

Allocation of Scarce Critical Care Resources during a Public Health Emergency

Executive Summary

Introduction: The purpose of this document is to provide guidance for the triage of critically ill patients in the event that a public health emergency—and specifically the COVID-19 pandemic—creates demand for critical care resources (e.g., ventilators, critical care beds) that outstrips the supply. These triage 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) robust efforts to transfer critically ill patients to other hospitals in the region have been unsuccessful. 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, and transparency. It has been informed by extensive consultation with citizens, disaster medicine experts, and ethicists. This document describes 1) the creation of triage teams to ensure consistent decision making; 2) a multi-principle allocation framework 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 triage teams: Patients' treating clinicians will not make triage decisions. Instead, each hospital will establish a triage team, who will apply the allocation framework described in this document. The separation of the triage role from the clinical role is intended to promote objectivity, avoid conflicts of commitments, and minimize clinicians' moral distress. The triage team will collaborate with the attending physician to disclose triage decisions to patients and families.

Section 2. Allocation criteria for ICU admission/ventilation: This allocation framework is based primarily on two ethical goals: 1) saving lives; and 2) promoting equitable access to scarce resources, enacted within the context of ensuring individualized patient assessments. All patients who meet medical criteria for critical care services will be assigned a priority score based on a multi-principle allocation framework (1-8 scale; lower scores indicate higher priority for critical care). The scoring criteria include two efficiency-focused considerations and three equity-focused considerations: 1) patients' likelihood of surviving to hospital discharge, assessed with an objective risk predictor (e.g., the LAPS2 score); 2) near-term prognosis, assessed as the presence of severe underlying medical conditions such that the patient is expected to die within a year even if they survived the acute critical illness; 3) heightened priority to frontline essential workers; 4) a correction factor to lessen the extent to which severe structural inequities disadvantage already-disadvantaged patients in triage; and 5) heightened priority to the young, who are the worst off in the sense that if they die, they will have had the least opportunity to live through life's stages (**Table 1**). This raw priority score may be converted to three color-coded priority groups (e.g., high, intermediate, and low priority) if needed to facilitate streamlined implementation in hospitals. All patients will be eligible to receive critical care beds and services regardless of their priority score; the available supply will determine how many patients can receive critical care. Patients who are triaged to not receive ICU beds or services will be offered medical care including intensive symptom management and should be periodically reassessed as ICU resources become available.

Section 3. Reassessment for ongoing provision of critical care/ventilation: The triage committee will conduct periodic reassessments of all patients receiving critical care. The timing of reassessments should be based on evolving understanding of typical disease trajectories and availability of ICU resources. A multidimensional, individualized 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 services until the next assessment. Patients showing substantial clinical deterioration that portends a very low chance for survival will have critical care discontinued. These patients will receive medical care including intensive symptom management and psychosocial support. Where available, specialist palliative care teams will provide additional support and consultation.

Introduction & Ethical Considerations

Overview: The purpose of this document is to provide guidance for the triage of critically ill patients in the event that a public health emergency creates demand for critical care resources (e.g., ventilators, critical care beds) that outstrips the supply. The allocation framework is designed for the COVID-19 pandemic and may need to be modified for use in other public health emergencies. These triage 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) robust efforts to transfer critically ill patients to other hospitals in the region have been unsuccessful. This allocation framework is grounded in ethical obligations that include the duty to care, duty to steward resources, distributive and procedural justice, and transparency. Extensive consultation with citizens, ethicists, and disaster medicine experts informed the principles and processes adopted in this document.¹

This document describes 1) the creation of triage teams to ensure consistent decision making; 2) a multi-principle allocation framework for initial allocation of critical care resources; and 3) reassessment criteria to determine whether ongoing provision of scarce critical care resources are justified for individual patients.

1. Ethical goals of the allocation framework

The dual ethical goals of this allocation framework are to save as many lives as possible while also fostering equitable access to scarce critical care resources. The focus on equity is an important distinction from frameworks that are solely designed to maximize the aggregate health outcomes of populations without regard to the distribution of those health benefits. The ethical grounding for this allocation framework is similar to the that of health care and public health in general: to help individuals secure a fair opportunity to formulate and carry out their conception of a meaningful life over a lifespan.² The World Health Organization and the National Academy of Sciences, Engineering and Medicine have identified attending to health inequities as a critical goal of public health.^{3,4} Prominent theories of health care and public health assert the importance of attending to justice considerations while promoting population health.^{2,5,6} For example, Faden and Powers argue that “twin moral impulses animate public health: to improve human well-being by improving health and to do so in particular by focusing on the needs of those who are the most disadvantaged”.⁵ Taking steps to prevent and reduce health inequities shows equal respect for all members of society by lessening the extent to which disadvantaged persons bear the greatest health burden.⁷

