenation, and reducing ventilator-induced lung injury.

Prone positioning has been shown to:

- Expand dependent lung areas
- Improve postural drainage
- Reduce the work of breathing due to reduced pressure on lungs from cardiac structures and abdominal organs

Turning a patient from the supine to prone position is a coordinated effort, accomplished by a multidisciplinary team. Please follow your unit's prone positioning procedure.

### **Neuromuscular Blockade**

Mechanically ventilated critically ill COVID-19 patients may benefit from deep sedation and paralysis. Neuromuscular blockade agents (NMBAs) provide skeletal muscle relaxation, and when used for greater than 24 hours:

- Facilitate oxygenation and ventilation in patients with severe respiratory failure
  - More advanced modes alter normal respiratory patterns (pressure control, inverse ratio, permissive hypercapnia). This may cause the patient respiratory effort to be asynchronous with the ventilator.
    - If aggressive sedation/analgesia is ineffective to ensure optimal peak/mean airway pressures and oxygenation, paralytic therapy may:
      - a) Optimize ventilation
      - b) Improve gas exchange
      - c) Minimize barotrauma
      - d) Decrease airway pressures

e) Improve tidal volume

f) Allow hypercapnia

- Reduce metabolic demands by stopping muscle movement: In instances of hemodynamic instability with increased metabolic demands, pharmacologic paralysis with sedation/analgesia and mechanical ventilation reduces the metabolic demands until supportive therapies can be effective.

### Reminders

- Patient must be intubated and ventilated, with a ventilator mode with a pre-set frequency as the respiratory muscles will be paralyzed.
- Sedation must be administered prior to NMBAs
- Chemical paralysis with no movement masks changes identified with clinical assessment.
- Reversal agent: Anticholinesterase agents (e.g. neostigmine (prostigmine))
- Neuromuscular blocking agents do not have sedative or analgesic properties; the patient is aware of the surroundings and experiences pain (analgesics/sedatives should also be administered)

The patient's need for subsequent doses of NMBAs may be assessed by using a peripheral nerve stimulator (PNS)/Train of Four (TOF) or ETCO<sub>2</sub> monitoring as per your unit procedure.

### Fluid Management

The AHS Care of the Critically Ill Adult recommends:

- Use conservative fluid management in patients with COVID-19 when there is no evidence of shock.
- Patients with COVID-19 should be treated cautiously with intravenous fluids, because aggressive fluid resuscitation may worsen oxygenation.
- Hypotonic fluids, starches and albumin should generally be avoided.

### 3. Pharmacology

Critically ill COVID-19 patients may benefit from deep sedation and paralysis as part of their overall treatment plan.

<input checked="" type="checkbox"/>	<b>Pharmacology ICU Quick Tips (page 31)</b>
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#### **4. Code Blue Management**

In the event of a Code Blue for patients with suspected or confirmed COVID-10 infection in the ICU, all responding staff must apply all PPE, including N95 mask and eye protection before entering the patient's room. Crash carts will be brought into the patient's room and used as required. The crash care must be appropriately decontaminated according to the equipment cleaning guidelines before it is removed from the room.

Be familiar with your site code blue standardized paper charting sheets or electronic charting if there is an electronic device already residing in the patient room. Do not bring portable electronic devices into the room. To avoid contaminating documents or rhythm strips, the recorder should be located as far from the patient as possible and both the recorder and charting record should remain clean. The recorder should refrain from doing any direct patient care and should not come in contact with anything in the environment. The recorder should use a N95 respirator and face shield, while gloves and gown are not necessary. When resuscitation is complete, the Recorder should place the clean documents outside the room without leaving the room, then doff their PPE prior to exiting the room.

## Pandemic Education Planning ICU Refresher Nurse Profile

Instructions: Complete this form and return to your Manager or Clinical Nurse Educator.

<b>General Information</b>	
Name:	
Phone/Cell:	
Email:	
ePeople Number:	

<b>Current Status/Employment</b>			
<input type="checkbox"/>	Retired	Number of years:	
<input type="checkbox"/>	Staff Nurse	Number of years:	Department/Site:
<input type="checkbox"/>	Management	Number of years:	Department/Site:
<input type="checkbox"/>	Education	Number of years:	Department/Site:
<input type="checkbox"/>	Research	Number of years:	Department/Site:
<input type="checkbox"/>	Other:	Number of years:	Department/Site:
Comments:			

<b>Past Critical Care Experience</b>		
Location(s) of ICU experience (City, Site, ICU Specialty):		
Number of years of ICU experience:		
Time elapsed since active duty:	<input type="checkbox"/> Less than 6 month <input type="checkbox"/> 6 months to 11 months	<input type="checkbox"/> 1 to 3 years <input type="checkbox"/> Greater than 3 years
Comments:		

Mgr/CNE comments:
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## Pandemic Education Planning ICU Nurse Skills Checklist

Instructions: Please print and complete this form and return to your Manager or Clinical Nurse Educator.

### General Information

Name:	
Phone/Cell:	
Email:	

### Skills Checklist

This self-assessment skills checklist will be used in planning to meet additional education needs should you be asked to support patient care in the ICU. Instructions: Please consider each ICU skill listed below and **assign a number score to two skill elements**:

1. Your knowledge base surrounding the listed skill, AND
2. Your comfort in performing the skill with your current knowledge base

Knowledge Assessment	
4	Well-developed/advanced knowledge
3	Some knowledge
2	Limited knowledge
1	No current knowledge

Comfort to Perform	
3	Comfortable to perform
2	Somewhat uncomfortable: need experience/demo refresh, and/or support at bedside before performing
1	Not comfortable: require full education before performing

	Knowledge Assessment	Comfortable to Perform	What would be helpful to you?
<b>Central Nervous System</b>			
Sedation vacation			
Restraints (monitoring & documentation)			
ICU Delirium			
Physical Assessment:			
Pupil assessment			
Glasgow Coma Scale			
Seizure management			
Stroke management			

Targeted Temperature Management			
Train of Four			
Advanced neuro monitoring (EVD, LICOX, etc.)			
Cerebral tissue perfusion alterations			
<b>Cardiovascular</b>			
Physical Assessment			
Heart sound auscultation			
NIBP			
Peripheral pulses			
Edema			
Cardiac Monitoring			
Normal sinus rhythm			
Common arrhythmias			
Lethal arrhythmias			
ECG strip analysis			
Assist with Line Insertion			
Central line/Introducer			
Dialysis catheter insertion			
Intraosseous needle insertion			
Hemodynamics/Lines			
Arterial pressure line setup			
Arterial line insertion assistance			
Arterial line levelling and zeroing			
Arterial line waveform			
Arterial line blood sampling & flushing			
Central line blood sampling			
Central venous pressure line setup			
Central venous line levelling and zeroing			
Central venous pressure monitoring			
Pulmonary artery pressure line setup			
Pulmonary artery pressure insertion assistance			

