A Proposed Ethical Framework: Balancing the Needs of Maintenance and Short-term Patients During a Pandemic

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THE COVID-19 PANDEMIC CONTINUES TO STRAIN HEALTH CARE SYSTEMS AND DRIVE SHORTAGES IN MEDICAL SUPPLIES AND EQUIPMENT AROUND THE WORLD.

Resource allocation in times of scarcity requires transparent, ethical frameworks to optimize decision-making and reduce healthcare worker and patient distress.

The complexity of allocating dialysis resources for both short and long-term patients has not previously been addressed. Using a rapid, collaborative and iterative process, our group, engaged with patients, nephrologists, ethicists, administrators and nurses to develop a framework for addressing system capacity, communication challenges, and allocation decisions.

GUIDING ETHICAL PRINCIPLES

Ethical Principles

Ethical Principle	Description
Maximizing Benefits	Priority should be given to patients with highest needs and greatest capacity to benefit to maximize health benefits for all.
Treating People Fairly	Those with equal need should have equal access to resources. Factors such as age, racialized background, ethnicity, disability, ability to pay, socioeconomic status, pre-existing health conditions, perceived social worth should not be considered unless they are relevant to need and potential for benefit.
Prioritizing Worst Off	Priority should be given to those with the greatest need first.
Procedural Justice	Decisions should be evidence-based, defensible, transparent and clearly communicated. Stakeholder input should be sought, and clear appeals mechanisms should be established.

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KEY ACTIONS REQUIRED FOR PATIENT CENTRED RESOURCE MANAGEMENT

- Ensure that a system and structure is in place for execution of the emergency plan, established in advance
- Ensure the ability to assess system capacity for acute and maintenance dialysis exists, ideally using electronic tools
- Ensure good communication to patients, families and health care providers about potential changes and the supporting rationale
- Increase dialysis capacity with existing human and dialysis machine resources by:
  - assessing maintenance hemodialysis patients' suitability for alteration of HD schedules, diet and other medication changes
  - developing contingencies for alternate dialysis modalities for both in- and out-patients (such as CRRT, PD)

Assume patients are modifying their behaviours (e.g. dietary adherence) to the best of their ability. Other criteria to consider include:
- residual renal function/urine output (responsiveness to diuretics for K or volume management)
- ability to tolerate potassium resin binders
- ability to tolerate further dietary restrictions and dialysate [K] reduction.

Patient characteristics		Volume Status		Potassium Status
Category 1	Stable, suitable for reduced frequency HD	Controlled: Interdialytic Weight Gain (IDWG) <4 %	AND	Controlled: Serum K<5 AND dialysate K>2
Category 2	May be suitable for shorter duration HD runs	Controlled: IDWG <4%	AND	Uncontrolled: Serum K >5 OR dialysate K ≤2
Category 3	Intermediate– Physician discretion to be used for reduced duration HD	Borderline: IDWG ~4% or 4kg AND/OR recent admission for volume overload	AND/ OR	Uncontrolled: Dialysate K ≤2 OR Serum K ≥5
Category 4	Unsuitable for short or less frequent HD	Uncontrolled: IDWG >4% OR >4Kg	AND	Uncontrolled: Serum K>5 OR Dialysate K≤2
Category 5	Case by case assessment: Use physician discretion when deciding on dialysis frequency/duration Patients who started HD within the last 1 month (noting that new patients may have delayed longer than usual to start during pandemic surge and may be metabolically and/or hemodynamically unstable and require frequent dialysis to stabilize) Patients on 4x-5x/week HD but have acceptable potassium or IDWGs			

Table 1- Categories of Eligibility for Dialysis Dose Reduction in Maintenance Patients

