



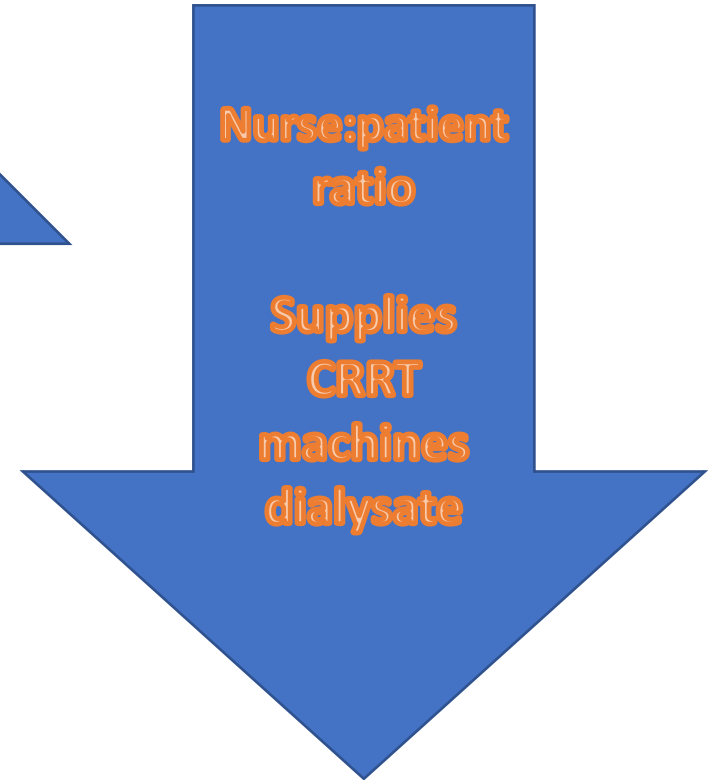
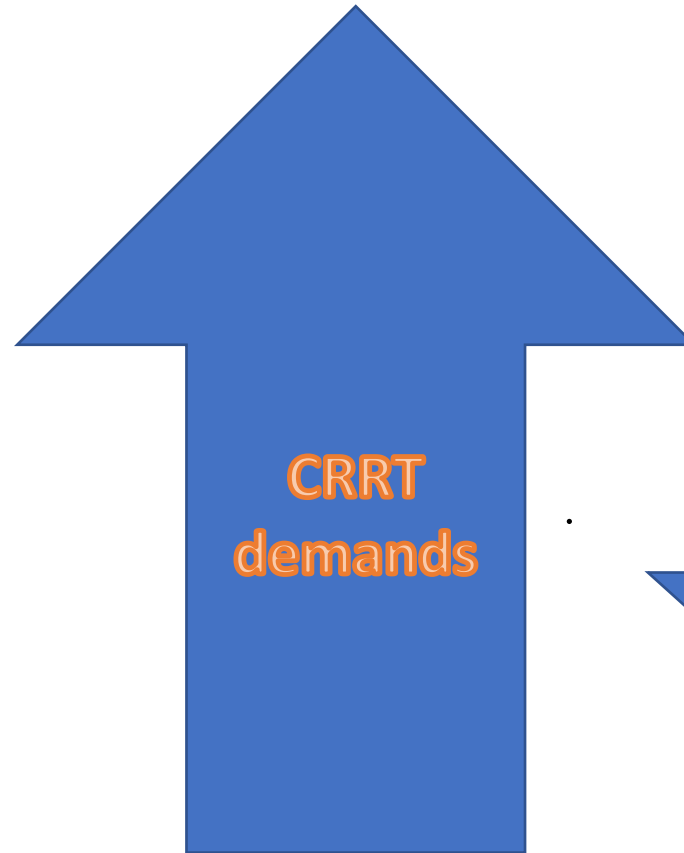
# Managing CRRT during the COVID-19 Surge

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- Managing CRRT during the COVID-19 Surge