Pulmonary artery pressure waveform			
Pulmonary artery pressure management			
Intra-aortic balloon setup			
Intra-aortic balloon counterpulsation			
Intraosseous infusion management			
<b>Temporary Pacemakers</b>			
Transcutaneous pacing			
Transvenous pacer insertion assistance			
Transvenous pacer management			
Epicardial pacing			
<b>Procedures</b>			
Cardioversion			
Defibrillation			
<b>ECMO/Nova Lung</b>			
Ventricular Assist Device			
<b>Fluid Management</b>			
Blood & blood product administration			
Rapid transfuser use			
Fluid warmer use			
<b>Code Blue</b>			
ACLS algorithms			
CPR			
<b>Respiratory</b>			
<b>Physical Assessment</b>			
Lung sounds			
Peripheral perfusion			
Pulse oximeter			
ABG analysis			
Bag valve mask use			
Assisting with intubation			

Pre-oxygenation & suctioning			
Endotracheal tube management			
Mouth care			
Oral airway management			
Trach management			
Proning			
Non-invasive ventilation (CPAP, BiPAP)			
<b>Mechanical Ventilation</b>			
Modes			
FiO <sub>2</sub>			
PEEP			
Rate			
Tidal volume			
Weaning			
<b>Chest Tubes</b>			
Assist with insertion			
Management			
Changing drainage system			
Monitoring			
<b>Gastrointestinal &amp; Genitourinary</b>			
Bowel sound assessment			
Abdominal pressure monitoring			
Feeding tubes			
OGT/NGT insertion			
OGT/NGT management			
Blood glucose monitoring			
Intake and output			
Hemodialysis			
CRRT			
<b>Medication Administration</b>			
Direct IV administration			
Administration/Titration			

High dose analgesia			
High dose sedatives			
Inotropes & vasoactives			
Neuromuscular blocking agents			
Electrolyte replacement			
Diuretics			
Insulin			
Bronchodilators			
Anticoagulants/antiplatelets			
Antihypertensives			
Antiarrhythmics			
Patient controlled analgesia			
Epidural analgesia			
<b>Safety</b>			
Safety checks			
Setting alarm parameters			
<b>Infection Control</b>			
Routine universal precautions			
PPE use			
Isolation precautions			
Donning and Doffing			
<b>Musculoskeletal</b>			
CSM Assessment			
Sequential Compression Device			
Wound care			
<b>Laboratory &amp; Diagnostics</b>			
Nasopharyngeal swab collection			
Patient transport for tests (i.e. to CT)			
Interpretation of electrolyte imbalance			

Interpretation of coagulopathies			
Cardiac markers			
Hepatic markers			
Renal markers			
Sepsis markers			
<b>Psychosocial</b>			
Collaboration with spiritual care			
Collaboration with social work			
End of life care			
Family involvement in resuscitation			
Post-mortem care			
<b>Equipment</b>			
Setup, Use and Troubleshooting			
IV infusion pump			
Patient monitor			
Central station monitor			
Transport monitor			
Telemetry			
Automated medication dispenser			
Defibrillator			
Ventilator			
Heating/cooling blanket			
CRRT/IHD machines			
Tube feed pump			
<b>Other</b>			

ICU Worksheet			
Date:	Room:	Pt Initials:	Age:
GOC:	Isolation:	MD/NP:	
Assessment		Notes	
CNS	GCS: RASS: ICDSC:		CNS
	Pain: CPOT/NPS:		
	Sleep:		
	Mobilization:		
	Restraints:		
CVS	Rhythm: HR:		CVS
	BP: T:		
	MAP: Artline:		
	Pulses: Edema:		
	Infusions:		
RESP	O2/ Ventilation:		RESP
	RR: SpO2:		
	Suctioning:		
	Breath Sounds:		
GI	Abdomen:		GI
	NG/OG:		
	Diet: PN:		
	Enteral Feeds:		
	Nausea/Vomiting: Last BM:		
	Drains:		
	Dressings:		
GU	Urine Output:		GU
	Fluid Balance:		
	Dialysis:		
Labs/Tests:		Outstanding:	
Family:			

ICU Worksheet			
<b>Date:</b>	<b>Room:</b>	<b>Pt Initials:</b>	<b>Age:</b>
<b>GOC:</b>	<b>Isolation:</b>	<b>MD/NP:</b>	
Assessment		Shift Planner	
<b>CNS</b>	GCS: Pupils:	0730 / 1930	
	Analgesic: CPOT/NPS:		
	Sedation: RASS:	0800 / 2030	
	ICDSC:		
	Paralytic:	0900 / 2100	
	Restraints: Mobilization: Sleep:		
<b>CVS</b>	Rhythm: HR:	1000 / 2200	
	BP: T:		
	MAP: Artline:	1100 / 2300	
	Pulses: Edema:		
	Infusions:	1200 / 2400	
		1300 / 0100	
<b>RESP</b>	O2/ Ventilation: FiO2:	1400 / 0200	
	ETT/Trach Size:		
	Difficult Airway: Y / N RR: SpO2:	1500 / 0300	
	Suctioning:		
	Breath Sounds:	1600 / 0400	
	Drains & Tubes:	1700 / 0500	
<b>GI</b>	Abdomen:		
	NG/OG:	1800 / 0600	
	Diet: PN:		
	Enteral Feeds: Rate: Residuals:	1900 / 0700	
	Glucometer: Oral Health:		
	Nausea/Vomiting: Last BM:	<b>To Do:</b>	
		<input type="checkbox"/>	
<b>GU</b>	Drains:	<input type="checkbox"/>	
	Dressings:	<input type="checkbox"/>	
	Hourly Intake:	<input type="checkbox"/>	
	Urine Output: Characteristics:	<input type="checkbox"/>	
	Fluid Balance: Fluid Balance Goal:	<input type="checkbox"/>	
CRRT/Dialysis:	<input type="checkbox"/>		
<b>Labs/Tests:</b>		<b>Outstanding Issues:</b>	
<b>Family:</b>			

