Beth Israel Lahey Health

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Allocation of Scarce Critical Care Resources During a Public Health Emergency[1]

Executive Summary

Introduction: In the event of an overwhelming public health emergency, the primary goal of the health care system is to save as many lives and life-years as possible. The purpose of this document is to provide guidance for the allocation of critical care resources (e.g., ventilators, critical care beds, or any other hospital resources) to critically ill patients in the event that a public health emergency creates demand for such resources that outstrips the supply. These allocation recommendations will be enacted only if: 1) critical care capacity is, or will shortly be, overwhelmed despite taking all appropriate steps to increase the surge capacity to care for critically ill patients; and 2) a regional authority has declared a public health emergency or BILH has otherwise consulted and coordinated with the appropriate regional authority, such as the Massachusetts Department of Public Health. This allocation framework is grounded in ethical obligations that include the duty to care, duty to steward resources to optimize population health, distributive and procedural justice, reciprocity, and transparency. (**See Addendum 1**) It is consistent with existing recommendations for how to allocate scarce critical care resources during a public health emergency, which were informed by extensive consultation with citizens, disaster medicine experts, and ethicists.

This document describes 1) the creation of allocation teams to support clinicians and ensure consistent decision making; 2) criteria for initial allocation of critical care resources; and 3) reassessment criteria to determine whether ongoing provision of scarce critical care resources is justified for individual patients.

Section 1. Creation of allocation teams: Clinicians treating patients will not make allocation decisions. Instead, each system region will designate an acute care physician allocation officer, supported (if resources allow) by an acute care nurse and one other clinician, and an administrator. This allocation team will apply the allocation framework described in this document. The separation of the allocation role from the clinical role is intended to promote objectivity, avoid conflicts of commitments, and minimize moral trauma and distress. The allocation officer will also be involved in appeals of allocation decisions (to the extent appeals are feasible within the time constraints), and in collaborating with the attending physician to disclose allocation decisions to patients and families.

Section 2. Allocation criteria for ICU admission/ventilation: Consistent with accepted standards during public health emergencies, the primary goal of the allocation framework is to maximize benefit to populations of patients, specifically by maximizing survival to hospital discharge and beyond for as many patients as possible. All patients who meet usual medical indications for ICU beds, ventilators and other critical care resources will be assigned a priority score using a 1-8 scale (lower scores indicate higher likelihood of benefit from critical care), derived from 1) patients' likelihood of surviving to hospital discharge, assessed with an objective and validated measure of acute physiology (e.g., the SOFA score); and 2) patients' likelihood of achieving longer-term survival based on the presence or absence of comorbid conditions that may influence survival of the immediate illness (**Table 1**). This raw priority score will be converted to three color-coded priority groups (e.g., high, intermediate, and low priority) if needed to facilitate streamlined implementation in individual hospitals. All patients interested in receiving critical care resources will be eligible to receive such resources regardless of their priority score, but available critical care resources will be allocated according to priority score, such that the availability of these resources will determine how many patients will receive critical care resources. After prioritization based on these allocation criteria, it may be necessary to further distinguish between

patients in priority groups, in which case a number of differentiators (described below) will be implemented to determine which patient will receive the scarce critical care resource. Patients who are not allocated certain critical care resources will be offered other medical care, including intensive symptom management and psychosocial support. Where available, specialist palliative care teams, social workers, and/or chaplains will provide additional support and consultation.

Section 3. Reassessment for ongoing provision of critical care/ventilation: The allocation team will conduct periodic reassessments of all patients receiving critical care resources during times of crisis (i.e., not merely those initially triaged under the crisis standards and not merely those with the disease or disorders that has caused the public health emergency (e.g., COVID19)). The timing of reassessments should be based on evolving understanding of typical disease trajectories and of the severity of the crisis. A multidimensional assessment should be used to quantify changes in patients' conditions, such as recalculation of severity of illness scores, appraisal of new complications, and treating clinicians' input. Patients showing improvement will continue to receive critical care resources until the next assessment. Patients showing failure to improve despite maximal therapy during the disease-applicable trial period or showing clinical deterioration that portends a very low chance for survival will no longer receive scarce critical care resources. These patients will receive medical care, including intensive symptom management and psychosocial support. Where available, specialist palliative care teams, social workers, and/or chaplains will provide additional support and consultation. Where palliative care specialists are not available, the treating clinical teams should provide primary palliative care.

1. BILH draft developed, reviewed and vetted by the BILH Ethics workgroup, comprising ethics committee and/or ethics support service representatives from all BILH hospitals, and BILH Critical Care workgroup, comprising critical care leaders from throughout BILH. Draft adapted from Model Policy circulated by Douglas White, Pitt. White's model hospital policy arose out of a decade-long process with ethicists, diverse citizens' groups, and disaster medicine experts. The original allocation framework was published in the Annals of Internal Medicine in 2009. A 3-year project of engaging diverse citizens regarding their views on how to allocate scarce resources in a pandemic followed. This project was led by Lee Daugherty-Biddison and Eric Toner at the UPMC Center for Health Security (now called the John Hopkins Center for Health Security). The community engagement efforts yielded broad endorsement of the general features of the allocation framework, as well as important suggestions for modifications, where were incorporated into subsequent revisions. In March 2020, in response to the intensifying COVID-19

pandemic, Dr. Douglas White and Dr. Scott Halpern (University of Pennsylvania) created the model hospital policy to encourage hospitals and health systems to implement a fair and transparent approach to allocate scarce critical care resources during the COVID-19 pandemic. It was revised after the initial sharing based on feedback from multiple sources.

