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Renal Replacement Therapy Surge Plan

EHC RRT Surge Planning Committee

Last Update Date: 4/6/2020

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Renal Replacement Therapy (RRT) During ICU Surge Situation

Background

- RRT is commonly required life-support tool for critically ill ICU patients
  - 15-30% ICU patients require RRT
- Multiple methods to provide RRT
  - **All methods effective** when used appropriately

Challenge

- RRT is a ***finite resource*** due to limitations in:
  - Machines
  - Supplies
  - Personnel → depending on the type of RRT performed
- Surge in ICU census → surge RRT needs

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RRT Surge Plan

- **Goal**:
  - Use multiple methods of RRT to ***maximize*** # of patients who can receive appropriate RRT to meet their individual support needs.
  - Equitable distribution and utilization of RRT resources to provide benefit to the most patients.

- **Challenge**:
  - Develop resource distribution systems to meet this goal.
    - Staffing
    - Supply chains
    - Machine use → when machines are limited, system to minimize machine down-time

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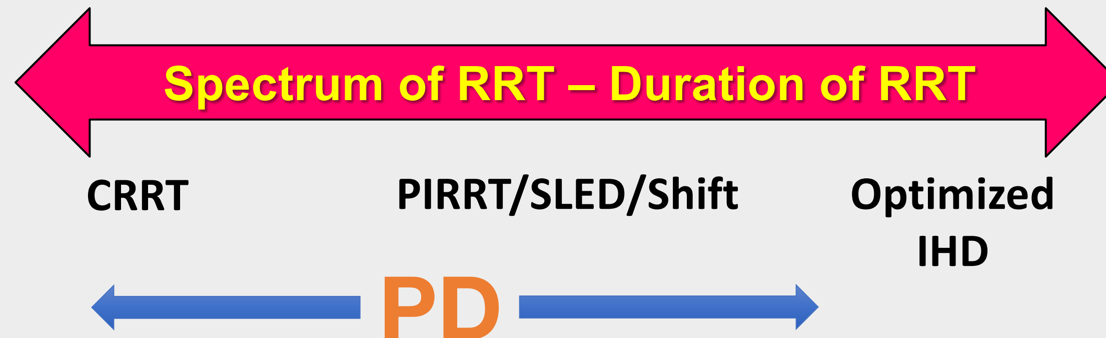
Acute Renal Support in the ICU



- **CRRT**
  - **Cardiovascular instability** (cardiogenic shock, septic shock, acute liver failure)
  - **Metabolic acidosis**
  - **Volume control**
  - **Cerebral edema**

- **IHD/PIRRT**
  - Hyperkalemia
  - Profound acidosis
  - Drug poisonings
  - Anticoagulation issues with CRRT

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Acute RRT Options in ICU

CRRT – 24h	Shift-based CRRT	PIRRT/SLED	Intermittent Hemodialysis (IHD)	Peritoneal Dialysis (PD)

• **Prismaflex CRRT machine**
• 24hr continuous RRT
• Work force = **ICU RNs**
	• **Prismaflex CRRT machine**
	• 10-12 hr RRT sessions
	• Work force = **ICU RNs**
		• **Conventional HD machine**
		  • or **Tablo®**
		• 6-8 hr RRT sessions
		  • Usually overnight
		• Work force = **collaborative**:
		  • **HD RNs:** set-up, start, & terminate HD
		  • **ICU RN**: monitors & calls HD RN for issues
			• **Conventional HD machine**
			• 3-4 hr RRT sessions
			• Work force = **Hemodialysis RN**
				• **2 Options:**
				  • Continuous treatments (CAPD)
				  • Automated PD (APD)
				• **CAPD**: exchanges q3-4 hrs, 24 hrs/day by **ICU or general ward RN**
				• **APD**: HD RN sets up & starts APD session lasting 10-12 hr