## Beginning of Shift Safety Checks

Safety Check	Comments
<b>Patient Identification</b> <ul style="list-style-type: none"> <li>• Patient wristband</li> <li>• Allergy wristband</li> <li>• Crossmatch wristband</li> </ul>	<input type="checkbox"/> Legible wristbands must be on wrists or ankles <ul style="list-style-type: none"> <li>• NOT taped to bed</li> <li>• Call Transfusion Medicine if a Crossmatch wristband needs to be moved</li> </ul>
<b>Goals of Care (GOC)</b>	<input type="checkbox"/> Know your patient's GOC <ul style="list-style-type: none"> <li>• Check green sleeve on chart</li> <li>• If not written, patient is R1</li> </ul>
<b>Bag Valve Mask (BVM)</b> <ul style="list-style-type: none"> <li>• Bagger</li> <li>• Positive End Expiratory Pressure PEEP valve</li> <li>• Mask / 10mL syringe</li> </ul>	<input type="checkbox"/> Bagger must be present, operational and able to reach the patient <ul style="list-style-type: none"> <li>• PEEP valve required for ventilated patients on a PEEP greater than 5cmH2O</li> </ul>
<b>Oxygen Source</b>	<input type="checkbox"/> Oxygen wall regulator and/or tank (1000 PSI minimum) present and functional
<b>Suction</b> <ul style="list-style-type: none"> <li>• In-line suction</li> <li>• NG/OG suction</li> <li>• Yaunker suction</li> <li>• EVAC/CASS suction</li> </ul>	<input type="checkbox"/> Suction must be functional and patent <ul style="list-style-type: none"> <li>• In-line suction no more than 125mmHg</li> <li>• NG/OT set on intermittent / low</li> <li>• Yaunker readily available</li> <li>• EVAC/CASS: Responsibility of RRT</li> </ul>
<b>Siderails</b>	<input type="checkbox"/> Are up and locked at all times
<b>Bed Brakes</b>	<input type="checkbox"/> Are ON at all times
<b>Restraints</b> <ul style="list-style-type: none"> <li>• Wrist/ankle</li> </ul>	<input type="checkbox"/> Confirm MP/NP Order <input type="checkbox"/> Ensure adequate circulation to extremities <ul style="list-style-type: none"> <li>• Be able to insert two fingers under each wrist and/or ankle restraint</li> </ul>
<b>Cardiac Alarm Limits</b> <ul style="list-style-type: none"> <li>• Heart rate / Respiratory rate</li> <li>• Blood pressure / Arterial line pressure</li> <li>• Oxygen saturation (SpO2)</li> </ul>	<input type="checkbox"/> Alarms set based on knowledge of patient condition and 'normal values' <input type="checkbox"/> <b>Alarms are NEVER turned off</b>
<b>Oxygen Therapy</b> <ul style="list-style-type: none"> <li>• Non-Invasive (Bi-PAP)</li> <li>• Invasive (mechanical ventilation)</li> </ul>	<input type="checkbox"/> Non-Invasive: know respiratory rate / FiO2 <input type="checkbox"/> Invasive: know mode / FiO2 / PEEP
<b>Intravenous Infusions</b> <ul style="list-style-type: none"> <li>• Critical Care profile</li> </ul>	<input type="checkbox"/> All lines must be labelled <input type="checkbox"/> Maintenance/main line should be labelled and readily available

# Adult Patient Assessment

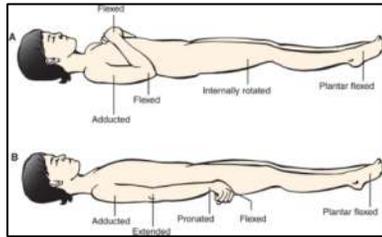
CNS

**Level of Consciousness (LOC):** Most important aspect of neurological exam as LOC usually deteriorates before other changes noted. Baseline assessment essential. Two major components:

- Arousal: ability to respond to verbal or noxious stimuli
- Awareness: orientation to person, place, and time

**Glasgow Coma Scale (GCS):** Determines level of arousal. Objective 15 point scale, scoring three items (*score in parenthesis*):

1. **Eye Opening:** Spontaneous (4); To speech or command (3); To noxious stimuli (2); None regardless of stimulation (1)
  - Pupils normally round, average size 3.5, with brisk reaction to light.
  - Sudden dilated or fixed pupil is an emergency.
2. **Best Verbal Response** (ask "what is your name"): Oriented to person, place, and time (5); Confused as answers not appropriate to question, but use of language correct (4); Inappropriate words that are disorganized, random, no sustained conversation (3); Incomprehensible sounds that are moans, groans, mumbles (2); None with no verbalization despite stimulation (1)
  - Some units will score out of 10 (eliminating verbal response) for intubated pts.
3. **Best Motor Response** (ask "show me your thumb", not "squeeze my hand"): obeys commands: Obeys commands, being able to perform tasks on command (6); Localizes pain with an organized attempt to localize and remove painful stimuli (5); Withdraws from pain, in using extremity to withdraw from pain (4); Abnormal flexion, with decorticate posturing spontaneously or in response to pain (3); Abnormal extension, with decerebrate posturing spontaneously or in response to pain (2), none, with no response to noxious stimuli, flaccid (0).

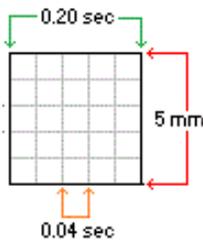
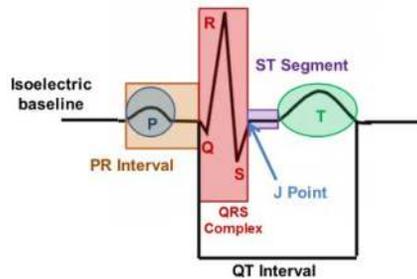


Stimulating Motor Response:

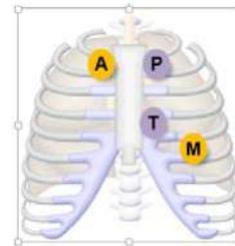
- Central Stimulation (more reliable as it assesses higher centers in the brain): trapezius squeeze, pinch
- Peripheral Stimulation (less reliable as it can be a simple spinal reflex): nailbed or interphalangeal joint pressure

CVS

**ECG Strip, HR**

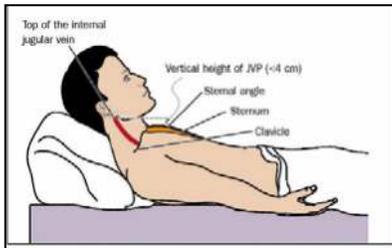


**Heart Sounds**



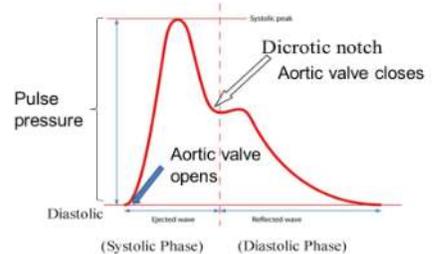
- Aortic Area**
  - 2<sup>nd</sup> ICS
  - Over aorta
- Pulmonic Area**
  - 2<sup>nd</sup> ICS
  - Over pulmonary artery
- Mitral Area (apex)**
  - 5<sup>th</sup> ICS
- Tricuspid Area**
  - 4<sup>th</sup> ICS

**JVD/JVP**



**JVD** implies the jugular vein was noted on assessment.  
**JVP** implies an actual measure was made. If greater than 4 cm, the JVP is increased.