The allocation framework is also designed to achieve the following:

1. To create meaningful access for all patients. All patients who are eligible for ICU services during ordinary circumstances remain eligible, and there are no exclusion criteria based on age, disabilities, or other factors.
2. To ensure that all patients receive individualized assessments by clinicians, based on the best available objective medical evidence.
3. To ensure that no one is denied care based on stereotypes, assessments of quality of life, or judgments about a person’s “worth” based on the presence or absence of disabilities or other factors.

No use of categorical exclusion criteria: The allocation framework described in this document differs in two important ways from other allocation frameworks. First, it does not categorically exclude any patients who would be eligible for critical care resources under ordinary circumstances. Instead, all patients who are ordinarily eligible remain eligible to receive critical care resources and are prioritized based on the multi-principle allocation system described below. The availability of critical care resources determines how many priority groups can receive critical care. There are compelling reasons to not use

exclusion criteria. Categorically excluding patients will make many feel that their lives are “not worth saving,” leading to justified perceptions of discrimination. Moreover, categorical exclusions are too rigid to be used in a dynamic crisis, when ventilator shortages will likely fluctuate during the pandemic. In addition, such exclusions violate a fundamental principle of public health ethics: use the means that are least restrictive to individual liberty to accomplish the public health goal. Categorical exclusions are not necessary because less restrictive approaches exist.

No consideration of quality of life judgments or long-term life expectancy: Second, this allocation framework does not incorporate quality of life judgments or long-term life expectancy into priority scores. There is no widely accepted and feasible method to measure quality of life in a way that does not unfairly disadvantage persons with disabilities. Prioritizing patients based on overall life expectancy would unfairly disadvantage patients with a decreased long-term life expectancy from disabilities or from diseases exacerbated by social inequalities. An implication of this design choice is that the framework treats as equal all patients who are not expected to die within a year from an end-stage illness. For example, a patient expected to live 3 more years would receive equal priority for ICU treatment as a patient expected to live 30 more years, all other things equal. This step was taken to affirmatively avoid disadvantaging individuals with life-shortening disabilities and those whose life expectancy is lessened due to unfair distribution of the social determinants of health.

2. Allocation criteria in the multi-principle framework

The multi-principle allocation framework includes two efficiency-focused considerations and three equity-focused considerations, described below. The integration of these five criteria into a point system is described in Section 2.

1. Efficiency-focused criteria

- a. **Chances of survival to hospital discharge**, assessed with an objective risk predictor (e.g., the LAPS2 score). Saving lives is a widely accepted goal when allocating scarce, potentially life-saving resources. Even with a focus on promoting fair opportunity, it is appropriate to attempt to save more lives by prioritizing patients who are likely to survive with treatment over patients who are likely to die despite treatment, all other things being equal. Although typically grounded in utilitarianism, this allocation criterion is also justified by non-consequentialist ethical theory. For example, another justification is that individuals have claims on society to protect their opportunities by avoiding premature death. All other things being equal, if society can't meet all of those claims, it should respect as many individuals' claims as possible. The best instrument for predicting hospital survival is uncertain. Recent evidence suggests that the SOFA score has poor discriminant accuracy in COVID-19 disease⁸ and that it is miscalibrated for Black patients in ways that would unfairly disadvantage them.⁹ The LAPS2 score appears to have superior accuracy and is better calibrated for racial minorities.⁹
- b. **Near-term prognosis**, assessed as the presence of an end-stage medical condition such that the patient is expected to die within a year even if they survived the acute critical illness. Within the context of keeping all patients eligible for critical care services, the allocation framework gives higher priority to patients who do not have a poor prognosis for near-term survival. There is precedent for using this type of criterion in allocation of scarce medical resources; U.S. rules to allocate lungs for transplantation incorporate patients' likelihood of 1-year survival after transplantation, not simply whether transplantation will avert impending death.¹⁰ Based on consultation with experts in disability rights and physical medicine and rehabilitation, we have intentionally not included lists of example conditions associated with death within one year. The rationale for this is that such lists run the risk of being applied as blanket judgments, rather than in the context of individualized assessments by clinicians, based on the best available objective medical evidence.

