

# 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 creates demand for critical care resources (e.g., ventilators, critical care beds) that outstrips the supply. These triage recommendations should be enacted only if: 1) critical care capacity is, or will shortly be, exceeded despite taking all appropriate steps to increase the surge capacity to care for critically ill patients; and 2) a regional-level authority has declared an emergency. This allocation framework is grounded in ethical obligations that include the duty to care, duty to steward resources, distributive and procedural justice, and transparency. It is consistent with existing recommendations for how to allocate scarce critical care resources during a public health emergency. Extensive consultation with citizens and disaster medicine experts also informed the principles and processes adopted in this document.

This document describes 1) the creation of triage teams to ensure consistent decision making; 2) allocation criteria 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.

**Section 1. Creation of triage teams:** Patients' treating physicians will not make triage decisions. Instead, each hospital will have a triage officer or 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 enhance objectivity, avoid conflicts of commitments, and minimize moral distress.

**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 critical care resources will be assigned a priority score using a 1-8 scale (lower scores indicate higher likelihood to benefit from critical care), derived from 1) patients' likelihood of surviving to hospital discharge, assessed with an objective measure of acute physiology (e.g., the SOFA score); and 2) patients' likelihood to achieve longer-term survival based on the presence of comorbid conditions that limit expected duration of survival (**Table 1**). All patients will be eligible to receive critical care resources and will be assigned to one of four color-coded priority groups based on their score on the multi-principle scoring system (e.g., Red group is highest priority, Orange group, Yellow group, Green group, each of which has incrementally lower priority). The availability of critical care resources each day over the course of the public health emergency will determine which priority groups will receive critical care. Access to critical care resources for lower priority groups should be increased or decreased based on real-time assessments of resource scarcity. In the event that there are 'ties' in priority scores between patients, life-cycle considerations should be used as a tiebreaker, with priority going to younger patients, who have had the least opportunity to live through life's stages. In addition, if there is convincing evidence that individuals who perform tasks that are vital to the public health response are likely to recover in time to again fulfill those roles during the current crisis, then these individuals should be given heightened priority. Patients who are not triaged to receive critical care/ventilation should receive medical care focused on intensive symptom management and psychosocial support. Where available, specialist palliative care teams will provide additional support and consultation.

**Section 3. Reassessment for ongoing provision of critical care/ventilation:** The triage committee will conduct periodic reassessments of patients receiving critical care/ventilation. These assessments will involve re-calculating SOFA scores and consulting with the treating clinical team regarding the patient's clinical trajectory. Patients showing improvement will continue with critical care/ventilation until the next assessment. Patients showing substantial clinical deterioration as evidenced by worsening SOFA scores or overall clinical judgment should not receive ongoing critical care/ventilation. They will receive medical care including intensive symptom management and psychosocial support. Where available, specialist palliative care teams will provide additional support and consultation.

## 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 creates demand for critical care resources (e.g., ventilators, critical care beds) that outstrips the supply. 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) a regional-level authority has declared an emergency. This allocation framework is grounded in ethical obligations that include the duty to care, duty to steward resources, distributive and procedural justice, and transparency. 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.<sup>1,2</sup> It should be noted that this goal is different from the focus of medical ethics, which is centered on promoting the wellbeing of individual patients.<sup>3</sup> As described below, the allocation framework operationalizes the broad public health goal by giving priority to patients who are most likely to survive to hospital discharge and beyond with appropriate treatment with critical care resources. Extensive consultation with citizens and disaster medicine experts also informed the principles and processes adopted in this document.<sup>4</sup>

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, 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 illness severity. 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.<sup>5</sup> Instead, the allocation framework also attempts to maximize the number of life-years save.

This document describes 1) the creation of triage teams to ensure consistent decision making; 2) allocation criteria 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.

## 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. These decisions are grounded in public health ethics, not clinical ethics, and therefore 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 moral distress.

### Triage Officer

A group of triage officers should be appointed. The desirable qualities of triage officers include being a physician with established expertise in the management of critically ill patients, outstanding 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. He or she is expected to make 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. 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 make decisions about which patients will receive the highest priority for receiving critical care. He or she is also empowered to make decisions regarding reallocation of critical care resources when patients experience substantial clinical deteriorations about being allocated critical care interventions.

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 consist of at least one nurse, and one administrative staff member to conduct data-gathering activities, documentation, and record keeping. 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 his/her decision-making process. A representative from hospital administration, should also be linked to the team, in order to supervise maintenance of accurate records of triage scores and to serve as a liaison with hospital leadership.

The triage officer and team members should function in shifts lasting no longer than 13 hours. Therefore, there should be at least two shifts per day to fully staff the triage function. Team decisions and supporting documentation should be reported daily to the appropriate hospital leadership and incident command.

### **Triage Mechanism**

The triage officer and his/her team will use the allocation framework 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.