CONTINGENCY LEVELS AND RECOMMENDED RESPONSES

	Description	Contingency Levels and Recommended Responses
Stage 1 Conventional Operations Minor Surge	All dialysis resources levels are fully intact. The hospital hemodialysis (HD) unit is functioning within usual bed capacity and adequate staffing levels.	• Disaster preparedness should be emphasized in HD units prior to an increased surge capacity. Patients should be aware of surge strategies well in advance. • Provide all patients with documents on emergency preparedness which should include diet and fluid plans. • Assess all patients for fitness for dialysis dose reduction to expand capacity • Prioritize Advance Care Planning discussions/serious illness and goals of care conversations to align care with patient goals and wishes. • Consider cohorting COVID-19 positive inpatients out of the HD unit when possible. • Cohorting of COVID-19 positive patients within inpatient units NOT in critical care areas should be considered to optimize nursing ratios during off-ward dialysis beyond 1:1. • Consider moving COVID-19 positive dialysis patients to adjacent rooms or multi-bed rooms within COVID-19 units to allow for this. • Work with dialysis vendors and off-site units to optimize resources, communication and joint decision-making structures across organizations
Stage 2 Conventional Operations Moderate Surge	All dialysis resource levels remain intact, but there is a possibility that staffing resources may become depleted. The hospital HD unit is functioning within usual bed and staffing capacity.	• Continue to keep patients informed of Emergency Stage/Surge Level. • Identify patients currently dialyzing in-centre who can potentially dialyse in community units and facilitate transfer where possible. • Identify potential home dialysis patients and fast track training • Review and update Resuscitation Orders (Code Status/MOST/POLST) • Maximize the use of all CRRT machines in Critical Care areas. • Determine essential components of sufficient HD care. Consider deferring routine: blood work, access flow surveillance, medication reviews. • Determine capacity of nurse to support multiple patients at essential service levels. • Determine interdisciplinary supports available to assist in care. • Consider repatriating HD trained staff from pre-dialysis and transplant clinic-based service areas and how to provide refresher training. • Explore other roles in health care (included and excluded) and determine how they can support direct care.
Stage 3 Contingency Operations Major Surge	An increase in demand for dialysis services, beyond the normal capacity, yet still maintainable with changes to staff ratios and HD treatment duration. Each HD unit remains responsible for determining the most effective approach to manage the increased demand volumes.	• Activate dialysis dose-reduction for long-term hemodialysis patients ◊ Consider 2 times a week hemodialysis for Category 1 patients. ◊ Consider reduced duration HD for Category 2 and 3 patients (may be facilitated by potassium resin binders and very low (K0 or K1) potassium dialysate baths) • Extend usual nurse patient ratio in ICU to acceptable and agreed upon staffing that includes ICU/HD RNs and renal technician. Outline strategies for urgent assistance if patient care needs change. • Consider increasing the utilization of PD urgent starts. • Proactively assess prognosis for long-term HD patients using the Charlson Comorbidity Index (CCI) in preparation for triage if Stage 4 Crisis is reached. • Increase nurse to patient ratio in hemodialysis unit and cohort stable patients to maximize ratio in a team-based approach. • Transfer long-term hemodialysis patients to other geographic regions with dialysis capacity.
Stage 4 Crisis Operations *Emergency Triage Status*	A significant increase in demand for HD services which impacts care at a regional level. More patients are requiring services than available resources. The system is operating at a crisis surge level and the increase in demands that overwhelms the renal resources of an individual hospital and region.	• Organize provincial/statewide response. A coordinated response at the regional network level is required. • At Stage 4, Emergency Operating Centre (EOC) should be in a position to provide direction to ensure clinical and operational leads are prepared to invoke management strategies to determine alternate service delivery. • Increase the utilization of PD urgent starts. • Implement triage allocation framework. • Allocation of available dialysis resources determined by the triage team

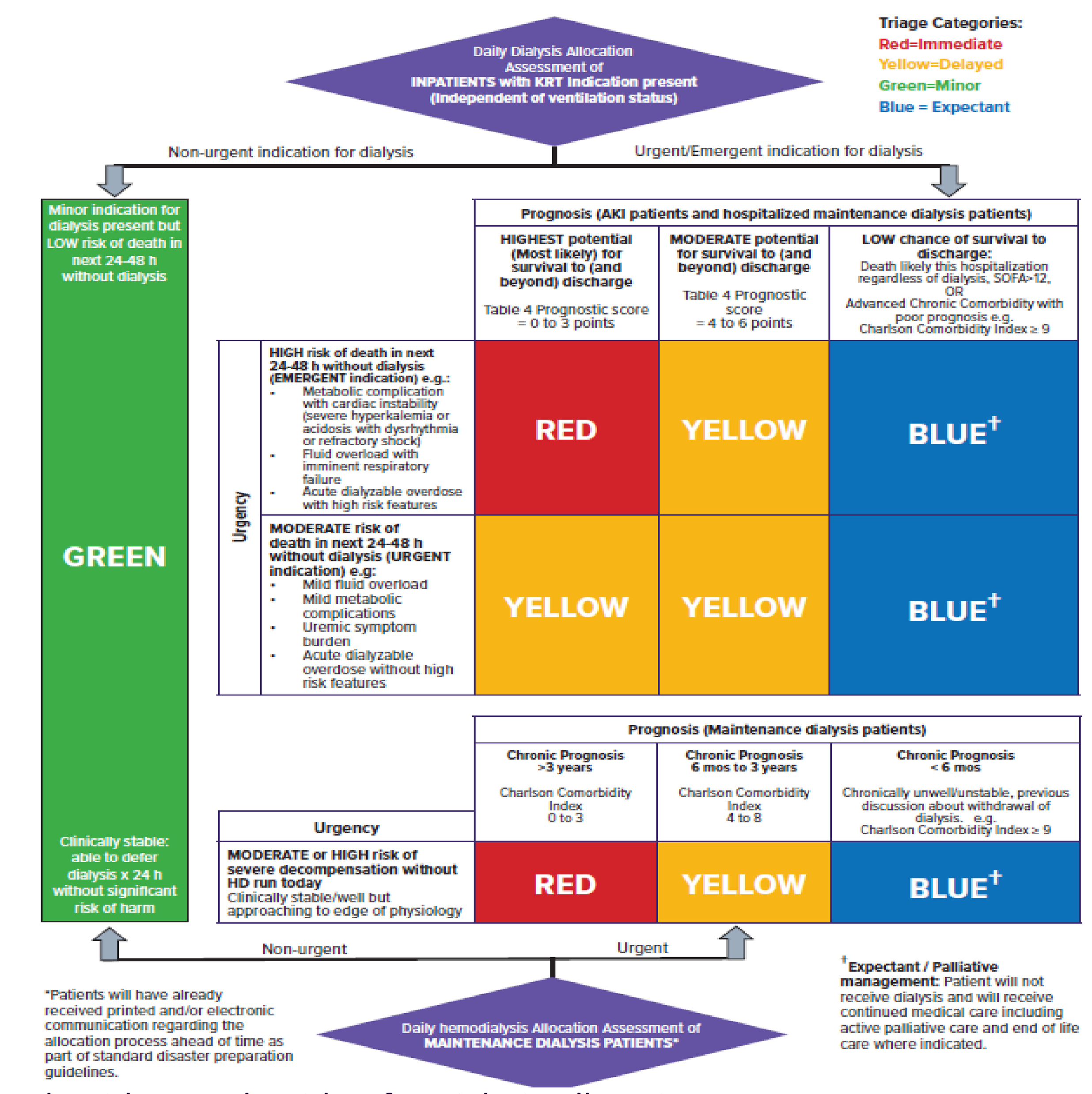
Table 2- Contingency Levels and Recommended Responses

