

# Conventional hemodialysis and adaptation to resource constraints

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# Increased need for RRT in hospitalized patients with COVID 19

**Table 2.** Clinical outcomes of hospitalized patients positive for COVID-19 compared with patients negative for COVID-19 and a historical control

Outcomes, <i>n</i> (%)	Hospitalization and Positive for COVID-19 ( <i>n</i> =3345)	Hospitalization and Negative for COVID-19 ( <i>n</i> =1265)	Risk Ratio (95% CI)	Historical control ( <i>n</i> =9859)	Risk Ratio (95% CI) (positive for COVID-19 versus historical control)
AKI	1903 (56.9)	471 (37.2)	1.5 (1.4 to 1.6)	2479 (25.1)	2.3 (2.2 to 2.4)
AKI stage					
1	942 (49.5) <sup>2</sup>	285 (60.5)		1830 (73.8)	
2	387 (20.3)	94 (20.0)		369 (14.9)	
3	574 (30.2)	92 (19.5)		280 (11.3)	
Need for RRT	164 (4.9)	20 (1.6)	3.1 (2.0 to 4.9)	93 (0.9)	5.2 (4.0 to 6.7)
Type of RRT					
CRRT	52 (31.7)	5 (25)		25 (26.9)	
PIRRT	11 (6.7)	2 (10)		8 (8.6)	
PD	16 (9.8)	0		0	
HD	85 (51.8)	13 (65)		60 (64.5)	

# COVID 19 patients in the ICU with AKI

**Table 2. AKI patient outcomes and admission and peak laboratory values**

Outcomes	Overall (N=224)	In Hospital		P Value
		Survivors at 60 d (N=75) <sup>a</sup>	Nonsurvivors at 60 d (N=149) <sup>b</sup>	
ICU LOS (d), median (IQR)	11 (6–18)	14 (8–26)	9 (6–15)	<0.001 <sup>c</sup>
Hospital LOS (d), median (IQR)	16 (9–28)	29 (17–42)	12 (7–20)	<0.001 <sup>c</sup>
RRT (n=114), n (%)	114 (51)	34 (30)	80 (70)	0.26
RRT (d), median (IQR)	7 (4–16)	17.5 (8–26)	5 (3–10)	<0.001 <sup>c</sup>
First RRT modality (n=114), n (%)				0.62 (omnibus)
CVVHD	33 (29)	11 (33)	22 (67)	
IHD	52 (46)	13 (25)	39 (75)	
PD	15 (13)	6 (40)	9 (60)	
SLED/SCUF	14 (12)	4 (29)	10 (72)	

# ESRD patients admitted with COVID 19 mostly needed IHD

**Table 2. Clinical course and outcomes in patients with ESKD on chronic hemodialysis hospitalized with COVID-19**

Clinical Course	Value
<b>Hospital admission, <i>n</i> (%)</b>	
General medical floor	99 (87)
Intensive care unit	15 (13)
<b>COVID-19 Treatment, <i>n</i> (%)</b>	
Hydroxychloroquine	87 (76)
<b>Anticoagulation, <i>n</i> (%)</b>	
None	17 (15)
Apixaban	36 (32)
Heparin	57 (50)
Warfarin	4 (14)
<b>Mechanical ventilation</b>	19 (17)
<b>according to location, <i>n</i> (%)</b>	
Intensive care unit	14
General medical floor	5
Vasopressors, <i>n</i> (%)	18 (16)
<b>Renal replacement modality, <i>n</i> (%)</b>	
Intermittent hemodialysis	111 (97)
Continuous RRT	2 (2)
Slow low-efficiency hemodialysis	1 (0.8)



# Exponential increase in need for RRT for AKI- five to seven times pre COVID

**Table 1. Surge in weekly census of COVID-19 confirmed patients with AKI at Montefiore Medical Center**

	March 10–16	March 17–23	March 24–30	March 31–April 6
Weekly AKI consults	12	38	62	78
Weekly acute RRT	4	10	52	75
Weekly hospital COVID-19 patient census	2–18	26–163	233–560	625–877
Expansion of intensive care units	7	7	9	16
Expansion of nephrology services	6	6	8	10