**Artline, BP**



**Skin:** color, temperature, moisture

**Edema:** pitting, non-pitting

**Peripheral Pulses:** Compare bilaterally (not carotid); presence, rate, rhythm, amplitude. If not palpable, use Doppler.

**Nailbed Appearance:** normally pinkish

**Cap Refill:** apply pressure to nailbeds for 5 seconds, then release; normally takes 3 secs for color to return

**Calf Appearance:** redness, swelling, tenderness

**Breathing:** rate, rhythm, degree of effort, use of accessory muscles

**Tracheal Position**

**Presence of SOB, cough, secretions**

**Chest wall expansion**

**Normal Breath Sounds**

- **Bronchial (Tracheal)**
  - Over major central airways
  - Loud, high-pitched / Harsh and hollow
- **Bronchovesicular**
  - Upper sternum, between the scapulae
  - Medium pitch
- **Vesicular**
  - Peripheral lung fields
  - Quiet, low-pitched / Soft and rustling

**Auscultation**

AIR ENTRY
ADEQUATE
Slightly DECREASED
DECREASED
ABSENT

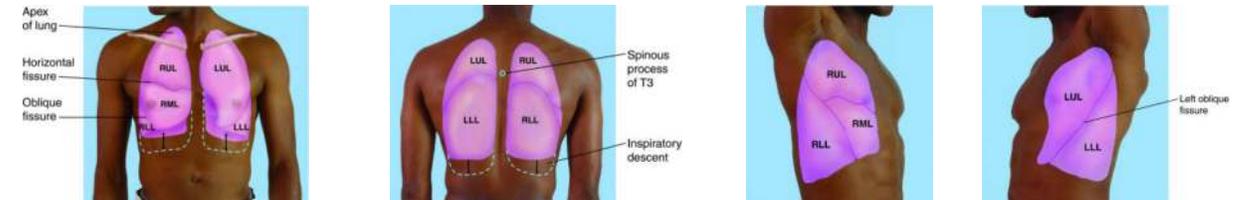
BREATH SOUNDS
NORMAL (CLEAR)
CRACKLES
WHEEZES
PLEURAL FRICTION RUB
STRIDOR

**Most Common Adventia:**

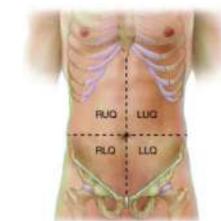
**Crackles:** Air moving through small amount of fluid in airways, small collapsed alveoli/airways reopening. May be crackling or popping, on inspiration or expiration, fine or coarse. May clear with breathing/coughing.

**Wheezes:** Air moving through narrowed airways. Continuous musical quality. Heard mainly on expiration, but may be heard throughout resp cycle.

**Auscultation Landmarks**



**Quadrants**



**Abdomen:**

**Presence of Pain**

**Inspect:** Contour, symmetry, color, scarring

**Auscultate:** Each quadrant at least 1 minute. Bowel sounds: normal are faint, low-pitched occurring every 5-15 seconds. Abnormal: hypoactive, hyperactive, absent

**Palpate:** light palpation only

**Mouth:** cheeks, teeth, gums, tongue

**Nutritional Status**

**Urine**

**Characteristics:** color, clarity

**Normal Output:** 0.5 mL/kg/hour

**Fluid Balance**

**Admission & Daily Weights:** most important indicator of fluid balance

- 1 kg of water = 1 liter of fluid

**Positive Fluid Balance** (contributes to hypervolemia) seen as: edema, dyspnea, S3, respiratory crackles

**Negative Fluid Balance** (contributes to hypovolemia) seen as: rapid weak pulse, tachycardia

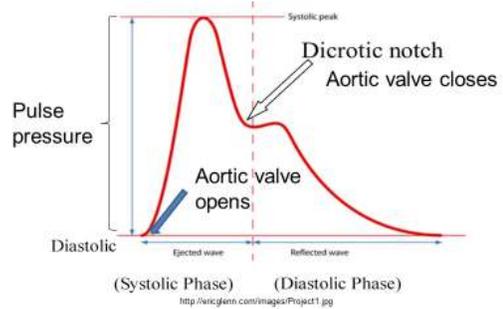
<b>OLIGURIA</b>	Low urinary output (Less than 400 mL/24 hours)
<b>POLYURIA</b>	Excessive or abnormally large passage of urine
<b>ANURIA</b>	Absence of urinary output (Less than 50 mL/24 hours)
<b>AZOTEMIA</b>	High levels of nitrogen-containing compounds in the blood (i.e. waste)
<b>ACUTE KIDNEY INJURY (AKI)</b>	Previously: Acute Renal Failure (ARF) Sudden / rapid loss kidney function

Lippincott procedure and advisor. (2020). Retrieved from <http://advisor.lww.com>

## Arterial Lines

### Maintenance

- ❑ Q4H assess pressure line and insertion site, ensuring:
  - Insertion site healthy
  - Color, sensation and warmth to distal limb
  - Dressing clean and intact
  - Pressure bag inflation at 300 mmHg (delivery rate 3 mL/hour)
  - Adequate flush solution in pressurized bag to maintain forward flow
- ❑ Q96H minimum, change tubing, flush solution, dressing
- ❑ Ensure alarms and scales set appropriately
- ❑ System must be levelled & zeroed for accurate readings



### Levelling & Zeroing

#### When to Level:

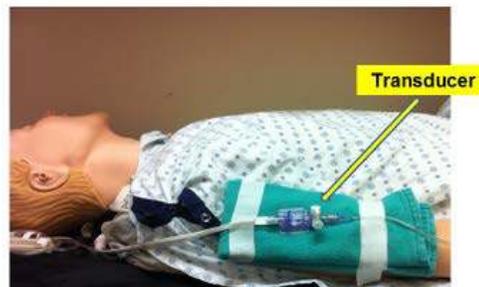
- Prior to insertion
- Beginning of shift
- After repositioning/disconnection