DIALYSIS TRIAGE

- Implementation of a Dialysis Triage Algorithm should includes both short-term and maintenance dialysis patients
- Develop contingencies for alternate dialysis modalities for both in-patients and out-patients (such as CRRT, PD)

TRIAGE CATEGORIES

- Two distinct allocation concepts (urgency and prognosis) should be applied in a sequential matrix to two distinct populations: short-term and maintenance hemodialysis patients.
- Accepted triage methodology: Red (Immediate), Yellow (Urgent), Green (Delayed) and Blue (expectant).



Algorithm 1- Algorithm for Dialysis Allocation

PRIORITIZATION SCORE

- Scoring table for the acute inpatient population that estimates acute prognosis using the Sequential Organ Failure Assessment (SOFA) score and estimates near-term prognosis using the Charlson Comorbidity Index (CCI).

Specification	0 points	1 points	2 points	3 points	4 points Patients in this column would already be triaged to Blue group for poor prognosis as noted in Algorithm 1
Predicted short term survival (Sequential Organ Failure Assessment (SOFA) score)	Not acutely ill – e.g. maintenance HD outpatient	SOFA < 6 e.g. inpatient	SOFA 6-9 e.g. ICU patient	SOFA 10-12 e.g. ICU patient	SOFA >12 e.g. ICU patient
Predicted near term survival (Charlson Comorbidity Index)	Charlson Comorbidity Index 0, 1 or 2 Points	Charlson Comorbidity Index 3 or 4 Points	Charlson Comorbidity Index 5 or 6 Points	Charlson Comorbidity Index 7 to 9 Points	Severe comorbidities with death expected within 6 months e.g. Charlson Comorbidity Index ≥ 9

- Patients are individually scored and ranked. Lower scores receive priority for RRT that day according to capacity that day
- **The Sequential Organ Failure Assessment (SOFA) score** is a mortality prediction score that is based on the degree of dysfunction of six organ systems and can be used to determine level of organ dysfunction and mortality risk in ICU patients. See https://qxmd.com/calculate/calculator_268/sequential-organ-failure-assessment-sofa
- **Charlson Comorbidity Index** is a mortality prediction score based on the presence of 17 specific comorbities as well as age, which has been validated in multiple studies involving kidney failure https://www.mdcalc.com/charlson-comorbidity-index-cci

TIE BREAKING PRINCIPLES: Life cycle (Fair innings principle) followed by random allocation

Algorithm 1 and Table 3 operate on the principle of maximizing utility-or maximizing benefit for the greatest number (saving the most lives and life years in terms of near term survival). If further prioritization is required then it is based on where individuals currently stand in the expected life cycle, with priority given to the worst off individuals defined as those who have had the least opportunity to experience life. This is the "fair innings principle" (equity/fairness). Individuals are ranked by age range (e.g., age 12-40, age 41-60; age 61-75; older than age 75) roughly indicative of life stages with priority given to those at an earlier life stage.

If, after applying the tiebreaker based on life-cycle considerations there are not enough resources to treat all patients within the lowest ranked life cycle group, then a lottery (i.e., random allocation) should be used to ultimately break the ties within that life cycle group.

Table 3- Proposed Prognostic Prioritization Score

This framework is intended to form a critical component of a broader, comprehensive pandemic dialysis response plan to help enable optimal outcomes as we navigate such public health crises now and in the future.