

## **Acute RRT For Critically Ill Patients in ICU Settings During Respiratory Pandemic**

(SARS-CoV-2 [COVID-19], Pandemic Influenza, others)

**Last updated: 4/6/2020**

**Scope of Committee** – Review current evidence and outline treatment guidelines and protocols for the provision of acute hemodialysis for critically ill patients during a respiratory pandemic (i.e. 2020 COVID 19 & others).

**\*\*\* Respiratory pandemics are rapidly evolving situations** (as is the case with COVID-19). **This document and the policies & procedures contained will require revisions and evolve throughout the course of a respiratory pandemic.\*\*\***

### **Introduction:**

Infectious respiratory pandemics often lead to a high-burden of severe acute respiratory failure and acute respiratory distress syndrome (ARDS) requiring invasive life support and intensive care unit admission and resources. Acute kidney injury (AKI) requiring acute renal replacement therapy (RRT) – often referred to as dialysis-dependent AKI (AKI-D) – occurs in approximately 15% of all ICU admissions, but this rate is often increased greatly in the setting of severe respiratory failure and acute respiratory distress syndrome (ARDS).

For example, during the current 2019-2020 SARS-CoV-2 pandemic, approximately 6-8% of all cases have required ICU-level of care. Reports have been highly variable, but some reports suggest that AKI-D has occurred in up to ~ 20-30% of critically ill patients with COVID-19. ICU patients with AKI-D have an increased risk of death with up to 50% mortality rate. It is unclear to the extent that AKI-D modifies mortality risk in COVID-19.

### **Purpose:**

The purpose of this document & work-group is to describe, standardize, & harmonize guidelines, procedures, and practices surrounding the provision of Acute RRT therapies in the ICUs of Emory Healthcare (EHC) during a respiratory pandemic.

### **Guiding Principles:**

1. Critically ill patients with acute respiratory failure and ARDS during a respiratory pandemic are labor and resource intensive.
2. RRT is a limited resource – in a respiratory pandemic surge, RRT plans in ICUs may have to be adapted to serve the greatest good to the greatest number of patients and rationing of RRT resources may be required (i.e. patients receiving less aggressive, less frequent, or shorter duration treatment sessions so as to maximize the number of patients that can be treated).

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3. Provision of RRT will impact every member of the multi-disciplinary ICU care team (i.e nursing, respiratory therapy, patient care technicians/assistants, physicians, advanced practice providers, pharmacists, dieticians, and therapists)
4. Members of the multi-disciplinary ICU care team will likely be experiencing physical, emotional, and moral distress, and they will need additional support and resources. The addition of RRT to a patient will further introduce several challenges to the team.
5. Policies and protocols for ICU RRT in a respiratory pandemic are & must be designed to minimize risk:
  - A. to patients (i.e. care delivery errors)
  - B. to staff (i.e. staff contamination)
  - C. to the wider hospital community (i.e. unnecessary staff entry/exposure to patient care areas).
6. In a respiratory pandemic critical-illness ICU surge situation, EHC will likely employ 1 of 2 ICU admission/census strategy (see **Table 1**):

**TABLE 1**

	<u>ICU Cohort Strategy</u>	<u>ICU Room Strategy</u>
<b>Location of pandemic ICU patients</b>	Co-locating / cohorting of all suspected & confirmed pandemic patients in specific ICUs at the ICU level	Certain ICU rooms in the hospital designated for suspected or confirmed pandemic patients
<b>Location of non-pandemic ICU patients</b>	Non-pandemic patients are excluded from designated pandemic ICU	Non-pandemic patients are co-located in any given ICU with pandemic patients
<b>PPE zone</b>	<b>Entire pandemic ICU <u>may</u> be designated a PPE zone in which PPE would be worn at all times while in the ICU</b> (per hospital infection control guidelines & recommendations)	PPE zone is at the <b>patient room level</b> .  The rest of the ICU is <u>not</u> considered PPE zone (i.e. it is not contaminated)
<b>PPE don/doff</b>	Don occurs prior to entering the designated ICU  Doff occurs as leaving the designated ICU	Don occurs prior to entering the individual pandemic patient room  Doff occurs as leaving the individual pandemic patient room

7. **Surface disinfection of RRT machines** (i.e. Prismaflex/Prismax CRRT machines) and other ICU related durable medical equipment (ventilators, IV pumps, ultrasound machines, etc) **occurs in standard practice in ICUs** between patients use and will still be required in a respiratory pandemic surge.