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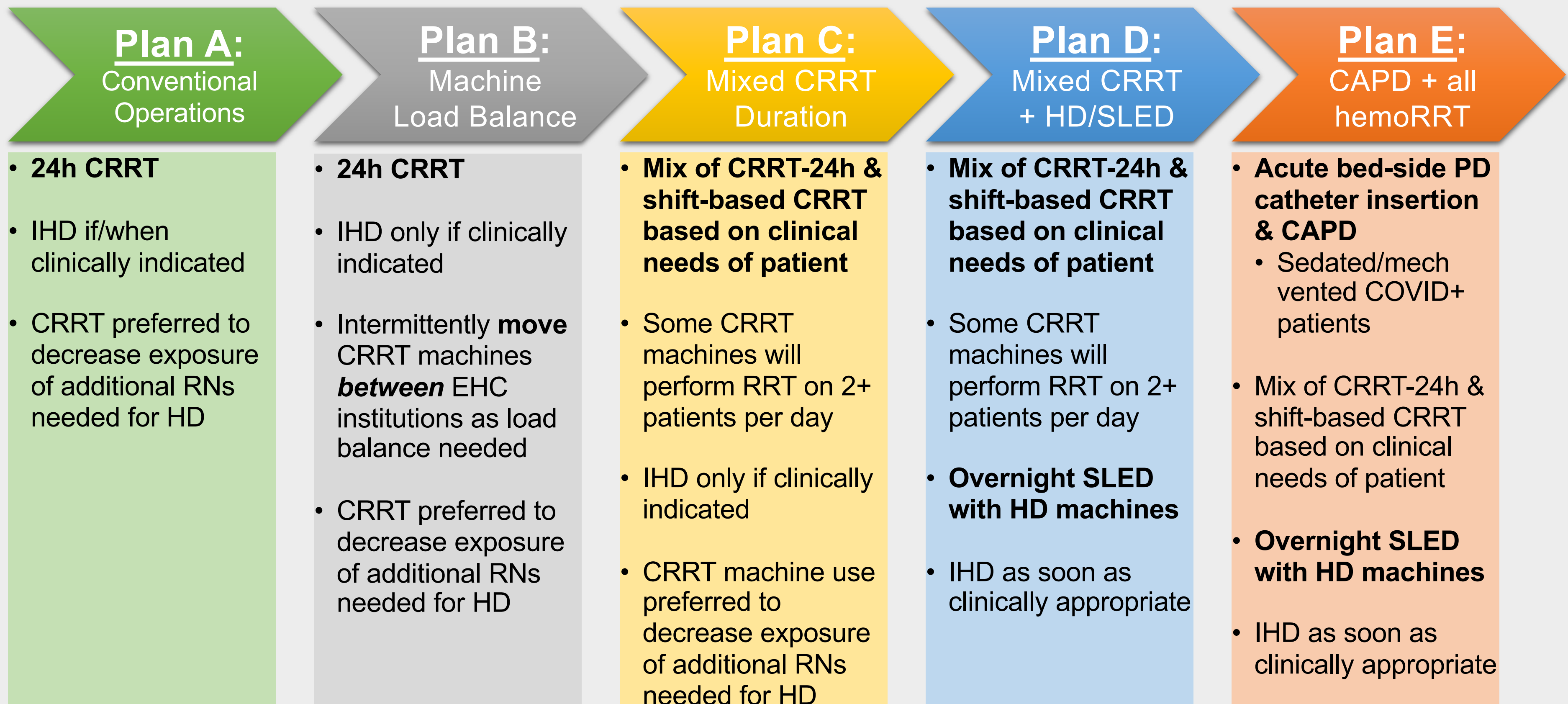

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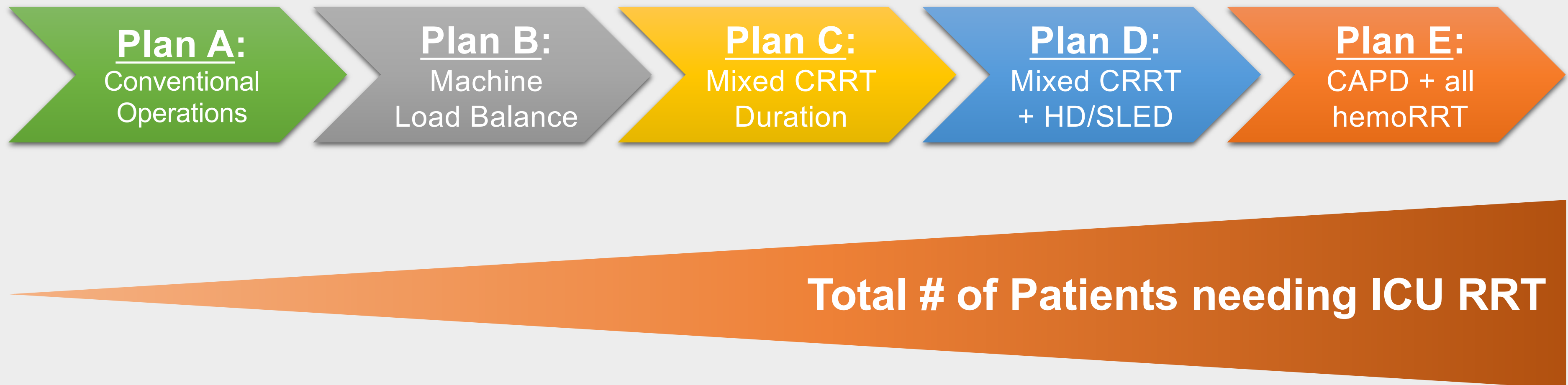
Determinant of RRT Surge Plan