2. Equity-focused criteria

- a. **Heightened priority to frontline essential workers.** Frontline essential workers are individuals who perform tasks that are vital to the societal response to the public health emergency and whose role places them at increased risk of infection. This category should be broadly construed to include not only those individuals who play a critical role in the chain of caring for patients (e.g. health care workers), but also other essential workers such grocery store clerks, agricultural workers, custodial workers, and bus drivers who face heightened risk of infection. Many states and the federal government have developed lists of essential workers employed by businesses identified in the government mandate to continue physical operations during the pandemic. Giving heightened priority for treatment to frontline essential workers is justified by society's reciprocal obligation to provide treatment to individuals who assume heightened risk in occupations vital to safeguard society during the pandemic. Because frontline essential workers who are contracting COVID-19 are disproportionately racial and ethnic minorities^{11,12}, giving heightened treatment priority to frontline essential workers will likely have a substantial disparity-mitigating effect regarding racial/ethnic disparities in COVID-19 outcomes.
- b. **Correction factor for structural inequities affecting triage.** Although allocating ICU resources based solely on objective estimates of patients' chances of hospital survival may seem unbiased, this approach would likely disproportionately deny critical care treatment to persons of color and the poor. The reason is that these disadvantaged groups tend to present for care with higher severity of illness scores—resulting in lower priority during triage-- due to a higher burden of medical comorbidities such as congestive heart failure and chronic kidney disease.^{13,14} Baseline health disparities arise from unjust, avoidable differences in the “social conditions in which people are born, grow, live, work, and age”.^{11,15-17} These social determinants of health include differential access to health care, job opportunities, income, education, and housing quality, as well as racial discrimination and unfair social patterns of power and advantage.^{5,13,14} In addition, there is evidence that existing risk prediction scores are miscalibrated for Black patients, such that they overestimate mortality for Black compared to white patients.⁹ More broadly, these concerns about unfair triage exist in the context of a pandemic that has laid bare the deep inequities in U.S. society that cause worse health outcomes among disadvantaged groups. Nationally, Black, Latinx, and Indigenous individuals are significantly more likely to be infected, hospitalized and die of COVID-19 compared to White individuals.¹⁸⁻²² The pandemic has also disproportionately impacted individuals from economically disadvantaged areas.²³

We therefore believe it is ethically warranted to add a correction factor to triage scores to lessen the disadvantage these groups experience from health inequities, which may be exacerbated by using chances of survival to hospital discharge as a triage criterion. It would be infeasible during ICU triage to conduct a detailed assessment of each patient's individual degree of disadvantage. However, it would be feasible to use an established composite measure of disadvantage. One such measure is the Area Deprivation Index (ADI)²⁴, which is a geographic measure of socioeconomic disadvantage in the U.S., which is calculated at the level of census blocks (approximately 1500 people). It creates an aggregate score of disadvantage on a 10-point scale, based on 17 measures of disadvantage related to poverty, education, employment, physical environment, and infrastructure within a neighborhood. The ADI is publicly accessible and is determined by entering a patient's home address into an online calculator.²⁵ It takes less than a minute to determine a patient's ADI score. Because the strongest association between ADI scores and health outcomes occurs at the highest levels of disadvantage, one way to operationalize this allocation criterion would be to incorporate an adjustment into the triage score for individuals that reside in the most disadvantaged neighborhoods (i.e., ADI scores of 8, 9, or 10). Although some commentators have advocated using patients' race and ethnicity to correct for structural inequities²⁶, there are major legal

and political barriers to considering patients' individual race and ethnicity in allocation strategies.^{27,28}

- c. **Heightened priority to those who have had the least chance to live through life's stages:** We advocate giving heightened priority to younger patients by using age as a tiebreaker between patients with similar triage scores but where significant differences in age existed; for example, if a 45 year-old patient and an 85 year-old patient presented with similar triage scores, priority for the scarce ICU bed/ventilator should go to the younger patient. Although some authors have mistakenly claimed that prioritizing younger individuals expresses animus toward older adults or devalues the contributions that older adults make to society²⁹, properly understood, the ethical justification is to promote fair opportunity to live through life's stages by prioritizing the worst off.^{30,31} In this sense, dying young is a severe form of disadvantage because young individuals will have died with fewer opportunities to formulate and carry out their life plans. Therefore, all else being equal, younger patients have a stronger claim to absolutely scarce life-saving resources than older individuals, who have had more opportunity to live through life's stages. Another important equity-focused outcome of giving some priority to younger individuals during triage is that it would counteract racial and ethnic disparities in COVID outcomes because racial and ethnic minorities are being hospitalized and dying at significantly younger ages than white patients.^{32,33} Moreover, giving some priority to young patients would likely offset disadvantages experienced by individuals with life-shortening disabilities who are more likely to face the risk of dying from COVID at an earlier age (e.g. patients with Down syndrome, cystic fibrosis, or various pediatric malignancies).