#### When to Zero:

- On insertion/initiation
- Beginning of shift
- After any disruption of pressure monitoring system such as tubing or cable disconnections/changes

#### How:

1. Position patient as per site direction
2. Connect pressure cable to transducer and monitor
3. Ensure waveform labeled and scale set appropriately
4. Ensure transducer positioned at phlebostatic axis
5. Close stopcock to patient and open to atmosphere, remove non-fenestrated cap
6. Select ZERO on monitor
7. Verify zero reference established on monitor
8. Close stopcock, replace cap
9. Ensure waveform return



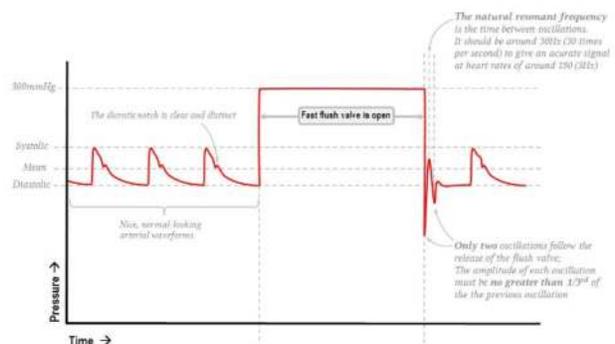
### Dynamic Response Testing

#### When:

- Beginning of each shift
- With any change in waveform

#### How:

1. Quickly flush the system by pulling fast flush
2. Square waveform should appear
3. This should immediately be followed by 1 or 2 oscillations
4. Usual ABP waveform should then reappear
5. The square wave test is much more accurate than using the cuff pressure to evaluate the accuracy of the arterial pressure values



## Central Lines

### General

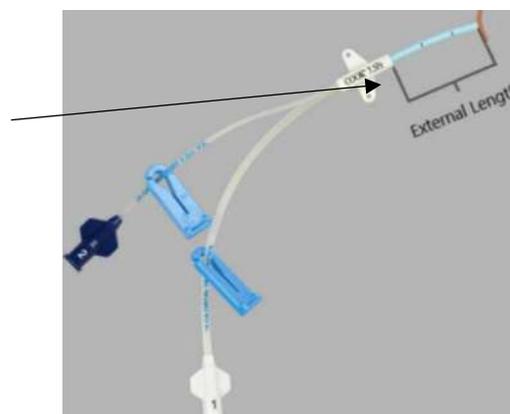
- Assess need for device daily
- Assess insertion site and path of device (PICC) every 4 hours after insertion for 24 hours, then once a shift
- Assess device function by flushing and aspirating for blood return prior to use each
- Change continuous IV tubing no more frequently than every 96 hours, and at least every 7 days or with new line insertion
- Change intermittent IV tubing every 24 hours
- Change transparent dressings weekly and as needed
- Change Propofol tubing every 12 hours
- Use aseptic technique with dressing changes: sterile gloves, mask
- [CVAD Dressing Change Checklist](#)
- [CVAD Flushing and Locking Checklist](#)

**For clinical guidance, refer to the CKCM Clinical Care Topic (CCT):**

[Vascular Access Device Infusion Therapy: Adult and Pediatric – All Locations](#)

### Non-Tunneled CVAD

- Assess external length with each assessment
  - Compare to external length at insertion
  - Measure external length with dressing change and when dislodgement/migration suspected
- Flush with NaCl 0.9% 10 mL
  - Exception: following lipids, blood products, blood sampling and medications known to precipitate, flush with 20 mL.
- Flush and Lock: at least every 24 hours when not in use (see Physician Order for locking solution)



### Peripherally Inserted Central Venous Catheter (PICC)

- Assess external length with each assessment
  - Compare to external length at insertion
  - See CCT for how to measure
- If PICC arm edematous, measure arm circumference 10 cm above ante-cubital fossa; compare to other arm
- Flush with NaCl 0.9% 10 mL
  - Exception: following lipids, blood products, blood sampling and medications known to precipitate, flush with 20 mL.
- Flush and Lock: at least every 7 days when not in use (see Physician Order for locking solution)



## Arterial Blood Gases (ABGs)

Component	Normal Value	Notes
pH	7.35 – 7.45	<ul style="list-style-type: none"> <li>• Indirect measure of the hydrogen ion (H<sup>+</sup>) concentration: as H<sup>+</sup> concentration increases, pH decreases</li> <li>• Acidemia: when pH less than 7.35</li> <li>• Alkalemia: when pH greater than 7.45</li> </ul>
PaO <sub>2</sub>	80 – 100 mmHg	<ul style="list-style-type: none"> <li>• Measure of partial pressure of oxygen (O<sub>2</sub>) dissolved in arterial blood</li> <li>• PaO<sub>2</sub> less than 80: Hypoxemia</li> <li>• PaO<sub>2</sub> less than 40: Life threatening</li> </ul>
PaCO <sub>2</sub>	35 – 45 mmHg	<ul style="list-style-type: none"> <li>• Natural by-product of cellular metabolism</li> <li>• Measure of the partial pressure of carbon dioxide (CO<sub>2</sub>) in arterial blood</li> <li>• Is the 'respiratory' component in acid-base balance</li> <li>• PaCO<sub>2</sub> greater than 45: Respiratory Acidosis</li> <li>• PaCO<sub>2</sub> less than 35: Respiratory Alkalosis</li> </ul>
HCO <sub>3</sub> <sup>-</sup> (Bicarbonate)	22 – 26 mEq/L	<ul style="list-style-type: none"> <li>• The main 'base' found in blood serum</li> <li>• Is the 'metabolic' component in acid-base balance</li> <li>• Increased HCO<sub>3</sub><sup>-</sup>: Metabolic Alkalosis</li> <li>• Decreased HCO<sub>3</sub><sup>-</sup>: Metabolic Acidosis</li> </ul>

	pH	PaCO <sub>2</sub>	HCO <sub>3</sub> <sup>-</sup>
Respiratory Acidosis	↓	↑	Normal
Respiratory Alkalosis	↑	↓	Normal
Metabolic Acidosis	↓	Normal	↓
Metabolic Alkalosis	↑	Normal	↑