Introduction

In the event of an overwhelming public health emergency, the primary goal of the health care system is to save as many lives and life-years as possible. The purpose of this document is to provide guidance for the allocation of critical care resources (e.g., ventilators, critical care beds, or any other hospital resources) to critically ill patients in the event that a public health emergency creates demand for such resources that outstrips the supply. These allocation recommendations should be enacted only if: 1) critical care capacity is, or will shortly be, overwhelmed despite taking all appropriate steps to increase the surge capacity to care for critically ill patients; and 2) a regional authority has declared a public health emergency or BILH has otherwise consulted and coordinated with the appropriate regional authority, such as the Massachusetts Department of Public Health. This allocation framework is grounded in ethical obligations that include the duty to care, duty to steward resources, distributive and procedural justice, reciprocity, and transparency. (**See Addendum 1**) Consistent with accepted standards during public health emergencies, the primary goal of the allocation framework is to maximize benefit to populations of patients, often expressed as doing the greatest good for the greatest number.[1,2] It should be noted that this goal is different from the traditional focus of medical ethics, which is centered on promoting the wellbeing of individual patients.[3] As described below, the allocation framework operationalizes the broad public health goal by giving priority for critical care resources to patients who are most likely to survive to hospital discharge and beyond with treatment. This policy, and the principles and processes, herein, were adapted from a model policy, which was the result of extensive consultation with citizens, ethicists, and disaster medicine experts informed.[4]

The allocation framework described in this document differs in two important ways from other allocation frameworks. First, it does not categorically exclude any interested patients who, in usual circumstances, would be eligible for critical care resources. Instead, all patients are treated as eligible to receive critical care resources and receive a priority assignment based on their potential to benefit from those resources. The availability of critical care resources determines how many priority groups can receive critical care. Second, the allocation framework goes beyond simply attempting to maximize the number of patients who survive to hospital discharge, because this is a thin conception of doing the greatest good for the greatest number.[5] Instead, the allocation framework also attempts to maximize overall survival of the immediate illness, expressed as the number of life-years saved.

This document describes: 1) the creation of allocation teams to support clinicians and ensure consistent decision making; 2) criteria for initial allocation of critical care resources; and 3) reassessment criteria to determine whether ongoing provision of scarce critical care resources is justified for individual patients.

Section 1. Creation of allocation teams

The purpose of this section is to provide guidance to create regional allocation teams whose responsibility is to implement the allocation framework described in Sections 2 and 3. It is important to emphasize that clinicians treating patients should not make allocation decisions. These decisions are grounded in public health ethics, not clinical ethics, and therefore an allocation team with expertise (and ideally training) in the allocation framework should make allocation decisions. The separation of the allocation role from the clinical role is intended to enhance objectivity, avoid conflicts of commitments, and minimize moral trauma and distress.

Allocation Officer

A group of allocation officers should be appointed, with one serving in each region at any time. Desirable qualities of allocation officers include being a physician with established expertise in the management of critically ill patients (e.g., specialize in critical care, emergency medicine, trauma surgery, transplant surgery, etc.), strong leadership ability, and effective communication and conflict resolution skills. This individual will be responsible for the allocation process, including assessing of patients, assigning a level of priority for each, communicating with treating physicians, and directing attention to the highest-priority patients. The allocation officer's role includes leading allocation team discussion to reach decisions according to the allocation framework described below, which is designed to benefit the greatest number of patients, even though these decisions may not necessarily be best for some individual patients. The allocation officer should review allocation team decisions to ensure fairness, particularly in light of existing healthcare disparities. To optimize effective functioning in a crisis, the allocation officer should ideally be well prepared and trained in advance by means of disaster drills or exercises.

A roster of approved allocation officers should be maintained that is large enough to ensure that allocation officers will be available on short notice at all times, and that they will have sufficient rest periods between shifts.

Allocation Team

In addition to the allocation officer, the allocation team should consist of (a) at least two additional clinical participants (so, three total clinical participants), one of whom should be a nurse with acute care (e.g., critical care or emergency medicine) experience (even if no longer clinically active), if resources allow, and (b) one administrative staff member who will conduct data-gathering activities, documentation and record keeping, and assistance liaising with a regional hospital's Command Center or bed management. The staff member must be provided with appropriate computer and IT support to maintain updated databases of patient priority levels and scarce resource usage (total numbers, location, and type). The allocation team has the responsibility and authority to apply the principles and processes of this document to make decisions about which patients will receive the highest priority for receiving critical care. It is also empowered to make decisions regarding reallocation of critical care resources that have previously been allocated to patients, again using the principles and processes in this document. In making these decisions, the allocation team should not use principles or beliefs that are not included in this document. The allocation team should make decisions by consensus, such that after discussion all team members accept an allocation decision that is fully supportable, even if it is not the preferred allocation decision of all team members.