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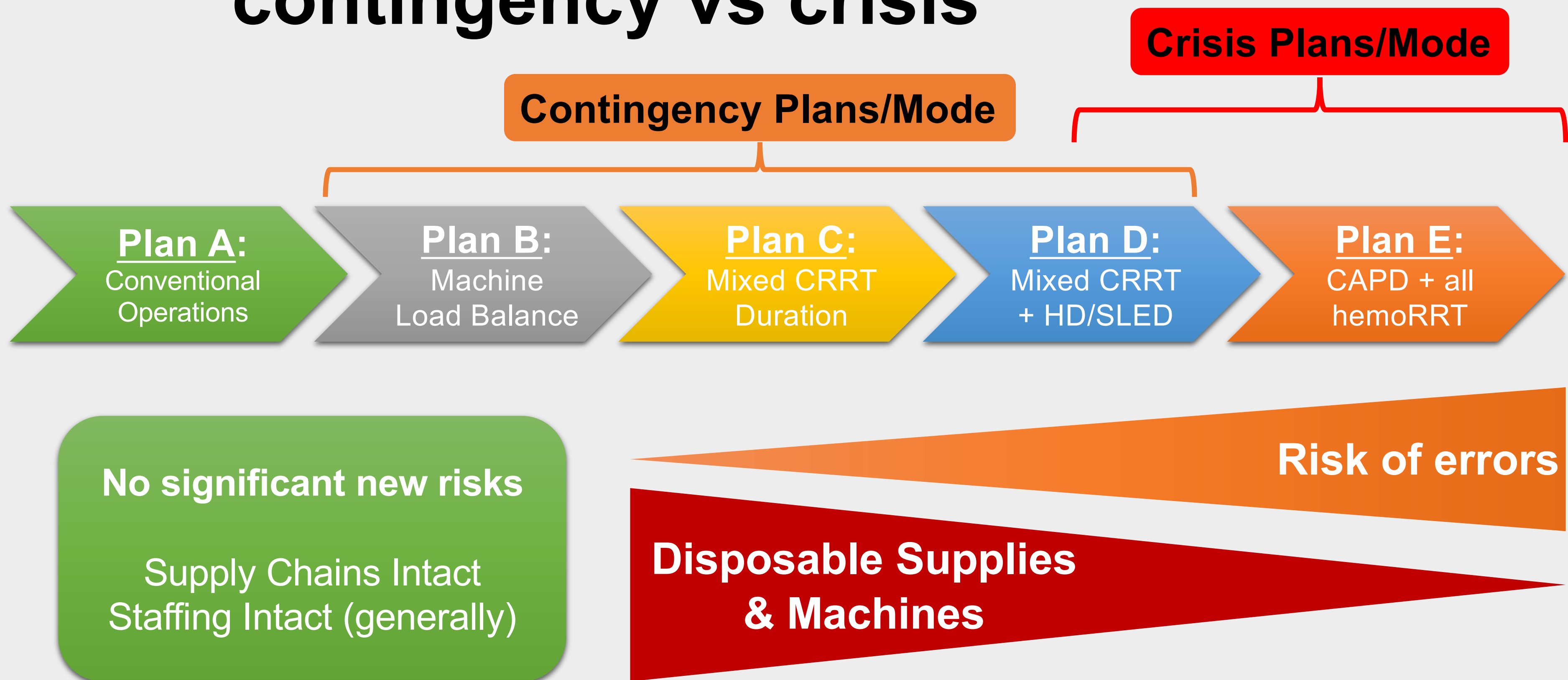