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**Acute RRT Modality**

Continuous renal replacement therapy (CRRT) or prolonged intermittent RRT (PIRRT) are the most common modality of RRT provided for AKI in US ICUs. CRRT and PIRRT have advantages over intermittent hemodialysis (IHD) for critically ill patients especially in that CRRT & PIRRT induce less hypotension or hemodynamic instability, provide superior removal of fluid and resolution of fluid overload, and are well tolerated in general.

In EHC ICUs, CRRT is the dominant modality of RRT provided. All ICU bedside nurses are trained and competent in providing CRRT independently.

***Practice Guideline:***

1. Throughout EHC, **CRRT machines are the preferred machine for acute RRT in biocontainment/isolation situations**
  - a. CRRT machines can provide both CRRT and/or hybrid hemodialysis prolonged intermittent RRT (PIRRT)
  - b. ICU RNs at EHC are all trained and competent on the use of CRRT → no additional Hemodialysis RNs must thus be exposed to patient for provision of RRT
  - c. CRRT machines sequestered in a pandemic biocontainment/isolation ICU can be used on all patients in that given location with using standard disinfection techniques after a given patients use (see more below in ***Infection Control*** section)
2. Both CRRT and/or PIRRT (using a CRRT machine for 8-12 hrs per day) may be prescribed for patients in the biocontainment/isolation ICU.
3. In a large surge situation, as CRRT machines are limited, PIRRT use for may increase as a means to provide sufficient RRT treatments for a higher number of AKI-D patients
4. Intermittent hemodialysis (IHD) may be employed as a **second-line option**.
  - a. IHD requires dedicated Hemodialysis RNs 1:1 to manage and deliver dialysis. This exposes additional staff to the infected patients and isolation environment
  - b. IHD also requires sufficient water and drain resources with high water pressure/flow rates to generate dialysate. These water resources may not be available in all biocontainment/isolation environments/locations. CRRT devices only requires a drain/toilet location.

**Timing of Initiation of Acute RRT**

Clear data on the optimal timing for initiation of dialysis for AKI in critically ill patients remains elusive. Death from AKI is most commonly due to complications of AKI – hyperkalemia, acidemia, and fluid/volume overload. Acute RRT is recommended in AKI to control, prevent, or manage the complications of AKI

***Practice Guideline:***

1. Nephrology, critical care medicine, bedside nursing, and patient/surrogate decisions makers should **collaborate** regarding the decision of if & when to start renal replacement therapy.

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2. Nephrology, critical care medicine, and bedside nurse should collaborate daily to decide on the daily goal(s) for acute RRT

### Acute RRT orders

#### **Practice Guideline:**

1. The nephrology attending/team remains the primary providers of acute RRT
2. The nephrology attending/team has responsibility for entering, maintaining, and communicating all RRT-related orders
3. Critical care medicine & nephrology should collaborate on fluid management targets
4. Critical care medicine is NOT to adjust CRRT effluent/therapy fluid flow rates independently but may be empowered by the nephrology team to adjust fluid removal targets.

### CRRT Anticoagulation

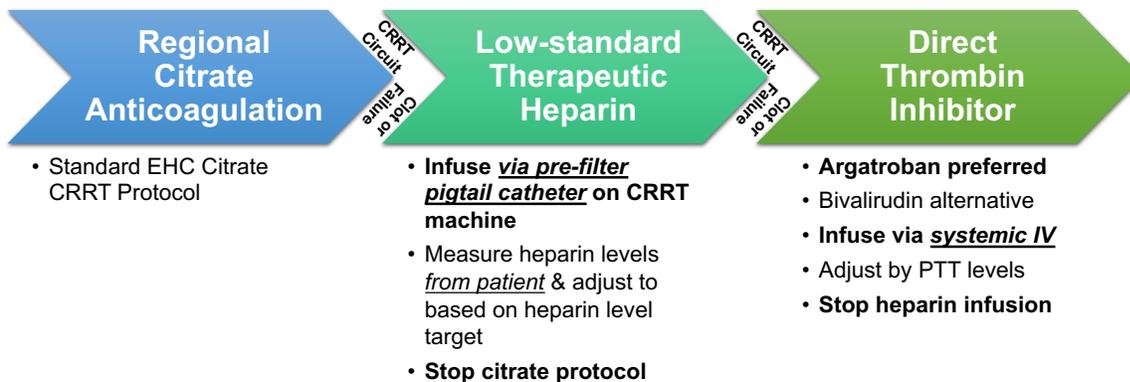
COVID-19 infection seems to induce a **hypercoagulable state** and CRRT circuit clotting has been occurring frequently.