A representative from the region's hospital administrations should also be linked to the team, in order to supervise maintenance of accurate records of allocation scores and to serve as a liaison with hospital leadership. A representative from an ethics support service within the region also shall be available for additional support. As resources permit, there may be representatives from social work, chaplaincy and palliative care who are linked to the allocation team to assist in coordinating psychosocial support and/or intensive symptom management for patients and families in situations where critical care resources cannot be offered or need to be reallocated.

The allocation officer and team members should function in shifts lasting no longer than 13 hours (to enable 30 minutes of overlap and handoffs on each end). Therefore, there should be two shifts per day to fully staff the allocation function.

Team decisions and supporting documentation should be reported daily to appropriate BILH leadership and BILH incident command. This system group will review decisions to confirm consistent and unbiased

application of the allocation criteria, including differentiators after the primary criteria, across the regions, and to ensure the allocation mechanism is not inadvertently creating or furthering inequities between groups (e.g., race, disability, perceived quality of life, gender, sexual orientation, gender identity, ethnicity, ability to pay, socioeconomic status, perceived social worth, immigration status, or past or future use of resources).

Allocation Mechanism

The allocation officer and her/his team will use the allocation framework, detailed in Section 2, to determine priority scores of all patients eligible to receive the scarce critical care resource. The allocation team should be as blinded and unbiased as possible, particularly with regard to patient demographic details that are unrelated to the clinical determination and the hospital in which the patient is located. For patients already being supported by the scarce resource, the evaluation will include reassessment to evaluate for clinical improvement or worsening at pre-specified intervals, as detailed in Section 3. The allocation officer will review the comprehensive list of priority scores for all patients and will communicate with the clinical teams immediately after a decision is made regarding allocation or reallocation of a critical care resource.

Communication of allocation decisions to patients and families

Although the *authority* for allocation decisions rests with the allocation officer, there are several potential strategies to *communicate* allocation decisions to patients and families. Communication or disclosure of such allocation decisions to patients and/or their next of kin is a required component of a fair allocation process that provides respect for persons.[6] The allocation officer should first inform the affected patient's attending physician about the allocation decision. Those two physicians should collaboratively determine the best approach to inform the individual patient and family. Options for who should communicate the decision include: 1) solely the attending physician; 2) solely the allocation officer; or 3) a collaborative effort between the attending physician and allocation officer (noting that the allocation officer may not physically be at the institution with the patient and so may need to participate in the conversation virtually). The best approach will depend on a variety of case-specific factors, including the dynamics of the individual doctor-patient-family relationship and the preferences of the attending physician. If the attending physician is comfortable with disclosing her- or him-self, this approach is useful because the communication regarding allocation will bridge naturally to a conveyance of prognosis, which is a responsibility of bedside physicians, and because it may limit the number of clinicians exposed to a circulating pathogen. The third (collaborative) approach is useful because it may lessen moral distress for individual clinicians and may augment trust in the process, but these benefits must be balanced against the risk of greater clinician exposure (if the allocation officer is on-site and not participating virtually). Under this approach, the attending physician would first explain the severity of the patient's condition in an emotionally supportive way, and then the allocation officer would explain the implications of those facts in terms of the allocation decision. The allocation officer would also emphasize that the allocation decision was not made by the attending physician but is instead one that arose from the extraordinary emergency circumstances, and reflect a public health decision. Regardless of who communicates the decision, it may useful to explain the medical factors that informed the decision, as well as the factors that were not relevant (e.g., race, disability, perceived quality of life, gender, sexual orientation, gender identity, ethnicity, ability to pay, socioeconomic status, perceived social worth, immigration status, or past or future use of resources). If resources permit, representatives from social work, chaplaincy and palliative care should be present or available to provide ongoing emotional and psychosocial support and/or intensive symptom management to support to the patient and family.

Appeals process for individual allocation decisions

It is possible that patients, families, or clinicians will challenge individual allocation decisions. Procedural fairness requires the availability of an appeals mechanism to resolve such disputes, to the extent time

allows. On practical grounds, different appeals mechanisms are needed for the initial decision to allocate a scarce resource among individuals, none of whom are currently using the resource, and the decision whether to withdraw a scarce resource from a patient who is showing failure to improve despite maximal therapy during the disease-applicable trial period or showing clinical deterioration that portends a very low chance for survival. This is because initial allocation decisions for patients awaiting the critical care resource will likely be made in highly time-pressured circumstances. Therefore, an appeal will need to be adjudicated in real time to be operationally feasible. It is possible, therefore, that an appeal may not be possible given time constraints dictated by patients' clinical situations.