Section 1. Creation of triage teams

The purpose of this section is to provide guidance to create a local triage team at each hospital whose responsibility is to implement the allocation framework described in Sections 2 and 3. It is important to emphasize that patients' treating physicians should not make triage decisions. A triage team with expertise in the allocation framework should make allocation decisions. The separation of the triage role from the clinical role is intended to enhance objectivity, avoid conflicts of commitments, and minimize clinicians' moral distress.

Triage Officer

A group of triage officers should be appointed. Desirable qualities of triage officers include being a physician with established expertise in the management of critically ill patients (generally, critical care and emergency medicine physicians), strong leadership ability, and effective communication and conflict resolution skills. This individual will oversee the triage process, assess all patients, assign a level of priority for each, communicate with treating physicians, and direct attention to the highest-priority patients. S/he is expected to make decisions according to the allocation framework described below. To optimize effective functioning in a crisis, the triage officer should ideally be well prepared and trained in advance by means of disaster drills or exercises. The triage officer 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. S/he 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 triage officer should not use principles or beliefs that are not included in this document.

So that the burden is fairly distributed, triage officers will be nominated by the chairs/directors of the clinical departments that provide care to critically ill patients. The Chief Medical Officer and the individual responsible for emergency management should approve all nominees. A roster of approved triage

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

Triage Team

In addition to the triage officer, if resources allow, the triage team should also consist of a nurse with acute care (e.g., critical care or emergency medicine) experience (even if no longer clinically active), and one administrative staff member who will conduct data-gathering activities, documentation and record keeping, and assistance liaising with a hospital 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 role of triage team members is to provide information to the triage officer and to help facilitate and support her/his decision-making process. A representative from hospital ethics committee and hospital administration should also be linked to the team, in order to provide ethical oversight, supervise maintenance of accurate records of triage scores, and serve as a liaison with hospital leadership.

Triage team members should receive advanced training to prepare them for the role, including training in:

1. Applying the allocation framework;
2. Communicating with clinicians and families about triage;
3. Avoiding implicit bias against persons of color and other marginalized groups; and
4. Respecting disability rights.

The triage 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 triage function. Team decisions and supporting documentation should be reported daily to appropriate hospital leadership and incident command.

Triage Mechanism

The triage officer and her/his team will use the allocation framework described in Section 2 to determine priority scores of all patients eligible to receive the scarce critical care resource. 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 triage 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. Care should be taken by the triage team to ensure that underlying disabilities and health conditions that do not impact the immediate or near-term survivability of the patient do not influence the assessment.

Communication of triage decisions to patients and families

Although the *authority* for triage decisions rests with the triage team, there are several potential strategies to *disclose* triage decisions to patients and families. Communicating triage decisions to patients and/or their next of kin is a required component of a fair triage process that manifests respect for persons.³⁴ The triage officer should first inform the affected patient's attending physician about the triage 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 triage officer; or 3) a collaborative effort between the attending physician and triage officer. 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 undertaking the disclosure, this approach is useful because the communication regarding triage 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. Under this approach, the attending physician

would first explain the severity of the patient's condition in an emotionally supportive way, and then the triage officer would explain the implications of those facts in terms of the triage decision. The triage officer would also emphasize that the triage decision was not made by the attending physician but is instead one that arose from the extraordinary emergency circumstances. Regardless of who communicates the decision, it may be useful to explain the medical factors that informed the decision, as well as the factors that were not relevant (e.g., race, ethnicity, gender, disability status, insurance status, perceptions of social worth, immigration status, among others). If resources permit, palliative care clinicians or social workers should be present or available to provide ongoing emotional support to the patient and family.