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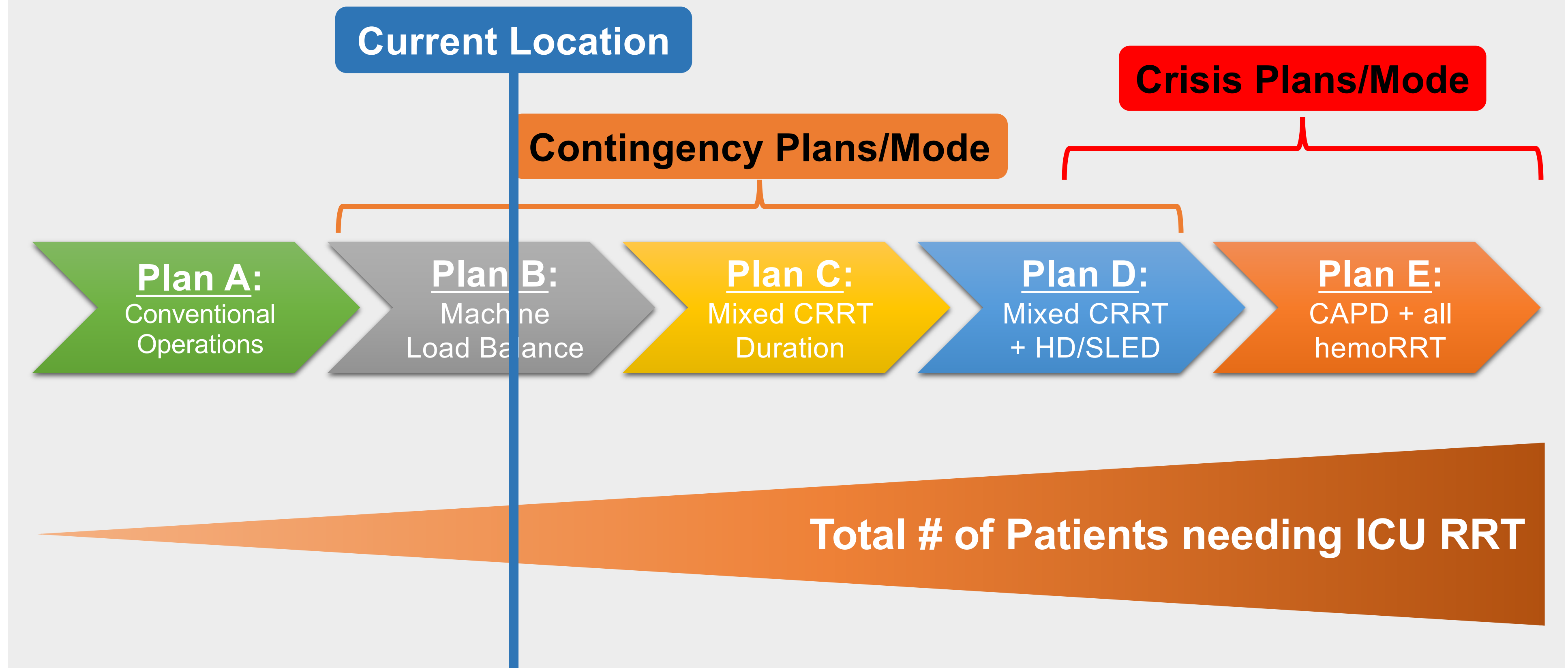

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Plan A – Conventional Operations

Challenges

- **No specific new challenges**
- Enough machines & disposable supplies to meet ICU RRT demands with 24h CRRT & IHD
- Usual challenges:
  - ICU RN & HD RN staffing
  - Adequate distribution of supplies including filters, CRRT solutions, citrate/calcium availability

Pandemic Surge Preparations

- Plan adapted for pandemic isolation needs
- Prefer CRRT use to minimize additional staff exposures to isolation environment
  - HD RN to deliver IHD
- IHD may continue in ICUs
  - Facilitate liberation from CRRT for PT/OT
  - ESRD patient with native AVF/AVG

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Plan B – Machine Load Balance

Surge Challenge

- Surge of patient at a given EHC facility → do not have enough machines to meet demand at a given facility
- Supply chains intact:
  - RRT supplies come from EHC offsite warehouse → easy to increase deliveries to meet demand
- Limited staffing impact