All appeals should be decided by a BILH-level Allocation Appeal Committee that is independent of the regional allocation team and of the patient's care team. The Allocation Appeal Committee should be made up of at least three individuals, recruited from the following groups or offices: Chief Medical Officer or designee, Chief Nursing Officer or other Nursing leadership, Legal Counsel, a hospital Ethics Committee or Consult Service, members of an institution's ethics faculty, and/or an off-duty allocation officer. Three committee members are needed for a quorum to render a decision, using a simple majority vote. The process can happen by telephone or in person, and the outcome will be promptly communicated to whomever brought the appeal.

For the initial allocation decision, the only permissible appeals are those based on a claim that an error was made by the allocation team in the calculation of the priority score or use/non-use of a differentiator (as detailed in Section 2). The process of evaluating the appeal should include the Allocation Appeal Committee verifying the accuracy of the priority score calculation by recalculating it. The treating clinician or allocation officer should be prepared to explain the calculation to the patient or family on request.

Decisions to withdraw a scarce resource such as mechanical ventilation from a patient who is already receiving it may cause heightened emotion and/or moral concern. Therefore, a more robust appeal process should be implemented for them, so long as the conditions of allocation decision making permit doing so. If appeals take up sufficient time that they impede other awaiting allocation decisions, then they should be limited only to verifying that the priority scoring was accurately calculated by recalculating the score. Time permitting, the more robust appeals process includes:

- The individuals appealing the allocation decision should explain to the allocation officer the grounds for their appeal. Appeals based in an objection to the overall allocation framework should not move forward.
- The Allocation Appeal Committee will hear from the appealing party the grounds for their objection, review the evidence supporting the allocation decision, including information on patients who are in the queue for the scarce resource, and render a decision.
- The appeals process must occur quickly enough that the appeals process does not harm patients who are in the queue for scarce critical care resources currently being used by the patient who is the subject of the appeal. If this is untenable, simple verification priority scoring should be offered.
- The decision of the Allocation Appeal Committee or subcommittee for a given hospital will be final.
- Periodically, the Allocation Appeal Committee should, if feasible, retrospectively evaluate whether the review process is consistent with effective, fair, and timely application of the allocation framework.

Section 2. Allocation process for ICU admission/ventilation

The purpose of this section is to describe the allocation framework that should be used to make initial allocation decisions for patients who present with illnesses that typically require critical care resources (i.e., illnesses that cannot be managed on a hospital ward in that hospital). The scoring system applies to all patients presenting with critical illness, not merely those with the disease or disorders that have caused the public health emergency (e.g., COVID19). For example, in the setting of a severe pandemic, those patients with respiratory failure from illnesses not caused by the pandemic illness will also be subject to the allocation framework. This process involves two steps, detailed below:

1. Calculating each patient's priority score based on the multi-principle allocation framework;
2. Determining each day how many priority groups will receive access to critical care interventions.

To be clear, emergency medicine specialists, bedside clinicians, and first responders should perform the immediate stabilization of any patient in need of critical care, as they would under normal circumstances or their own crisis allocation criteria (e.g., CODE VENT Policy for use in the emergency department during a scarcity of ventilators). If time permits, this allocation protocol should be followed prior to allocation of a critical care resource. Along with stabilization, temporary ventilatory support may be offered to allow the allocation officer to assess the patient for critical resource allocation. Every effort should be made to complete the initial allocation assessment within 90 minutes of the recognition of the likely need for critical care resources.

Ethical goal of the allocation framework. Consistent with accepted standards during public health emergencies, the primary goal of the allocation framework is to maximize benefit for populations of patients, often expressed as "doing the greatest good for the greatest number."

STEP 1: Calculate each patient's priority score using the multi-principle allocation framework. This allocation framework is based primarily on two considerations: 1) saving the most lives; and 2) saving the most life-years. Patients who are more likely to survive with intensive care are prioritized over patients who are less likely to survive with intensive care. Patients who do not have serious comorbid illness are given priority over those who have illnesses that limit their life expectancy. As summarized in **Table 1**, the Sequential Organ Failure Assessment (SOFA) score will be used to determine patients' prognoses for hospital survival. In addition, the presence of life-limiting comorbid conditions, as determined by the allocation team, is used to characterize patients' longer-term prognosis as a result of the immediate illness.

Table 1. Multi-principle Strategy to Allocate Critical Care/Ventilators During a Public Health Emergency

Principle	Specification	Point System*			
		1	2	3	4
Save the most lives	Prognosis for short-term survival (SOFA score#)	SOFA score < 6	SOFA score 6-8	SOFA score 9-11	SOFA score ≥12
Save the most life-years	Prognosis for long-term survival of the immediate illness (medical assessment of comorbid conditions)	…	Major comorbid conditions with substantial impact on long-term survival of the immediate illness	…	Severely life-limiting conditions; death likely within 1 year

[#]SOFA= Sequential Organ Failure Assessment; note that another measure of acute physiology that predicts in-hospital mortality, such as LAPS2 score, could be used in place of SOFA, but should similarly be divided into 4 ranges.
*Scores range from 1-8, and persons with the lowest score would be given the highest priority to receive critical care beds and critical care resources.