Appeals process for individual triage decisions

It is possible that patients, families, or clinicians will challenge individual triage decisions. Procedural fairness requires the availability of an appeals mechanism to resolve such disputes. 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 not clearly benefiting from that resource. This is because initial triage 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. For the initial triage decision, the only permissible appeals are those based on a claim that an error was made by the triage team in the calculation of the priority score or use/non-use of a tiebreaker (as detailed in Section 2). The process of evaluating the appeal should include the triage team verifying the accuracy of the priority score calculation by recalculating it. The treating clinician or triage 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 moral concern. Furthermore, such decisions depend on more clinical judgment than initial allocation decisions. Therefore, there should be a more robust process for appealing decisions to withdraw or reallocate critical care beds or services. Elements of this appeals process should include:

- The individuals appealing the triage decision should explain to the triage officer the grounds for their appeal. Appeals based in an objection to the overall allocation framework should not be granted.
- The triage team should explain the grounds for the triage decision that was made.
- Appeals based in considerations other than disagreement with the allocation framework should immediately be brought to a Triage Review Committee that is independent of the triage officer/team and of the patient's care team (see below for recommended composition of this body).
- 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.
- The decision of the Triage Review Committee or subcommittee for a given hospital will be final.

The Triage Review 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 designee, Legal Counsel, hospital Ethics Committee or Consult Service, members of an institution's ethics faculty, and/or an off-duty triage 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.

Periodic equity review of triage decisions

A team external to the triage committee should periodically evaluate the triage process and outcomes. Members of this team should include experts in health equity, bioethics, medicine, nursing, and hospital

operations. The review should evaluate whether the triage process and outcomes are consistent with effective, fair, and timely application of the allocation framework. Moreover, the review should assess trends in resource allocation, with a focus on identifying any unintended health disparities that may arise from the triage process, including disparities related to race, ethnicity, socioeconomic status, and disability status.

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 triage decisions for patients who present with illnesses that typically require critical care resources (e.g., shock requiring vasopressors, acute respiratory failure requiring mechanical ventilation). All patients who meet these inclusion criteria for critical care services will be assigned a priority score using a 1-8 scale (lower scores indicate higher priority for critical care). 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. 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 can receive access to critical care interventions.

First responders and bedside clinicians should perform the immediate stabilization of any patient in need of critical care, as they would under normal circumstances. Along with stabilization, temporary ventilatory support may be offered to allow the triage officer to assess the patient for critical resource allocation. Every effort should be made to complete the initial triage assessment within 90 minutes of the recognition of the likely need for critical care resources.

STEP 1: Calculate each patient's priority score using the multi-principle allocation framework.

As summarized in **Table 1**, first an objective measure of probability of survival to hospital discharge is used to determine patients' prognoses for hospital survival. Between one and four points are assigned according to the patient's prognosis for hospital survival. More points are assigned the higher the risk of death during the hospitalization.

Second, zero or four points are assigned according to the patient's prognosis for near-term survival. Zero points are assigned if the patient is expected to live more than one year if s/he survives the acute illness. Four points are assigned if the patient is expected to die within one year, even if s/he survives the acute illness. Based on consultation with experts in disability rights, we have intentionally not included a list of example conditions associated with death within one year. The rationale for this is that such a list runs the risk of being applied as a blanket judgment, rather than in the context of individualized assessments by clinicians, based on the best available objective medical evidence.

Third, to honor our reciprocal obligation to individuals who take on added risk of infection in their role as an essential part of the societal response to the pandemic, one point is deducted from the triage score if the patient is a frontline essential worker.

Fourth, to lessen the extent to which structural inequities unfairly disadvantage patients who are already disadvantaged, one point is subtracted from the triage score of patients from highly disadvantaged communities—using the Area Deprivation Index to identify individuals residing in a neighborhood in the highest levels of socioeconomic disadvantage (ie, ADI score= 8, 9, or 10).

These points are then added together to produce a total priority score, which ranges from 1 to 8. Lower scores indicate higher predicted benefit from critical care, and priority will be given to those with lower scores.

In the event of ties between patients with identical triage scores, priority should go to younger patients because they have had the least opportunity to live through life’s stages.^{30,35-37}

If a second tiebreaker is needed, random allocation is preferable because it gives equal chances to patients who are similar in ethically-relevant ways.