### Things to Know about ABGs and Values

#### 1. pH

- When pH is LESS than 7.35 = patient is becoming ACIDOTIC
- When pH is GREATER than 7.45 = patient is becoming ALKALOTIC

#### 2. In ICU, we will often accept a PaO<sub>2</sub> of 60mmHg or higher

- Rationale: SaO<sub>2</sub> will be greater than 90% (which means over 90% of the hemoglobin is saturated with oxygen – a good thing)
- When PaO<sub>2</sub> LESS than 60mmHg: Call RT – Need to increase FiO<sub>2</sub>

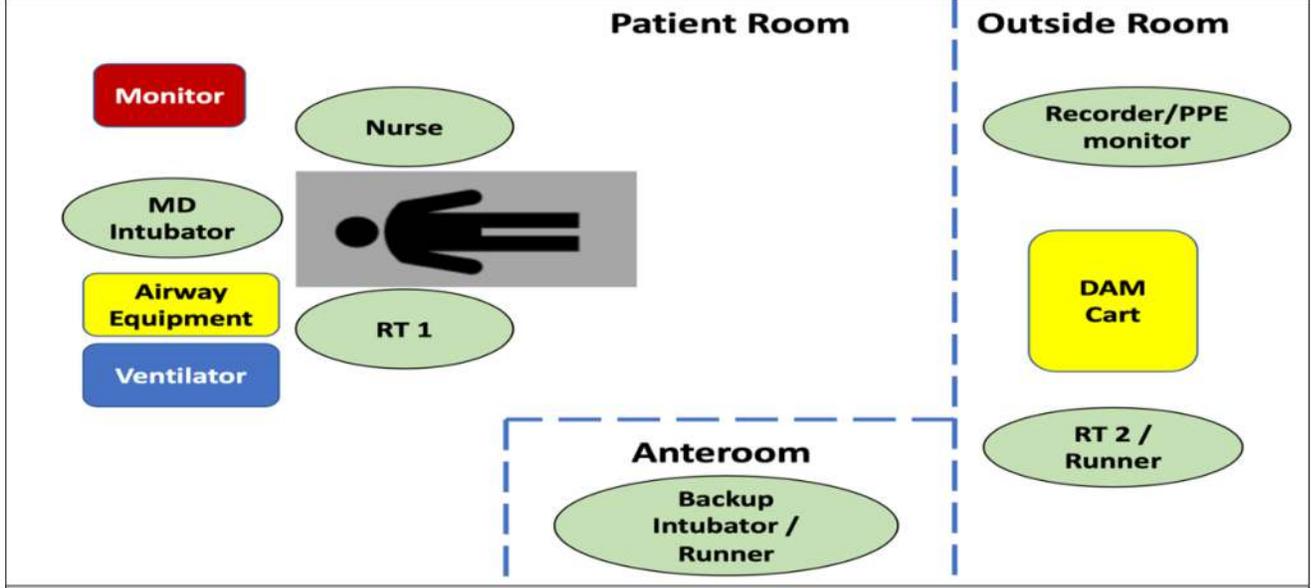
#### 3. PaCO<sub>2</sub>

- When PaCO<sub>2</sub> is increasing = patient respiratory rate too slow
  - RT may increase respiratory rate
  - Decrease analgesia / sedation
- When PaCO<sub>2</sub> is decreasing = patient breathing too fast
  - Call RT: Maybe new mode of mechanical ventilation required?
  - May need to give analgesia and/or sedation

## Assisting with Intubation

Preparation	<p><b>Prior to Entering Patient Room</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Notify team (RRT, Charge Nurse, etc.) of intubation</li> <li><input type="checkbox"/> Secure equipment <ul style="list-style-type: none"> <li>• Use of video-laryngoscope should be considered</li> <li>• Bring only necessary equipment into room</li> </ul> </li> <li><input type="checkbox"/> Prepare medications as per ordered <ul style="list-style-type: none"> <li>• Deep sedation and paralysis may be used to minimize cough or aerosol generation.</li> </ul> </li> <li><input type="checkbox"/> Prepare necessary equipment and medications outside of room</li> <li><input type="checkbox"/> Don full PPE: N95, face shield, gown, and gloves <ul style="list-style-type: none"> <li>• Proper application should be verified by independent observer prior to room entry</li> <li>• Consider use of goggles as secretions can potentially flow around front-covering face shields with coughing and during head turns of intubator</li> </ul> </li> <li><input type="checkbox"/> Clarify if bronchoalveolar lavage (BAL) sampling needs collection</li> </ul>
	<p><b>In Patient Room</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Ensure room door closed</li> <li><input type="checkbox"/> Minimize number of people involved <ul style="list-style-type: none"> <li>• Nursing and RRT support ideally should be provided by individuals assigned to patient</li> </ul> </li> <li><input type="checkbox"/> In rooms with adjustable airflow, increase rate of airflow (or put room in “bronchoscopy mode”)</li> </ul>
Intubation	<p><b>Before</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Ensure monitoring in place</li> <li><input type="checkbox"/> Ensure patent IV access</li> <li><input type="checkbox"/> Ensure suction functional with yankauer set up</li> <li><input type="checkbox"/> Pre-oxygenate as much as possible using non-invasive oxygen (nasal prongs, 15 L/min NRB mask) <ul style="list-style-type: none"> <li>• Reserve use of bag-valve-mask ventilation via facemask to situations where non-invasive oxygen delivery is failing</li> </ul> </li> </ul>
	<p><b>During</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Administer medications as ordered</li> <li><input type="checkbox"/> Continue monitoring patient’s tolerance of procedure</li> <li><input type="checkbox"/> Ensures BAL collected if needed</li> </ul>
	<p><b>After</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> If no contraindications, Modified RSI (avoid coughing and facilitate first pass success): <ul style="list-style-type: none"> <li>• Use higher mg/kg dose of muscle relaxants to ensure rapid onset of optimal intubating conditions (Allow 1 minute for adequate muscle relaxation): <ul style="list-style-type: none"> <li>▪ Rocuronium 1.2-1.6 mg/kg (ideal body weight)</li> <li>▪ Succinylcholine 1.5-2 mg/kg (total body weight)</li> </ul> </li> <li>• Avoid BVM ventilation during apneic period unless life threatening hypoxemia</li> <li>• Wait until cuff up post-intubation to ventilate</li> </ul> </li> <li><input type="checkbox"/> Assist with tube placement assessment (ETCO<sub>2</sub> monitoring, bilateral chest wall movement, air entry)</li> <li><input type="checkbox"/> Arrange for chest x-ray for tube placement</li> <li><input type="checkbox"/> Place in-line suction and heat and moisture exchangers (HME) on all patients</li> <li><input type="checkbox"/> Avoid ventilator circuit disconnections</li> <li><input type="checkbox"/> Clamp ETT for planned disconnections</li> <li><input type="checkbox"/> Use in-line suction for all ventilated patients; avoid opening suctioning</li> <li><input type="checkbox"/> Avoid use of heated humidity systems other than when they are fixed integral systems of a particular ventilator <ul style="list-style-type: none"> <li>• Active/heated humidity systems should only be used when necessary (e.g. to manage difficult secretions or to provided inhaled epoprostenol) and only when such a system is part of a fixed integral part of a particular ventilator</li> </ul> </li> </ul>