Points are assigned according to the patient's SOFA score (range from 1 to 4 points) plus the presence or absence of comorbid conditions (2 points for major life-limiting comorbidities, 4 points for life-limiting comorbidities likely to cause death within a year (**Table 2**)). These points are then added together to produce a total priority score, which ranges from 1 to 8. Lower scores indicate higher likelihood of benefiting from critical care, and priority will be given to those with lower scores.

Table 2. Examples of Major Comorbidities and Severely Life Limiting Comorbidities*

Examples of Major comorbidities (+2 pts.) **(**associated with significantly decreased long-term survival of the immediate illness)	**Examples of Severely Life Limiting (+4 pts.) Comorbidities (**commonly associated with survival < 1 year)
• Moderate Alzheimer's disease or related dementia • Malignancy with a < 10 year expected survival • New York Heart Association Class III heart failure • Moderately severe chronic lung disease (e.g., COPD, IPF) • End-stage renal disease in patients < 75 • Severe multi-vessel CAD • Cirrhosis with history of decompensation	• Severe Alzheimer's disease or related dementia • Cancer being treated with only palliative interventions (including palliative chemotherapy or radiation) • New York Heart Association Class IV heart failure plus evidence of frailty • Severe chronic lung disease plus evidence of frailty • Cirrhosis with MELD score ≥20, ineligible for transplant • End-stage renal disease in patients older than 75

***This Table only provides examples of potentially relevant co-morbidities that the allocation team may consider**. This table may be modified upon consultation with relevant specialists and as understanding of the illness leading to the public health emergency evolves.

Other scoring considerations:

1. Pregnancy: In general, pregnant patients will be assigned a priority score based on the same framework used for non-pregnant patients. Clinicians will discuss all relevant treatment options with the patient. In the setting of pregnancy where a multidisciplinary clinical care team and the patient have decided on a plan for neonatal resuscitation (should delivery happen), then two points will be deducted from the patient's raw priority score.

2. Limited data: If laboratory values or other elements needed for the priority score are not available prior to the need for a time-sensitive decision by the allocation team, the allocation team will do his/her best to approximate a priority score.

Irrelevant Criteria
In determining the priority score for a patient, the allocation team may have access to information about patients that have no bearing on the likelihood or magnitude of benefit from receiving the scarce critical care resource, including, but not limited to: race, disability, perceived quality of life, gender, sexual orientation,

gender identity, ethnicity, ability to pay, socioeconomic status, perceived social worth, immigration status, or past or future use of resources. The allocation team must not consider such information in any way in assigning priority scores.

Absence of categorical exclusion criteria: A central feature of this allocation framework is that it does not use categorical exclusion criteria to bar individuals from consideration for critical care resources during a public health emergency. There are several ethical justifications for this. First, the use of rigid categorical exclusions would be a major departure from traditional medical ethics and raise fundamental questions of fairness. Second, such restrictive measures are not necessary to accomplish public health goals during a pandemic or disaster; it is equally feasible to assign all patients a priority score and allow the availability of resources to determine how many patients can receive the scarce resource. Third, categorical exclusion criteria may be interpreted by the public to mean that some groups are "not worth saving," leading to perceptions of unfairness and distrust. In a public health emergency, public trust will be essential to ensure cooperation with restrictive public health measures. Thus, an allocation system should make clear that all individuals are "worth saving" by keeping all patients who would receive critical care during routine clinical circumstances eligible, and by allowing the availability of beds and other critical care resources to determine how many eligible patients receive them. It is important to note that there are some conditions that lead to immediate or near-immediate death despite aggressive therapy such that during routine clinical circumstances clinicians do not provide critical care resources (e.g., cardiac arrest unresponsive to appropriate ACLS, massive intracranial bleeds, intractable shock). During a public health emergency, clinicians should still make clinical judgments about the meaningful medical benefit of critical care using the same criteria they use during normal clinical practice. Note that the Allocation team/Officer may be helpful in supporting clinicians making these determinations.

Consideration of Non-Survivable Conditions: There are some conditions that lead to immediate or near-immediate death despite aggressive therapy (e.g., cardiac arrest unresponsive to appropriate ACLS, overwhelming traumatic injuries or burns, advanced and irreversible neurologic event, intractable shock). During a public health emergency, clinicians should still make clinical judgments about the appropriateness of critical care using the same criteria they use during normal clinical practice and, to the extent critical care utilization would be deemed non-beneficial during normal clinical practice, it should not be offered during a public health emergency. Allocation officers and attending physicians will make clear in communicating with families whether critical care is not being offered based on the existence of a non-survivable medical condition or based on the allocation framework.

STEP 2: Make daily determinations of how many priority groups can receive the scarce resource. Hospital leaders and allocation officers should make determinations twice daily, or more frequently if needed, about what priority scores will result in access to critical care resources. These determinations should be based on real-time knowledge of the degree of scarcity of the critical care resources, as well as information about the predicted volume of new cases that will be presenting for care over the near-term (several days). For example, if there is clear evidence that there is imminent shortage of critical care resources (i.e., few ventilators available and large numbers of new patients daily), only patients with the highest priority (lowest scores, e.g., 1-3) should receive scarce critical care resources. As scarcity subsides, patients with progressively lower priority (higher scores) should have access to critical care interventions.