# Dialysis and COVID 19

**The New York Times**

April 18, 2020

## *An Overlooked, Possibly Fatal Coronavirus Crisis: A Dire Need for Kidney Dialysis*

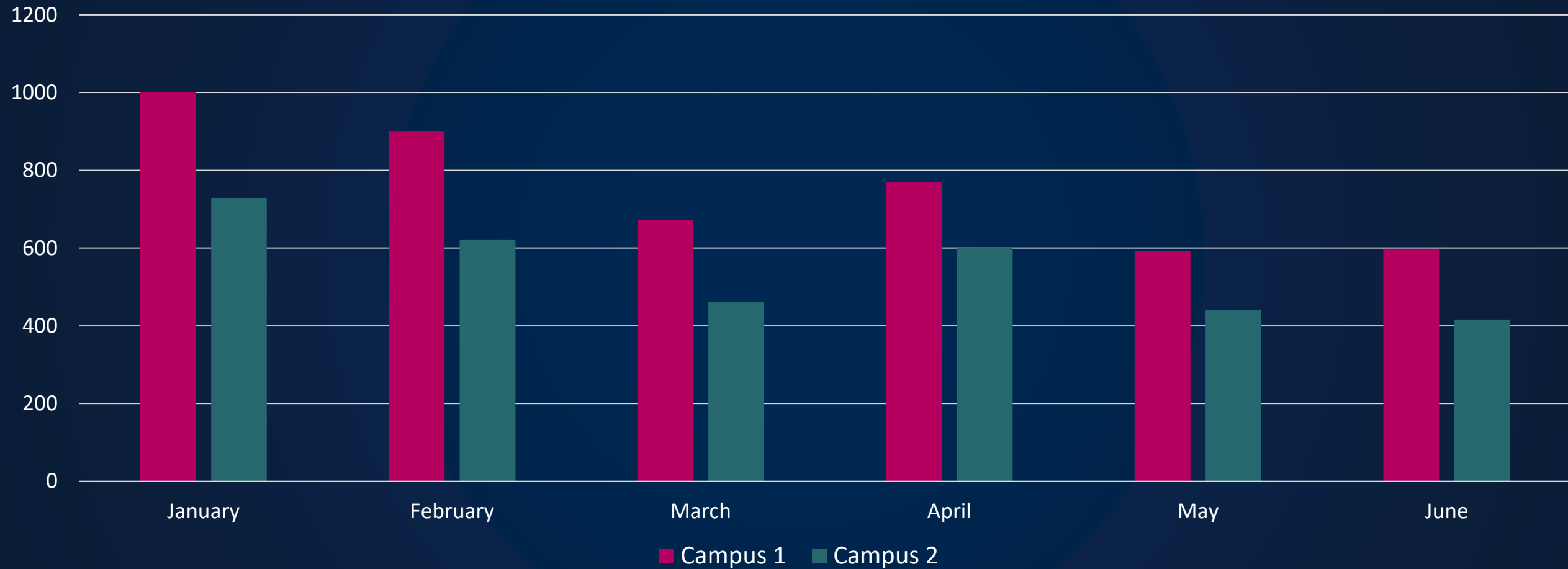
Ventilators aren't the only machines in intensive care units that are in short supply. Doctors have been confronting an unexpected rise in patients with failing kidneys.



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# Inpatient dialysis treatments at MMC



# Challenges

- Infections among staff
- Initial need for bedside dialysis for patients with COVID 19.
  - Limited number of machines with portable water treatment systems.
  - Few hospital rooms with adequate plumbing to support portable HD machines
- Delay in getting test results



# Adaptation to challenges

- Twice a week dialysis, unless needed for volume or electrolyte needs
- Higher flows and lower potassium dialysate as tolerated
- Increased potassium binders. sodium zirconium cyclosilicate (lokelma) and patiromer (veltassa) used most frequently
- High dose Lasix, if patients urinated
- Baby monitors to minimize staff exposure in patient rooms. Each equipped with 2 cameras allowing nurses to separately monitor patients/vascular access and the dialysis machines from outside the patient room
- Nephrologists trained to assist dialysis nurses with tasks in the dialysis unit, freeing additional nurses to perform bedside dialysis in the hospital
- COVID+ shifts in the dialysis unit, initially in the last shift of the day and then on separate days. This allowed for terminal cleaning of the unit after the shift.
- Not very successful with increasing plumbing for in room dialysis

# Challenges-outpatient dialysis

- Inability for patients to isolate at home
- Infections and anxiety among staff
- Limited spacing in the waiting room, especially during change to staff
- Inability to test and get results in a timely manner
- Inability to send patients with milder initial illness to the hospital due to the overwhelming number for patients that were in the ED or admitted

# Adaptation to challenges-outpatient

- Infection control-more about this later
- Tried to create a new COVID shift at the end of the day- 1 week only
- New units dedicated for COVID positive patients. Transportation issues persist. Also patients with dialysis need to go to an unfamiliar unit.
- Ability to test in the dialysis unit, results still take time
- Staggering of schedule, so fewer patients in the waiting room
- More interest and uptake of incenter patients for home therapy, mostly HHD

# Current situation

- Number of patients with COVID 19 that need dialysis are less but patients are usually more debilitated than non COVID patients
- Challenges on a day-to-day basis to try and separate COVID positive and negative patients that need dialysis in the inpatient dialysis unit
- Significant number still need bedside dialysis due to inability to come to the dialysis unit
- Placement in outpatient units is difficult due to more need for SAR with onsite dialysis or need for placement in COVID positive dialysis units that is also treating non COVID patients on different days

Thank you