# COVID-19 Surge Planning – First five weeks

1<sup>st</sup> patient on CRRT  
March 10  
Nephrology COVID  
Task force 3/16

Perfusionists  
perform PIRRT  
Shared Triage  
sheet  
April 5

Nx stage  
meeting about  
national  
shortage  
Lactate buffered  
dialysate arrived  
April 13

National  
Pharmacy  
Committee **ASHP**  
to push **FDA** for  
supplies  
April 17

March 25  
CAR502 **Extension  
Tubing**  
March 27  
First Bedside **acute  
PD**

April 11  
CRRT Dialysate runs low  
**ASN COVID  
Response Team**  
Dialysate borrowed  
PD fluid used as PIRRT  
dialysate  
Daily Inventory checks

April 15  
**CMS COVID** online  
talk about Best  
Practices and Insights  
with Dr Ross

April 18  
Dr Ross is  
interviewed by  
**NYTimes**  
**Home Hemo** to  
function as PIRRT  
on



CRRT demand  
increase

Lack of Supplies  
&  
Staff

# March 10- March 16



- 1<sup>st</sup> patient on CRRT

- Nephrology COVID Task force

**Expanded Services 4 to 6 services as ICU beds tripled at Moses**  
**Transplant nephrology work as general Nephrologists**  
**Modify CRRT duration and dose- PIRRT**

# March 25-27

- CAR502  
**Extension Tubing**
- First **Bedside acute PD**



Reduce PPE  
wastage and  
minimize  
exposure





• April 5

Perfusionists  
perform  
PIRRT  
  
Shared  
Triage sheet



CVVHD  
virtual  
learning

Monday 5/4							Wednesday 4/29						
Daytime Dialysis Plan							Nighttime Dialysis Plan						
Priority	Location	Name	MRN	Team	Notes from team	Notes from perfusion	Location	Name	MRN	Team	Notes from team	Notes from perfusion	
1	CCU8		503625	Silver/Emad-Ladan	to continue CVVHD today, done by CCU nurse								
2													
3													
4													
5													
6													
7													
8													
9													
10													

NextStage Devices			
Moses		Weiler	
1	7796 CSICU	1	43150
2	8524 CSICU	2	43106
3	22098 NSICU/rental?		
4	19725 CSICU		
5	22624 CSICU		
6	22629 CSICU		
7	7763 CSICU		
8	43168 CSICU		
9	22631 NSICU		
10	15818 NSICU		
11	36378 CCU		
12	22630 NSICU		
13	12398 NSICU/rental?		

Unified Watch List			
Location	Name	MRN	Notes from team
SICU 11			Transplant/Yorg
Rose 416			Gold/mary-milagros DECEASED
Rose 431			Gold/mary-milagros
Rose 436			Transplant/Yorg
Cath-CCU-2			Gold/mary-milagros
CCU-09			Gold/mary-milagros
PCHAM-02			Gold/mary-milagros
PCHAM-11			Gold/mary-milagros
Rose 435			Gold/mary-milagros
Rose 425			Gold/mary-milagros CVVHD ordered for 4/30, never started

# Daily PIRRT triage sheet

Monday 5/4	Daytime Dialysis Plan					
Priority	Location	Name	MRN	Team	Notes from team	Notes from perfusion
1	CCU8		503625	Silver/Emad-Ladan	to continue CVVHD today, done by CCU nurse	
2						
3						
4						
5						
6						
7						
8						
9						
10						

NextStage Devices					
Moses			Weiler		
1	7796	CSICU	1	43150	
2	8524	CSICU	2	43106	
3	22099	CSICU/rental?			
4	19725	CSICU			
5	22624	CSICU			
6	22629	CSICU			
7	7763	CSICU			
8	43168	CSICU			
9	22631	NSICU			
10	15818	NSICU			
11	36379	CCU			
12	22630	NSICU			
13	12398	NSICU/rental?			