#### **Practice Guideline:**

1. Anticoagulation is **required**
2. Follow **CRRT Anticoagulation Guidelines** (Figure)

## CRRT Anticoagulation Guidelines – COVID-19

**Goal:** Maximize CRRT circuit survival in any patient running **continuously** to max 72 hrs



### Daily Patient-centered rounds

**In biocontainment/isolation settings, EHC policy is that direct access/contact with patient should be limited to only those immediately necessary.** Thus, in order to minimize staff contamination risk, only providers performing an essential task requiring direct patient access should the biocontainment/isolation environment (ICU or patient's room depending on hospital strategy).

Physical exams will be performed by a qualified provider at least once daily and findings shared with all consultant services (i.e. nephrology). Thus, nephrology consultants should not enter the

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biocontainment/isolation unit (or room) for rounds every day. Much of the care can be provided at a designated remote facility outside of the biocontainment facility or patient room.

**Practice Guideline:**

1. Multi-disciplinary rounds (to include nephrology team, critical care medicine, bedside ICU RN (or nursing representative), and ICU clinical pharmacist should occur at least once daily (preferably in the morning) for all patients receiving RRT.
2. Daily AM Rounds should review physical exam findings, fluid balance, daily weight, pertinent labs/medications, CRRT system performance, etc for each patient receiving RRT
3. RRT-specific goals should be established for each patient, communicated to bedside RN, medication dosing adjusted (as needed), and orders updated (as needed) for each patient receiving RRT

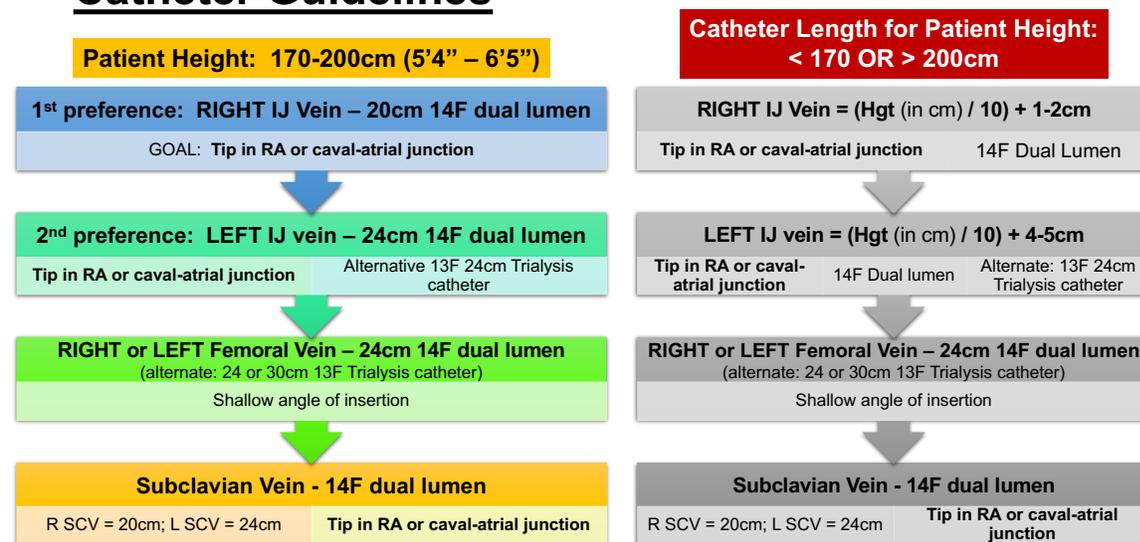
**Dialysis vascular access:**

Nephrology, critical care medicine, interventional radiology, surgical services, and others all have expertise to insert dialysis vascular catheters.