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

Principle	Criterion	Point System*			
		+1	+2	+3	+4
PROMOTE POPULATION HEALTH OUTCOMES	Prognosis for hospital survival (LAPS2 or other severity of illness score)	Quartile 1 lowest risk of death (i.e., risk of death <25%)	Quartile 2 (i.e., risk of death 25-49%)	Quartile 3 (i.e., risk of death 50%-75%)	Quartile 4- highest risk of death (i.e., risk of death >75%)
	Prognosis for near-term survival (individualized clinical judgment)	Death expected within 1 year from end stage condition
PROMOTE JUSTICE/EQUITY	Priority to frontline essential workers	Subtract one point from triage priority score if the patient is an essential worker in a high-risk occupation.			
	Correction to lessen disadvantage from structural inequities	Subtract one point from triage priority score if the patient resides in a highly disadvantaged community (i.e., ADI score= 8,9, or 10).			
	Priority to those who’ve had the least chance to live through life’s stages	Tiebreaker: In the event that two patients have identical triage priority scores, give priority to the younger patient when a significant age difference exists.			
	Equal chances	Second tiebreaker: In the event that two patients have identical triage priority scores and are of similar ages, use random selection to determine who receives the resource.			

Other considerations:

Patients who present for acute care and are already using a ventilator chronically for pre-existing respiratory conditions (e.g., home ventilation or ventilation at a skilled nursing facility) should NOT be separated from their chronic ventilator to reallocate it to other patients.

It is important to note that there are some conditions that rapidly lead to death despite intensive treatment such that during routine clinical circumstances clinicians generally do not provide critical care services (e.g., cardiac arrest unresponsive to appropriate ACLS, massive intracranial bleeds not amenable to surgical intervention, intractable shock despite all appropriate treatment). During a public health emergency, clinicians should still make judgments about the medical appropriateness of critical care using the same criteria they use during normal clinical practice.

STEP 2: Make daily determinations of how many priority groups can receive the scarce resource.

Hospital leaders and triage officers should make determinations twice daily, or more frequently if needed, about what priority scores will result in access to critical care services. 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.

There are at least two reasonable approaches to group patients: 1) according to their raw score on the 1-8 multi-principle allocation score; and 2) by creating 3 priority categories based on patients' raw priority scores (e.g., high priority, intermediate priority, and low priority). Using the full 1-8 scale avoids creating arbitrary cut-points on what is a continuous scale and allows all the information to be used from the priority score. Using priority categories is consistent with standard practices in disaster medicine and avoids allowing marginal differences in scores on an allocation framework that has not been extensively tested to be the determinative factor in allocation decisions. Both approaches are reasonable. The best choice depends on institutional preferences and comfort with different ways to operationalize triage protocols on the front lines of clinical care.

Instructions on how to assign patients to color-coded priority groups. For those institutions who prefer to create broader priority groups, this section provides instructions on how to do so. Once a patient's priority score is calculated using the multi-principle scoring system described in Table 1, each patient should be assigned to a color-coded triage priority group, which should be noted clearly on their chart/EHR (Table 2). This color-coded assignment of priority groups is designed to allow triage 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 highest predicted benefit from critical care interventions and should therefore receive priority over 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 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 2. 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

Appropriate clinical care of patients who cannot receive critical care. Patients who are not triaged to receive critical care/ventilation will receive medical care that includes intensive symptom management and psychosocial support. They should be reassessed daily to determine if changes in resource availability or their clinical status warrant provision of critical care services. Where available, specialist palliative care teams will be available for consultation. Where palliative care specialists are not available, the treating clinical teams should provide primary palliative care.

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

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

Ethical goal of reassessments of patients who are receiving critical care services. 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 saving lives would be jeopardized if patients who were determined to be very unlikely to survive were allowed indefinite use of scarce critical care services. 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 services will be allowed a therapeutic trial of a duration to be determined by the clinical characteristics of the pandemic disease. 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. Trial duration will also need to be tailored for other non-pandemic diseases and patient contexts, given the concern that patients with certain disabilities may need longer trials to determine benefit. The trial duration should be modified as appropriate if subsequent data emerge about the clinical course of the pandemic illness. Patients who present for acute care and are already using a ventilator chronically for pre-existing respiratory conditions (e.g., home ventilation or ventilation at a skilled nursing facility) should NOT be separated from their chronic ventilator to reallocate it to other patients.

The triage team will conduct periodic reassessments of patients receiving critical care/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 critical care/ventilation until the next assessment. If there are patients in the queue for critical care services, then patients who upon reassessment show substantial clinical deterioration as evidenced by significantly worsening severity of illness scores or overall clinical condition should have critical care 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 for near-term survival, the triage team may make a decision before the completion of the specified trial length that the patient is no longer eligible for critical care treatment.

Appropriate clinical care of patients who cannot receive critical care.

Patients who are no longer eligible for critical care treatment should receive medical care including intensive symptom management and psychosocial support. Where available, specialist palliative care teams will be available for consultation. Where palliative care specialists are not available, the treating clinical teams should provide primary palliative care.

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