### **Communication of triage decisions to patients and families**

Although the *authority* for triage decisions rests with the triage officer, we recognize that there are several potential strategies to *communicate* triage decisions to patients and families. The triage officer should first inform the affected patient's attending physician about the triage decision, then they should collaboratively determine the best approach to inform the individual patient and family. Options for who should communicate the decision include: 1) solely the triage officer; 2) solely the attending physician; and 3) a collaborative effort between the triage officer and the attending physician. The best approach will likely depend on a variety of local factors, including the dynamics of the individual doctor-patient-family relationship and the preferences of the attending physician. As a default approach, we suggest that the attending physician and the triage officer should collaboratively conduct this conversation. Under this approach, the attending physician would first explain the severity of the patient's condition in an emotionally supportive way, then the triage officer would explain the implications of those facts in terms of the triage decision. The triage officer should also emphasize that the triage decision was not made by the attending physician but is instead one that arose from the extraordinary emergency circumstances, and reflected a public health decision. It may also be appropriate to explain the medical

factors that informed the decision, as well as the factors that were not relevant (e.g., race, ethnicity, insurance status, perceptions of social worth, immigration status, etc). It may be appropriate to have palliative care clinicians or social workers present 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 clinically deteriorating. This is because initial triage decisions for patients awaiting the critical care resource will likely be made in highly time-pressured circumstances. Therefore, an operationally feasible appeal process will need to be adjudicated in real time. For the initial triage decision, we recommend that 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. The process of evaluating the appeal should consist of the triage team verifying the accuracy of the priority score calculation by recalculating the score.

For appeals of decisions to withdraw the scarce resource from a patient who is already receiving it, we recognize that decisions to withdraw life support may cause heightened moral concern and also depend on more clinical judgment than initial allocation decisions. Therefore, there should be a more robust appeal process. The appeals process should involve:

- The appeal should be immediately brought to a Triage Review Committee or a designated subcommittee that is independent of the triage team (see below for recommended composition of this body).
- The individuals who are appealing the triage decision should explain the grounds for their disagreement with the triage decision. An appeal may not be brought based on an objection to the overall allocation framework.
- The triage team should explain the grounds for the triage decision that was made.
- The appeals process must occur quickly enough that the appeals process does not harm patients who are in the queue for the scarce resource.
- The decision of the Triage Review Committee or subcommittee for a given hospital will be final.
- Periodically, the Triage Review Committee should retrospectively assess whether the review process is consistent with effective, fair, and timely application of the allocation framework.

The Triage Review Committee should be made up of at least three individuals, pulled from each of the following or their designee: Chief Medical Officer, Chief Nursing Officer, Legal Counsel, Chair of the Ethics Committee, one designated 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.

## **Section 2. Allocation process for ICU admission/ventilation**

The purpose of this section is to describe the allocation framework that should be used make initial triage decisions for patients who present with illnesses that typically require critical care resources. The scoring system applies to all patients presenting with critical illness, not simply those with the disease or disorders that arise from 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 several steps, detailed below:

1. Calculating each patient’s priority score based on the multi-principle allocation framework;
2. Assigning each patient to a priority group (Red, Orange, Yellow, or Green); and
3. Determining on a daily basis how many priority groups will 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 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 to populations of patients, often expressed as “doing the greatest good for the greatest number”.

**Step 1: Calculation of 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 is used to characterize patients’ prognosis for hospital survival. The presence of life-limiting comorbid conditions is used to characterize patients’ longer-term prognosis.

Points are assigned according to the patient’s SOFA score (range from 1 to 4 points); and the presence of comorbid conditions (2 points for major life-limiting comorbidities, 4 points for severely life-limiting comorbidities (**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 to benefit from critical care; priority will be given to those with lower scores.

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

Principle	Specification	Point System*			
		1	2	3	4
<b>Save the most lives</b>	Prognosis for short-term survival (SOFA score)	SOFA score < 6	SOFA score 6-9	SOFA score 10-12	SOFA score > 12
<b>Save the most life-years</b>	Prognosis for long-term survival (medical assessment of comorbid conditions)	...	Major comorbid conditions with substantial impact on long-term survival	...	Severely life-limiting conditions; death likely within 1 year

SOFA= Sequential Organ Failure Assessment

\* Persons with the lowest cumulative score would be given the highest priority to receive mechanical ventilation and critical care services.