Once a patient's priority score is calculated using the multi-principle scoring system described in Table 2, each patient will be assigned to a color-coded allocation priority group, which should be noted clearly on their chart/EHR (**Table 3**). This color-coded assignment of priority groups is designed to allow Allocation Officers to create operationally clear priority groups to receive critical care resources, according to their

score on the multi-principle allocation framework. For example, individuals in the red group have the best chance to benefit from use of critical care resources and should therefore receive priority over all other groups in the face of scarcity. The orange group has intermediate priority and should receive critical care resources if there are available resources after all patients in the red group have been allocated critical care resources. The yellow group has lowest priority and should receive critical care resources if there are available resources after all patients in the red and orange groups have been allocated critical care resources.

Table 3. Assigning Patients to Color-coded Priority Groups

Use Raw Score from Multi-principle Scoring System to Assign Priority Category	
Level of Priority and Code Color	**Priority score from Multi-principle Scoring System**
RED **Highest priority**	**Priority score 1-3**
ORANGE **Intermediate priority** (reassess as needed)	Priority score 4-5
YELLOW **Lowest priority** (reassess as needed)	Priority score 6-8

Distinguishing Within a Priority Group:

There may be situations in which the allocation team determines that it will offer critical resources to a certain priority group on a given day, and then there are not enough critical care resources for all patients within that priority group to receive them. Accordingly, it will become necessary to distinguish within a priority group. It is important to note, too, that in some circumstances, it may be ethically permissible to conserve scarce critical care resources during times of high demand to assure that the resources are available to those with the best prognoses.

Priority Score
If there is need for differentiation within a priority group, the raw priority scores should be used as a differentiator, with priority going to the patients with the lower raw priority score.

Giving heightened priority to those who have had the least chance to live through life's stages:
Life-cycle considerations should be used as the second differentiator if there are not enough resources to provide to all patients with the same raw priority score, with priority going to younger patients. Ages will be broken out into the following categories: first priority age 0-17; second priority age 18-49; third priority age 50-65; fourth priority age 66-80; fifth priority age > 80. First and foremost, evidence suggests that the older a

patient, the less likely they are to benefit from critical care resources, particularly ventilatory support. Moreover, beyond this utilitarian justification, an additional ethical justification for incorporating the life-cycle principle is that it is a valuable goal to give individuals equal opportunity to pass through the stages of life—childhood, young adulthood, middle age, and old age.[7] The justification for this principle does not rely on considerations of one's intrinsic worth or social utility. Rather, younger individuals receive priority because they have had the least opportunity to live through life's stages. Evidence suggests that when individuals are asked to consider situations of absolute scarcity of life-sustaining resources, most believe younger patients should be prioritized over older ones.[8] Public engagement about allocation of critical care resources during an emergency also supported the use of the life-cycle principle for allocation decisions.[4] Harris summarizes the moral argument in favor of life-cycle–based allocation as follows: "It is always a misfortune to die . . . it is both a misfortune and a tragedy [for life] to be cut off prematurely."[9]

Giving heightened priority to those who are central to the public health response:
Participation in the public health response should be used as the third differentiator if there are not enough resources to provide to all patients with the same raw priority score. Priority will go to front-line health care workers, others who care for ill patients, and those who keep critical health care infrastructure (like, hospitals) operating during a public health crisis (e.g., maintenance staff who keep hospital rooms clean). These workers should be given priority not because they are somehow more worthy, but because of their ability to further the public health goal of saving the most lives. Prioritizing individuals essential to the long-term pandemic response will achieve a "multiplier effect" through which more lives are ultimately saved through their work. If these workers are incapacitated, all patients — not just those with COVID-19 — will suffer greater mortality and years of life lost. Note that it would be inconsistent with distributive and procedural justice, and inappropriate under any circumstances to prioritize front-line *physicians* and not prioritize other front-line staff, such as nurses and respiratory therapists, and other key personnel such as maintenance staff and those who disinfect hospital rooms for new patients. Whether these workers who need ventilators will be able to return to work during the scarcity crisis is uncertain, but it is possible they will be able to return to work during the pandemic response given the projected duration of the COVID-19 pandemic. Further, giving them priority for critical care resources recognizes their assumption of the high-risk work of saving others, and it helps to ensure that they continue to assume those risks, particularly given shortages of personal protective equipment.[10]

* *Differentiation after this point should be applied at the BILH-system level.*

Lottery
If there it still need for differentiation after applying priority based on raw score, a lottery (i.e., random allocation) should be used to ensure fairness**.**

Appropriate clinical care of patients who cannot receive critical care. Patients who are not allocated certain scarce critical care resources will receive other medical care that includes intensive symptom management and psychosocial support, as well as a code status consistent with their clinical situation in light of non-allocation of the scarce resource. They should be reassessed daily to determine if changes in resource availability or their clinical status warrant provision of critical care resources and/or a change in code status. Where available, specialist palliative care teams, social workers, and/or chaplains will provide additional support and consultation. Where palliative care specialists are not available, the treating clinical teams should provide primary palliative care.