**Practice Guideline:**

1. To minimize exposure/contamination risks, **critical care medicine will be the primary team responsible for insertion and maintenance of all central venous lines (including non-tunneled temporary dialysis vascular catheters)** in biocontainment/isolation environments/ICUs
2. For IJ or subclavian dialysis catheters, the goal is for the tip of the catheter to reach the right atrium or caval-atrial junction.

## **EHC Acute Dialysis Vascular Access: Catheter Guidelines**



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**CRRT Machine Disinfection**

Disinfection of dialysis machines will be required whenever a given patient is finished using that equipment. This occurs as part of standard ICU practice in non-pandemic situations. In usual practice, dialysis machines (including CRRT machines) receive a surface disinfection with appropriate disinfecting wipes after all disposable material has been removed and appropriately discarded.

**Practice Guideline:**

1. Per CDC guidance, **following CRRT machine use on a patient with SARS-CoV-2 (COVID-19) infection, the CRRT machine should undergo disinfection with a rigorous surface cleaning & disinfection using the “Sani-Cloth Germicidal Wipes” (PURPLE Top)** [EPA Reg. # 9480-4] with a 2 minute wet contact time on all readily-accessible machine surfaces.
  - a. If any EHC facility is **NOT** stocking/using the **“Sani-Cloth Germicidal Wipes” (PURPLE Top)** disinfection wipes, then that institution **must** select and use an alternative EPA-registered, hospital-grade disinfectant product that has qualified under the EPA’s emerging viral pathogens program (EPA List N) for use against SARS-CoV-2 (<https://www.epa.gov/pesticide-registration/list-n-disinfectants-use-against-sars-cov-2>)
2. Per CDC guidance, following step 1 (rigorous surface cleaning), **no additional terminal disinfection procedure is required** for CRRT machines prior to exiting a COVID-19 room or dedicated COVID-19 ICU.
3. **TABLE 2** describes RRT Equipment Disinfection procedures

**TABLE 2 – RRT Equipment Disinfection**

	<b><u>ICU Cohort Strategy</u></b>	<b><u>ICU Room Strategy</u></b>
<b>At end of RRT session</b>	All disposable RRT machine equipment (tubing/filter sets, CRRT solutions bags, etc) should be discarded as directed by hospital infection control & policy.	All disposable RRT machine equipment (tubing/filter sets, CRRT solutions bags, etc) should be discarded as directed by hospital infection control & policy.
<b>RRT Machine Disinfection</b>	RRT Machine (Prismaflex or Prismax) surface should be disinfected using <b>“Sani-Cloth Germicidal Wipes” (PURPLE Top)</b>  <b>No additional disinfection steps required prior to use on next pandemic patient.</b>	RRT Machine (Prismaflex or Prismax) surface should be disinfected using <b>“Sani-Cloth Germicidal Wipes” (PURPLE Top)</b>  <b>No additional disinfection steps required before machine can:</b> <ul style="list-style-type: none"> <li>• leave pandemic patient’s room</li> <li>• move to another patient’s room</li> <li>• used on a different pandemic or non-pandemic patient</li> </ul>

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Further guidance regarding RRT Machine disinfection AND approved disinfection cleaning products for SARS-CoV-2 (COVID-19) can be found at:

1. <https://www.cdc.gov/coronavirus/2019-ncov/healthcare-facilities/dialysis.html>
2. <https://www.epa.gov/pesticide-registration/list-n-disinfectants-use-against-sars-cov-2>

### **CRRT Supply Chain**

#### ***Practice Guideline:***

1. EHC Supply Chain Management will be responsible for maintaining sufficient supply of disposable CRRT supplies (filter/tubing sets, effluent bags, CRRT solutions)
2. Central Supply & central pharmacy should review with the biocontainment/isolation ICU at least twice per day which CRRT solutions and supplies require restocking AND deliver required supplies promptly.
3. To minimize contamination risk in the hospital, it is NOT recommended that the staff from the biocontainment/isolation ICU retrieve supplies themselves from central supply

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