Request for Public Input

The Oregon Resource Allocation Advisory Committee[1] (ORAAC) is advising the Oregon Health Authority (OHA) on the development of updated crisis care guidelines. When many people need healthcare at once, there may not be enough hospital beds, supplies or staff to care for everyone. This can happen during emergencies such as a pandemic or natural disaster. This committee is reviewing how decisions are made in Oregon during emergencies. The ORAAC will recommend ways for hospitals and health systems to care for patients in these emergency situations.

The committee is interested to know what people in Oregon think about the options being considered. Please review this document to learn about these options. This document is organized as follows:

Submitting Public Comment: Once you have reviewed this document, please share your input. There are multiple options for providing public comment:

- You may submit written public comment until June 26, 2023 using a survey available in English or Spanish. The survey is available in additional languages on the ORAAC website.
- You can submit your comments by email to OHA.ResourceAllocation@odhsoha.oregon.gov.
- You can provide verbal public comment during the May 23, 2023 ORAAC meeting from 1:30-3:30 pm or in the meetings on June 15 or June 29. Since

[1]Oregon Resource Allocation Advisory Committee: https://www.oregon.gov/oha/Pages//ORAAC-Oregon-Resource-Allocation-Advisory-Committee.aspx

time for comment is limited, please sign up in advance to provide public testimony. Meeting agendas can be found on the ORAAC website.
- For any questions about submitting public testimony, please contact OHA.ResourceAllocation@odhsoha.oregon.gov.
- If you need assistance signing up to provide public testimony at a meeting or would like to request an accommodation to participate, please call or email Kristen Darmody as soon as possible: 971-888-3358 (voice/text) or kristen.c.darmody@oha.oregon.gov. All relay calls accepted.

Part I: Background

Crisis standards of care are rules that guide health care delivery in a widespread public health emergency or overwhelming disaster. In such situations, it is often necessary to provide care differently than during normal operations. Crisis care guidance describes how a community or health care system should respond when resources are overwhelmed. OHA published the Oregon Interim Crisis Care Tool[2] to provide guidance for healthcare workers during the COVID-19 pandemic. In light of new evidence and debate, and to be better prepared for future emergency situations, OHA is currently reviewing and revising this guidance.

The ORAAC's task is to recommend updates to Oregon guidance regarding who receives scarce, life-saving resources when there is not enough for everyone who needs them. The goal of Oregon's approach to allocating resources is to protect the health of all communities in Oregon and to reduce health inequities and the disadvantage caused by oppression. The ORAAC is focused on centering hope and innovation in its work and to build on, rather than be limited by, ways in which crisis standards of care have been designed to date.

During the ORAAC's work, members have recognized that crisis care guidance must acknowledge:

- There is no universally accepted approach to crisis care resource allocation; justification will be needed for all choices made;

[2] Oregon's Interim Crisis Care Tool: https://sharedsystems.dhsoha.state.or.us/DHSForms/Served/le4019c.pdf

- It will be necessary to frequently evaluate chosen approaches, review data, learn and refine guidance; and
- Health systems should develop ongoing partnerships with the communities most impacted by health inequities to develop and refine crisis care guidelines and other approaches to reducing health inequities.

Crisis care guidance is only one component of broader efforts needed in advance of and during a public health emergency to protect the public and reduce inequities. These broader efforts include but are not limited to:

- Emergency preparedness;
- Broad access to culturally responsive health care and needs;
- Access to supports that allow individuals with disability to achieve desired independence and communicate their needs and goals;
- A diverse, responsive and supported healthcare workforce;
- Local, regional, statewide and interstate communication; and
- Movement of patients to access needed care (also called “load balancing”).

A central element in crisis standards of care is known as triage. In this setting, triage refers to the prioritization process to determine which patient(s) will receive life-saving resources when there are not enough for everyone who needs them. For example, in the case of the COVID-19 pandemic, many states prepared sets of rules to decide who should be offered ventilators for mechanically assisted breathing when there were more patients than available ventilators in a given location. This document is concerned with triage (also called an allocation framework) in a public health emergency. We welcome your input to help us identify a reasonable allocation framework.

Part II: Criteria Under Consideration for Allocation of Scarce, Life-Saving Resources

The ORAAC has reviewed a range of criteria that can be used separately, or in combination, for the allocation of scarce, life-saving resources. The committee has deliberated on justification and drawbacks for each and explored how they might be used in a stand-alone fashion or combined as part of a multi-criteria approach.

In this section, we describe the primary criteria and options discussed by the committee. In the next section, we describe three combined sets of criteria. While there are other triage options that could be used, we focus here on the ones the committee has deliberated on the most. If there are any additional options or approaches that you feel we should consider, please let us know in addition to providing feedback on the options we list below.

Crisis Care Triage – criteria for consideration:

1. Clinician prognosis;
2. Equitable chances;
3. Essential worker status;
4. Multiplier effect;
5. Life cycle principle;[3] and
6. Sequential Organ Failure Assessment (SOFA)/ Modified SOFA (mSOFA).[4]

Each of these options is described individually on the pages to follow.