Implications of the allocation process on determination of code status. Our duty to treat patients with respect and dignity is always at the forefront of the care we provide. Accordingly, we should understand

patients' goals of care and offer only those available interventions that are consistent with such goals. Time permitting, all care teams should discuss patient goals and wishes with the patient and/or family as soon as possible in the course of any illness and with a change in the patient's clinical status. This is particularly important during a public health crisis. It is imperative that clinicians have a frank conversation with patients (and their families) about the likelihood of success of CPR. It is essential that providers share with patients and families as accurate a prognosis as possible. If the clinical assessment is that attempts at resuscitation are expected to be harmful, ineffective or of no medical benefit (e.g., unlikely to lead to patient's survival to hospital discharge), this should be compassionately conveyed to patients and families. Only with this information will they be able to decide if an attempt at resuscitation would still reflect their goals and wishes in the setting of a poor prognosis. Clinicians also must make clear, however, that a patient's decision to forego resuscitative efforts (i.e., be DNAR) will not impact other aspects of the patient's care, including their eligibility for a ventilator if one becomes necessary.

During a public health emergency that requires allocation of scarce critical care resources, allocation decisions may impact the code status of patients:

1. Patients who presently need but are not allocated a ventilator will be considered DNAR. It is not supportable to start CPR on a patient with an inability to escalate care or perform intubation without the possibility of ventilator support.
2. All patients who may reasonably be anticipated to need resuscitative efforts should be assessed for priority of receiving ventilator support, should it become necessary. If the patient would not receive a high enough priority for the subsequent critical care required for continued survival (assuming they survived resuscitative efforts), then the patient should be considered DNAR.
3. If upon reassessment of the patient and the system resources, a patient's priority scoring changes such that they are allocated a ventilator or would be if it became necessary, their code status should be reassessed and determined according to the institution's then-current relevant policies (i.e., re: code status and ineffective interventions).

Section 3. Reassessment for ongoing provision of critical care/ventilation

The purpose of this section is to describe the process the allocation team should use to conduct reassessments on patients who are receiving critical care resources, in order to determine whether s/he continues with the treatment.

Ethical goal of reassessments of patients who are receiving critical care resources. The ethical justification for such reassessment is that, in a public health emergency when there are not enough critical care resources for all, the goal of maximizing population outcomes would be jeopardized if patients who were determined to be unlikely to survive were allowed indefinite use of scarce critical care resources. In addition, periodic reassessments lessen the chance that arbitrary considerations, such as when an individual develops critical illness, unduly affect patients' access to treatment.

Approach to reassessment
All patients who are allocated critical care resources will be allowed a therapeutic trial of a duration to be determined by the natural history of the disease (COVID-19 or whatever disease is causing the need for critical care resources). The decision about trial duration will ideally be made as early in the public health emergency as possible, when data becomes available about the natural history of the disease. The trial

duration should be modified as appropriate if subsequent data emerge that suggest the trial duration should be longer or shorter, as discussed with and agreed upon by the regional allocation officer.

The allocation team will conduct periodic reassessments of patients receiving scarce critical care resources (e.g., mechanical ventilation). A multidimensional assessment should be used to quantify changes in patients' conditions, such as recalculation of severity of illness scores, appraisal of new complications, and treating clinicians' input. Patients showing improvement will continue with the scarce critical care resource (e.g., ventilator) until the next assessment. If there are patients in the queue for critical care resources, then patients who upon reassessment failure to improve despite maximal therapy during the disease-applicable trial period or showing clinical deterioration (as evidenced by worsening SOFA scores or overall clinical judgment) that portends a very low chance for survival should have the scarce critical care resource withdrawn, including discontinuation of mechanical ventilation, after this decision is disclosed to the patient and/or family. Although patients should generally be given the full duration of a trial, if patients experience a precipitous decline (e.g., refractory shock and DIC) or a highly morbid complication (e.g., massive stroke) which portends a very poor prognosis, the allocation team may make a decision before the completion of the specified trial length that the patient is no longer eligible for the critical care resource.

Rapid reassessment of patients unable to be triaged initially
Those patients who receive critical care services (e.g. mechanical ventilation) emergently in order to allow time for priority scoring by the allocation team, but who are subsequently determined to be unable to receive critical care based on priority assignment, will receive medical care including intensive symptom management and psychosocial support. They will not receive a full trial of critical care as described above. By way of example, this might include patients intubated in the field, patients intubated emergently in the emergency department, patients with severe trauma stabilized in the emergency department and brought to the ICU, and patients resuscitated on a medical floor in a code situation. The appeals process for withdrawal of critical care described above will not apply to these patients.