Pandemic Surge Preparations

- **Move RRT machines** periodically ***between*** **EHC institutions** to meet RRT demands
- Coordination between:
  - Biomedical engineering departments
  - Clinical leadership teams
  - Asset administration
  - Movers
  - Others
- Takes time to implement

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Plan C – Mixed CRRT Durations

Challenges

- **Unable to meet RRT demands**
  - # of ICU RRT pts > CRRT machines
- Different patients will require different RRT plans
  - One shift-based RRT plan will not fit all
- Highly complex to orchestrate
  - Matching available machines to appropriate pts
  - Complex scheduling

Surge Preparations – Needs

- Operational expertise to implement
- Daily CRRT machine deployment schedule
  - Staff to develop deployment schedule
- Staff to orchestrate machine deployment
- Appropriate RRT orders to match plan

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Plan D – Mixed CRRT + HD/SLED

Challenges

- **Unable to meet RRT demands**
  - # of ICU RRT pts > CRRT machines (even with shift-based CRRT implementation)
- Will have to more widely use HD machines & HD RNs for ICU HD & SLED
  - HD RN staffing impact → ? less non-ICU HD
- Highly complex to orchestrate
- ICU RNs unfamiliar with HD equipment

Surge Preparations – Needs

- New machine: **Tablo®** – **10** have been ordered
- EHC Fresenius HD Machines: **require chip upgrade to perform SLED**
- Operational expertise to implement
- Daily CRRT & HD machine & staff deployment schedule → staff needed to develop schedule & orchestrate deployments
- SLED: Overnight HD RN(s) to set-up, initiate, terminate HD sessions & to make rounds while patients are running on SLED.

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Plan E – CAPD & all HemoRRT

Challenges

- **Unable to meet RRT demands**
  - # of ICU RRT pts > CRRT + HD machine + staff availability
- ICU RNs CAPD educational needs
  - CAPD performed rarely in EHC ICUs
- Bed-side PD catheter insesrtion → surgeons
- CAPD charting

Surge Preparations – Needs

- Identifying & train surgeon partners
- **RN training for and delivery of CAPD**

  versus
- **HD RN performing APD with limited ICU RN involvement**
- Continue need for CRRT & HD machine & staff deployment program/resources
- Determine supplies for CAPD & purchase soon
  - Surgeons' & nephrologists' preferred PD catheter
  - Disposable supplies for PD exchanges
  - PD solutions

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ICU RRT for ESRD Patients

- During pandemic, RRT for ICU patients with ESRD should be guided by:
  1. **Patients preferred outpatient dialysis method**
     - HD via AVF/AVG
     - HD via Permcath (PC)
     - PD
  2. **Native dialysis vascular access**
  3. **Clinical condition**

- **Native AVF/AVG:** preference is HD via AVF/AVG unless too hemodynamically unstable
- **Native PC:** HD via PC or CRRT-24h/CRRT-shift via PC
- **PD:** PD

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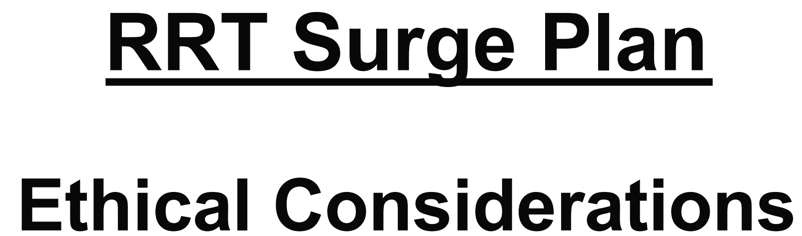

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RRT Surge Plan – Ethics

- **No strong data** that 1 method of RRT is ***clearly superior*** to another
  - When prescribed & performed well, **all methods of RRT are effective at achieving patient-centered goals** (correction of acid-base or electrolyte disorders, fluid management goals, etc)
- Provided EHC can provide appropriate RRT to meet a patient's needs, then there are little (if any) ethical implication of any of these techniques
- Ethical issues arise if/when we do not have the supplies or capacity to meet a given patient's needs

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RRT Surge Plan

Summary

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Summary

- System-wide RRT surge plan is ***required***

- **System-wide expertise will be needed to operationalize & implement** any RRT surge plan
  - MDs, APPs
  - RNs & staff
  - Educators
  - Administrative leadership
  - Administrative expertise
  - Supply Chain Management

ACUTE RRT IS A ***TEAM SPORT***

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