**Suggested Roles and Organization**



DAM: Difficult Airway Management

## Mechanical Ventilation Modes and Suctioning

Invasive Ventilation						
	Other Name	Type of Support	What is Set			Notes / Variables
			Rate	FiO2	PEEP	
<b>Assist Control Volume Control</b>	AC, VC	Full	Yes	Yes	Yes	<ul style="list-style-type: none"> <li>Guaranteed tidal volume (<math>V_t</math>)</li> <li>Trend pressures</li> </ul>
<b>Pressure Control</b>	PC	Full	Yes	Yes	Yes	<ul style="list-style-type: none"> <li>Peak pressure limit (PIP) set</li> <li>Trend Volumes</li> </ul>
<b>Airway Pressure Release Ventilation</b>	APRV (Bi-Level)	Full	Yes	Yes	Yes	<ul style="list-style-type: none"> <li>Two levels of pressure: P-high, P-low</li> <li>Two time intervals: T-high, T-low</li> <li>Inhalation: high pressure, long time</li> <li>Exhalation: low pressure, short time</li> </ul>
<b>Pressure Regulated Volume Control</b>	PRVC	Full	Yes	Yes	Yes	<ul style="list-style-type: none"> <li>Delivers set tidal volume with lowest amount of pressure</li> </ul>
<b>Synchronous Intermittent Mandatory Ventilation</b>	SIMV	Partial	Yes	Yes	Yes	<ul style="list-style-type: none"> <li>For ventilator delivered breaths, a set rate and volume</li> <li>For patients own breath, patients gets their own tidal volume</li> </ul>
<b>Pressure Support</b>	PS	Spontaneous Breathing	No	Yes	Yes	<ul style="list-style-type: none"> <li>Patient determines own rate and tidal volume</li> <li>No set respiratory rate: may need to switch mode if apnea occurs</li> </ul>
<b>Continuous Positive Airway Control</b>	CPAP	Spontaneous Breathing	No	Yes	Yes	<ul style="list-style-type: none"> <li>Patient breathes spontaneously through ETT</li> <li>Same level of pressure on inspiration and expiration</li> </ul>

### Suctioning

Indications for suctioning include the presence of secretions in the airway, adventitious breath sounds on auscultation, increased peak airway pressure, frequent coughing, suspected aspiration of gastric or upper airway secretions, sudden onset of respiratory distress with suspected airway obstruction, and a decrease in oxygen saturation level.

Important: Use in-line suction only. Avoid circuit disconnections.

1. Note patient condition (baseline respiratory rate, chest sounds, saturation levels, etc. for post suction comparison)
2. Pre oxygenate prior to suctioning- push the 100% O2 button for 30-60 seconds
3. Pushed Silence button on the ventilator
4. While steadying the T-piece with one hand, advance the suction catheter through the ETT with the other hand
  - Do not apply suction while advancing suction catheter in
  - If you hit the carina, pull back prior to suctioning
5. Withdraw the suction catheter while applying suction
  - Suction to be set at approximately 150 mmHg
  - Activate suction by depressing the suction control valve
  - Suction passes should not exceed 5-10 seconds
6. After suctioning, place suction control valve in OFF position
7. Hyperoxygenate patient again
8. Document number of suction passes and patient tolerance



\*Do not routinely instill. If instilling, do not leave the NS instill/flush attached to ETT tube when suctioning completed.

## Adult ICU Pharmacology

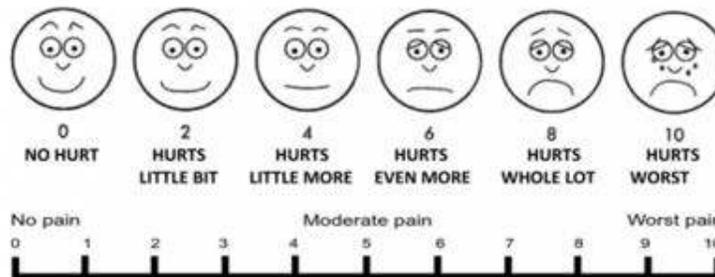
Analgesia		Assessment: CPOT and NPS	
Drug	Route	Dose	Details
<a href="#">Hydromorphone</a> (Dilaudid)	Direct IV Push	0.2–1 mg IV administered undiluted over 2-5 minutes	Onset: 10-15 minutes Peak: 60 minutes Duration: 4-5 hours
	Continuous IV Infusion	0.5 to 3 mg/hour OR 7-15 mcg/kg/hour Mixing: See monograph	
<a href="#">Fentanyl</a> (Sublimaze)	Direct IV Push	25-100 mcg IV administered undiluted over 1-3 minutes Maximum rate 100 mcg/min	Onset: Immediate Peak: 1-5 minutes Duration: 30-60 minutes
	Continuous IV Infusion	12.5-200 mcg/hour OR 0.5-1.5 mcg/kg/hour Mixing: See monograph (may be supplied by Pharmacy)	
<a href="#">Morphine</a>	Direct IV Push	2.5-15 mg IV direct administered undiluted over 2-5 minutes Maximum concentration of 5 mg/mL	Onset: 2-5 minutes Peak: 20 minutes Duration: 3-4 hours
	Continuous Infusion	0.8 to 10 mg/hour (may titrate higher) Mixing: See monograph (may be supplied by Pharmacy)	

### CPOT COMPONENTS

Observation	0	1	2
Facial Expression	Relaxed	Tense	Eyes tightly closed or biting ETT
Body Movements	Normal	Protective moments	Restless
Muscle Tension	Relaxed	Tense	Rigid
Ventilator Synchronicity / Verbalization	Synchronous with vent or normal speech	Coughing / moaning	Fighting ventilator / Crying out and/or sobbing