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

Examples of Major comorbidities (associated with significantly decreased long-term survival)	Examples of Severely Life Limiting Comorbidities (associated with survival < 1 year)
<ul style="list-style-type: none"> <li>• Moderate Alzheimer’s disease or related dementia</li> <li>• Malignancy with a &lt; 10 year expected survival</li> <li>• New York Heart Association (NYHA) Class III heart failure</li> <li>• Moderately severe chronic lung disease (e.g., COPD, IPF)</li> <li>• End stage renal disease</li> <li>• Severe, inoperable multi-vessel CAD</li> </ul>	<ul style="list-style-type: none"> <li>• Severe Alzheimer’s disease or related dementia</li> <li>• Metastatic cancer receiving only palliative treatments</li> <li>• New York Heart Association (NYHA) Class IV heart failure</li> <li>• Severe chronic lung disease with FEV1 &lt; 25% predicted, TLC &lt; 60% predicted, or baseline PaO2 &lt; 55mm Hg</li> <li>• Cirrhosis with MELD score ≥20</li> </ul>

**Step 2: Assign patients to color-coded priority groups**

Once a patient’s priority score is calculated using the multi-principle scoring system described in Table 2, each patient should be assigned to a color-coded triage priority group, which should be noted clearly on their chart/EHR (Table 3). 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 best chance to benefit from critical care interventions 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.

It is important to note that all patients will be *eligible* to receive critical care beds and services regardless of their priority score. The availability of critical care resources will determine how many eligible patients will 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.

**Step 3: Make daily determination of how many priority groups can receive the scarce resource**

We recommend that hospital leaders and triage officers make determinations twice daily, or more frequently if needed, about what priority groups will have 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 in the highest priority group (Red group) should receive the scarce critical care resource. As scarcity subsides, more priority groups (e.g., first Orange group, then Yellow group) should have access to critical care interventions.

**Table 3. Assigning Patients to Color-coded Priority Groups**

<b>Step 2- Use Priority Score from Multi-principle Scoring System to Assign Priority Category</b>	
<b>Level of Priority and Code Color</b>	<b>Priority score from Multi-principle Scoring System</b>
<b>RED</b> <b>Highest priority</b>	<b>Priority score 1-3</b>
<b>ORANGE</b> <b>Intermediate priority</b> (reassess as needed)	Priority score 4-5
<b>YELLOW</b> <b>Lowest priority</b> (reassess as needed)	Priority score 6-8
<b>GREEN</b> <b>Do not manage with scarce critical care resources</b> (reassess as needed)	No significant organ failure or no requirement for critical care resources

**Other considerations:**

1. Resolving “ties” in priority scores between patients. In the event that there are ‘ties’ in priority scores between patients and not enough critical care resources for all patients with the lowest priority score, life-cycle considerations should be used as a tiebreaker, with priority going to younger patients. The ethical justification for using the lifecycle principle as a tiebreaker 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.<sup>6</sup> 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. There is a precedent for incorporating life-cycle considerations into pandemic planning. The U.S. Department of Health and Human Services’ plan to allocate vaccines and antivirals during an influenza pandemic prioritizes infants and children over adults.<sup>7</sup> Empirical data suggest 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.<sup>8</sup> Public engagement about allocation of critical care resources during an emergency also supported the use of the lifecycle principle for allocation decisions.<sup>4</sup> 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.”<sup>9</sup>



If there are still ties after applying priority based on life cycle considerations, a lottery (i.e., random allocation) should be used to break the tie.

2. Categorical exclusion criteria: A central feature of this allocation framework is that it avoids the use of categorical exclusion criteria to indicate individuals who should not have access to critical care services under any circumstances during a public health emergency. Categorical exclusion may be interpreted by the public that some groups are “not worth saving,” leading to perceptions of unfairness. In a public health emergency, public trust will be essential to ensure compliance with restrictive measures. Thus, an allocation system should make clear that all individuals are “worth saving.” One way to do this is to keep all patients who would receive mechanical ventilation during routine clinical circumstances eligible, but allow the availability of ventilators to determine how many eligible patients receive it. It should be noted 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 services (e.g., cardiac arrest unresponsive to appropriate ACLS, overwhelming traumatic injuries, massive intracranial bleeds, 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.

3. Giving heightened priority to those who are central to the public health response. Individuals who perform tasks that are vital to the public health response, including all those whose work directly supports the provision of acute care to others, will be given heightened priority. This category should be broadly construed to include those individuals who play a critical role in the chain of treating patients and maintaining societal order. The specifics of how to operationalize this consideration will depend on the exact nature of the public health emergency. Options include subtracting points from the priority score for these individuals or using it as a tiebreaker criterion. However, broadly speaking, it would not be appropriate under any circumstances to prioritize front-line *physicians* and not prioritize other front-line clinicians, such as nurses and respiratory therapists, and other key personnel such as the maintenance staff that disinfects hospital room for a new patient.

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

The purpose of this section is to describe the process the triage committee should use to conduct reassessments on patients who are receiving critical care services, in order to determine whether he/she 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 maximizing population outcomes would be jeopardized if patients who were determined to be 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 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. The trial duration should be modified as appropriate if subsequent data emerges which suggests the trial duration should be longer or shorter.



The triage committee will conduct periodic reassessments of patients receiving critical care/ventilation. These assessments will involve re-calculating SOFA scores and consulting with the treating clinical team regarding the patient's clinical trajectory. 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 worsening SOFA scores or overall clinical judgment should not receive ongoing critical care/ventilation. 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 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

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.

## References

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