Wednesday 4/29	Nighttime Dialysis Plan				
Night CVVHD	Location	Name	MRN	Team	Notes from team
Silver/Emad-Ladan	Unified Watch List				
PD-1/Pablo					
PD-2/???					
Transplant/Yorg					
AO/???					
	SICU 11			Transplant/Yorg	
	Rose 416			Gold/mary-milagros	DECEASED
	Rose 431			Gold/mary-milagros	
	Rose 436			Transplant/Yorg	
	Cath-CCU-2			Gold/mary-milagros	
	CCU-09			Gold/mary-milagros	
	PCHAM-02			Gold/mary-milagros	
	PCHAM-11			Gold/mary-milagros	
	Rose 435			Gold/mary-milagros	
	Rose 425			Gold/mary-milagros	CVVHD ordered for 4/30, never started



# Anticoagulation protocol

- Bolus Bivalirudin 50 mg/kg bolus  
Order ACT in 15 minutes after bolus
- Bivalirudin Maintenance
- .25 mg/kg per hour. Stop one hour prior to crrt finishes
- Check PTT 4 hours into treatment

# Clotting and COVID-19

- 1<sup>st</sup> 6 weeks
  - 100 patients had CRRT orders
- We evaluated the first 3 individual treatments-of 69 patients
  - 162 treatments
- Primary Outcome-hours of dialysis therapy delivered compared to hours of dialysis therapy prescribed.

# Percent of Hours Delivered/Prescribed

- no anticoagulation 58%,
  - Heparin 78%
  - Bivalirudin 85%.
- 
- There was no difference in transfusion requirements or death between the groups.
  - Percent of delivered hours of CRRT increased on Anticoagulation ( p value <0.001)

Germany, 25 patients UFH 21.3 Hours vs RCA 46 hours

## **RCA prolonged treatment time vs UFH**

8% machines running by 48 hours UFH vs 45 % RCA group

Comparison of different anticoagulation strategies for RRT in critically ill patients with COVID-19: a cohort study F Arnold et al BMC Nephrology 2020

- Boston, 65 patients -Clotting 44%
- **Adjust UFH using Factor Xa levels**

Third Filter in protocol group has clotting 55% vs 93%

Filter Clotting with CRRT in COVID-19 Endres et al Journal of Thrombosis and Thrombolysis 10/20

- NY, 80 patients- Clotting 40% (with AC (35%) no AC 79 (52%))
- 0.21 hazard ratio for circuit clotting for **RCA + Heparin vs RCA alone**
- Median clotting free survival was 21 hours without anticoagulation versus 72 hours with citrate and heparin.
- Anticoagulation Strategies and Filter Life in COVID-19 Patients Receiving Continuous Renal Replacement Therapy A Single-Center Experience Divya Shankaranarayanan, et al CJASN 1/21

April 11



CRRT Dialysate runs low

## **ASN COVID Response Team**

Dialysate borrowed

**PD fluid** used as PIRRT  
dialysate

**Daily Inventory checks**



April 11



CARLOON  
COLLECTIONS  
.com

Search ID: AB900041

***“ Perhaps there’s another way  
I can safely borrow a cup of sugar.”***

April 13

**Nx Stage  
meeting about  
national  
shortage**

Lactate buffered dialysate  
arrived



April 15

**CMS COVID**

online talk about  
Best Practices and  
Insights for CRRT  
Dr Ross/Dr Brogan



April 17

National  
Pharmacy  
Committee  
**ASHP** push **FDA**  
for supplies

Rent Home  
machines



April 18-28

Dr Ross is interviewed  
by The **NYTimes**

**Home Hemo** to  
function as PIRRT  
machines



ISN Global Report North America

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on

- Shortage of Staff – Repurpose Perfusionists to operate PIRRT machines and Transplant Nephrologists worked as general nephrologist
- High number of patients- PIRRT allows 2 patients/machine daily and developed a shared triage sheet

- Reduce PPE and Exposure- longer Tubing

Reduce Clotting- Anticoagulation Protocols

Shortage of Dialysate- Lactate dialysate or converted to acute PD

- Reach out to ASN and Media for help for Supplies