**SCORE OF 4 OR MORE = SIGNIFICANT PAIN**

### NUMERIC PAIN SCALE



Sedation			Assessment: RASS
Drug	Route	Dose	Details
<a href="#">Dexmedetomidine</a> (Precedex)	Direct IV Push	No	Onset: 10-15 minutes Peak: 60 minutes Duration: 4-5 hours
	Continuous IV Infusion	Optional Loading Dose: 1mcg/kg per dose Maintenance Dose: 0.2-1.1 mcg/kg/hour <ul style="list-style-type: none"> <li>Usual maximum dose 1.5 mcg/kg/hour</li> </ul> Mixing: Add 200 mcg (2 mL) in 50 mL to 0.9% sodium chloride or D5W for final concentration of 4 mcg/mL	
<a href="#">Propofol</a> (Diprivan)	Direct IV Push	5-20 mg IV direct administered undiluted over 3-5 minutes	Onset: Less than 1 minute Peak: Unknown Duration: 10-15 mins
	Continuous IV Infusion	Initiation: 5 mcg/kg/minute (0.3 mg/kg/hour) <ul style="list-style-type: none"> <li>Increase by 5-10 mcg/kg/min (0.3-0.6 mg/kg/hour) over 5-10 minutes to desired level of sedation</li> </ul> Maintenance: 5-50 mcg/kg/minute (0.3 to 3 mg/kg/hour) or 50-30 mg/hour <ul style="list-style-type: none"> <li>Maximum rate: 5 mg/kg/hour</li> </ul> Mixing: Available as premix Side Effects: hypotension, respiratory depression/failure	
<a href="#">Versed</a> (Midazolam)	Direct IV Push	0.01-0.05 mg/kg mg IV direct administer undiluted over 2 min, repeat at 5 to 15 minute intervals <ul style="list-style-type: none"> <li>Maximum concentration of 5 mg/mL</li> </ul>	Onset: 3-5 minutes Peak: 3-5 minutes Duration: 2-6 hours
	Continuous IV Infusion*	Initial: 0.02-0.1 mg/kg/hour (0.3-1.7 mcg/kg/minute) titrate to desired level of sedation Mixing: Standard concentration 1 mg/mL <ul style="list-style-type: none"> <li>50 mg/50 mL: remove 10 mL from bag, add 10 mL of midazolam 5mg/mL</li> <li>100 mg/100 mL: remove 20 mL from bag, add 20 mL of midazolam 5mg/mL</li> </ul> Side Effects: hypotension, respiratory depression/failure	

## AGITATION

### • SCORED BY RICHMOND AGITATION- SEDATION SCALE (RASS), MINIMUM Q4H

Score	Term	Description
+4	Combative	Overtly combative, violent, immediate danger to staff
+3	Very Agitated	Pulls or remove tubes(s) or catheters(s), aggressive
+2	Agitated	Frequent non-purposeful movement, fights ventilator
+1	Restless	Anxious but movements not aggressively vigorous
0	Alert and Calm	
-1	Drowsy	Not fully alert but has sustained awakening. Eye opening to voice > 10 seconds
-2	Light Sedation	Briefly awakens to <b>VOICE</b> with eye contact < 10 seconds
-3	Moderate Sedation	Movement or eye opening to <b>VOICE</b> , no eye contact
-4	Deep Sedation	No response to voice but movement or eye opening to <b>PHYSICAL</b> stimulation
-5	Unarousable	No response to voice or <b>PHYSICAL</b> stimulation

Vasopressors & Inotropes		Assessment: SBP, MAP	
Drug	IV Infusion Dose	Titrate	Details
<a href="#">Epinephrine</a> (Adrenalin)	Initial: 1 mcg/minute OR 0.05-0.07 mcg/kg/minute Rate range: 1-20 mcg/minute or 0.05-0.2 mcg/kg/minute Mixing: See monograph Side Effects: reflex bradycardia, arrhythmias, hypertension, decreased renal function, decreased peripheral perfusion	Yes	MD will order SBP or MAP targets  Central line preferred
<a href="#">Norepinephrine</a> (Levophed)	Cardiac Arrest and Hypotension: <ul style="list-style-type: none"> <li>Initial: 8-12 mcg/min OR 0.1-0.5 mcg/kg/min</li> <li>Maintenance: 0.03-0.06 mcg/kg/min OR 2-4 mcg/min</li> </ul> Septic Shock <ul style="list-style-type: none"> <li>0.01-1.5 mcg/kg/minute</li> </ul> Mixing: See monograph (premix may be available in fridge) Side Effects: reflex bradycardia, hypertension, decreased renal function, decreased peripheral perfusion	Yes	MD will order SBP or MAP targets  Central line preferred  Check VS every 5 min with titration
<a href="#">Vasopressin</a> (Antidiuretic Hormone, Pressyn)	Septic Shock <ul style="list-style-type: none"> <li>0.01 units/minute to 0.04 units/minute</li> </ul> Mixing: See monograph Side Effects: peripheral vasoconstriction, bronchial constriction	No	Central line preferred

Nondepolarizing Neuromuscular Blockade Agents (NMBAs)		Assessment: TOF*, ETCO <sub>2</sub>	
Drug	IV Infusion Dose		
<a href="#">Cisatracurium</a> (Nimbex)	Acute Respiratory Distress Syndrome (ARDS) <ul style="list-style-type: none"> <li>Initial: 15 mg administered direct IV undiluted over 5-10 seconds</li> <li>Maintenance continuous IV Infusion: 37.5 mg/hour for 48 hours</li> </ul> Mixing: See monograph		
<a href="#">Rocuronium</a> (Zemuron)	ICU Paralysis <ul style="list-style-type: none"> <li>Initial: 0.6-1 mg/kg administered IV direct undiluted over 5-20 seconds</li> <li>Maintenance continuous IV infusion: 8-12 mcg/kg/min (0.48-0.72 mg/kg/hour)</li> </ul> Mixing 500mg/250 mL: Remove 50 mL from 250 mL of IV solution and add 50 mL of 10 mg/mL rocuronium, for final concentration 2 mg/mL		
Airway patency must be maintained at all times (manual or mechanical ventilation) *Peripheral Nerve Simulator (PNA)- Train of Four (TOF) The need for NMBAs must be reviewed at least every 24 hours to minimize the chances of inappropriately prolonged use and post-paralytic complications. <b>Caution:</b> <ul style="list-style-type: none"> <li>Should NOT be administered before the induction of unconsciousness to avoid patient distress.</li> <li>Sedation MUST be used in conjunction with NMBAs as NMBAs has no sedative properties.</li> </ul>			