Appropriate clinical care of patients who cannot receive critical care resources.
Patients who are not allocated certain scarce critical care resources after reassessment will receive other medical care that includes intensive symptom management and psychosocial support, as well as a code status consistent with their clinical situation in light of non-allocation of the scarce resource. Where available, specialist palliative care teams, social workers, and/or chaplains will provide additional support and consultation. Where palliative care specialists are not available, the treating clinical teams should provide primary palliative care.

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Addendum 1

Ethical Framework

It is imperative that the teams who take on the awesome task of allocating scarce critical care resources are supported by an explicit and comprehensive ethical framework. BILH's rests on these values:

Duty to Care

Healthcare professionals have a duty to care, even at personal risk. This includes a commitment to delivering the best care possible given the available resources. In a crisis, every patient should receive compassionate care, with respect and dignity, regardless of whether that care is aimed at maximizing survival or supporting a dignified death.

Duty to Steward Resources

In crisis, all resources are potentially scarce, and all clinicians have a duty to protect them. All resources should be carefully allocated according to their known scarcity, likelihood of renewal, and the extent to which they can be replaced or reused.

Distributive and Procedural Justice

A system of allocation during crisis must be applied consistently and broadly, to maximize the chances of fairness and minimize the influence of biases such as ageism, sexism, racism, or ableism. Allocation decisions should seek to support access to care for all, regardless of their insurance status, and especially the most vulnerable or those who suffer disproportionately

Reciprocity

Health care professionals, by virtue of the healing relationships they support through their work, may be justly given preference for scarce critical care resources under some circumstances.

Transparency

To the extent practically feasible, allocation plans should be communicated as efficiently, widely, and comprehensively as possible across the healthcare system and moral community, inclusive of government agencies, nearby healthcare facilities, staff, patients, and other stakeholders. Such transparency is likely to minimize actual and vicarious trauma to patients, loved ones, staff, and members of the public after the crisis has abated.

Additional Ethical Discussion: Placing these values in the framework of principlism

Most health care providers, researchers, and administrators are taught bioethics using the primary ethical principles of respect for persons (autonomy), beneficence, nonmaleficence, and justice. The use of these ethical principles as a general framework for moral judgment and decision making is frequently referred to as principlism. Because the values outlined above are likely not familiar to many, this discussion will place them in the context of these more familiar principles.

Principlism

Principlism came about as a response to the revelation of several instances of ethically questionable research studies that came to light in the late 1960s and early 1970s. These revelations led Congress to pass the National Research Act of 1974 that created the National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research. The Commission ultimately developed a report in 1978,

referred to as The Belmont Report (named after the conference center where the Commission met), that outlined the following ethical principles:

1. *Respect for persons*: People should be treated as autonomous and be allowed to make their own decisions, while also recognizing that those with diminished decision making capacity should be protected and/or allowed to have an appropriate surrogate make a decision in their best interest. This principle is frequently implemented with procedures to acquire the consent of patients or study subjects for their care or participation in research, respectively.

2. *Nonmaleficence*: People should not be harmed. This principle dates back to the Hippocratic Oath and the instruction to *primum non nocere* (first do no harm). In those situations where harm is unavoidable, the harm should be minimized to the extent possible. Although included under the principle of beneficence in the Belmont Report, the principle of nonmaleficence is typically regarded as a separate principle with different implications.

3. *Beneficence*: The benefits to people should be maximized. This principle is particularly important in healthcare, where the goal is to improve the health and wellbeing of patients. The concept of utility (a formal way of assessing benefits, risks, and costs) can be used to attempt to maximize the benefits among a group of people.

4. *Justice*: The benefits and burdens of any particular course of action should be shared fairly across both individuals and groups within society.

Principlism and the Ethical Framework for Crisis Care

Each of the values identified in the Ethical Framework above can be justified using the concepts of principlism.

1. *Duty to Care*: The duty to care is rooted in professional ethics, which outline the responsibility of the healthcare professional to provide responsible care to the patient and to not abandon patients in their time of need. This includes pandemic situations in which the healthcare provider may be placed at increased risk. The duty to care represents aspects of all four of the main ethical principles. The assumption of the duty to care assumes a respect for each individual patient, providing the best possible care while recognizing the preferences of the individual patient. Nonmaleficence requires that patients not be harmed, as can occur with abandonment. Beneficence requires that the healthcare professional acts to benefit the patient. Healthcare professionals hold a privileged place in society, and with that privilege comes the responsibility of shouldering an increased risk in certain situations that satisfies the requirements of fair treatment under the principle of justice.

2. *Duty to Steward Resources*: The principles of beneficence and justice are manifest in the duty to steward resources. In a crisis situation, beneficence requires the use of resources for the greatest benefit across all of the people affected in the crisis while justice demands that these resources be distributed fairly.

3. *Distributive and Procedural Justice*: This value is consistent with the principle of justice.

4. *Reciprocity*: The principle of justice supports the favored allocation of scarce resources to healthcare providers who have faced an increased risk in the care of patients, providing a benefit to those who have faced an increased burden.

5. *Transparency*: An open and transparent process provides respect for persons, allowing them to act as informed individuals.