1. Clinician Prognosis

This approach draws on a clinical team's assessment of how likely a patient is to respond to treatment and survive their immediate hospitalization. From here on, we also term this hospital "survivability." Using this criterion, patients with very

[3] Please note that OHA has significant concerns with using this option. See drawbacks listed.
[4] OHA has significant concerns with continuing to use this option. See drawbacks listed.

high chances of hospital survival if given the resource are prioritized first, and patients with very low chances of hospital survival are prioritized last.

Note: The committee has not discussed using longer-term survivability, such as a patient's remaining life expectancy, as a criterion for resource allocation. OHA has previously outlined equity concerns with using this criterion.[5] For example, persistent gaps in life expectancy exist across population groups,[6] often reflecting structural injustice and discrimination against legally protected groups.

Approach

Clinical prognosis is determined by a triage team:

- An interdisciplinary triage team determines how likely it is for a patient to survive to hospital discharge if they receive the needed resource (*not* how long the patients will live after hospitalization if treated successfully);
- Training and processes for prognosis determination based on clinical information would be developed to increase consistency across triage teams; and
- Clinical prognosis would change a patient's prioritization for receiving the needed, scarce resource if they have a greater than or equal to 90 percent (≥ 90%) chance of hospital survival or a less than or equal to 10 percent (≤ 10%) chance of hospital survival if provided the resource.

Using this criterion, no-one is excluded, and patients are placed in one of several "resource priority groups" based on clinician prognosis of the patients' survival to hospital discharge*. For example:*

- Priority Group 1: patient has a greater than or equal to 90% chance of survival to discharge if provided the resource

[5] https://sharedsystems.dhsoha.state.or.us/DHSForms/Served/le3513.pdf
[6] GBD US Health Disparities Collaborators. Life expectancy by county, race, and ethnicity in the USA, 00-19: a systematic analysis of health disparities. *Lancet*. 2002. https://doi.org/10.1016/S0140-6736(22)00876-5

- Priority Group 2: patient has an 11-89% chance of survival to discharge if provided the resource
- Priority Group 3: patient has a less than or equal to 10% chance of survival to discharge if provided the resource

When an absolutely scarce resource exists, the order of priority for who receives that resource is determined based on the assigned priority group. *For example*:[7]

- Priority Group 1 is first in line for resource
- Priority Group 2 is second in line for resource
- Priority Group 3 is third in line for resource

If the resource runs out, additional criteria would be applied to determine prioritization within a priority group.

Justification

This criterion prioritizes an absolutely scarce resource (a ventilator, for example) for patients with the highest likelihood (≥ 90%) to survive the hospital stay. Also, by not allocating an absolutely scarce resource to a patient with very low likelihood to survive hospital stay (≤ 10%), that ventilator is available to someone more likely to survive. This approach helps save the most lives.

In addition:

- Evidence suggests high accuracy of clinician prognosis for survivability,[8] such as when prognosis for chance of survival is ≥ 90% or ≤ 10%;[9]

[7] The ORAAC is exploring whether to recommend a fourth priority group, possibly defined as patients who are imminently dying. Further exploration of the accuracy of clinician prognosis for imminent death or similar prognosis is needed.

[8] Ros M, van der Zaag-Loonen H, Hofhuis M, Spronk P. SURvival PRediction in Severely Ill Patients Study- The Prediction of Survival in Critically Ill Patients by ICU Physicians. *Crit Care Exp* 2021;3:1-9.

[9] White N, Reid F, Vickerstaff V, et al. Imminent death: clinician certainty and accuracy of prognostic predictions *BMJ Supportive & Palliative Care* 2022;12:e785-e791

- A team assessment based on clinical expertise removes reliance on inaccurate and inequitable survivability prediction scoring tools such as SOFA/mSOFA (see below); and
- Opportunities to optimize a triage team's composition (for example, triage team members' expertise and experience), triage processes and training allows for hope and innovation.

Drawbacks:

- While published research demonstrates high accuracy of clinician judgement when it comes to relatively small shares of patients who are either highly likely, or highly unlikely, to survive, research is far more mixed when it comes to the larger group of patients who make up the group in-between. Accuracy is lowest when intermediate levels of prognosis are estimated.[10] Therefore, patient chances for survival between 11-89% are not further distinguished in this criterion for the purposes of resource prioritization.
- This allocation approach may allow for discrimination and provider bias. This can happen in several ways. For example, patients with disabilities, older adults, and those with worse access to healthcare may be more likely to be assigned to the lower priority groups, even if their hospital survivability is the same as other individuals. Triage team training and assessment process optimization can help to limit bias and discrimination.
- When there are more patients who would fall in the highest priority group than there are available resources, another criterion needs to be used to decide who among the qualifying patients should receive it.

2. Equitable Chances

A helpful way to describe the ***equitable chances*** criterion is by comparing it to a related, but different concept: equal chances. One way of resolving the question of who among different eligible patients with similar survivability should receive a

[10] White N, Reid F, Vickerstaff V, et al. Imminent death: clinician certainty and accuracy of prognostic predictions *BMJ Supportive & Palliative Care* 2022;12:e785-e791

resource is to treat them all as equals, for example by entering them into a drawing in which each has the same chance of being drawn (and receiving the resource). This model can be called "equal chances." However, "equal chances" typically fails to recognize that patients face different levels of disadvantage before an emergency hits, and that more disadvantaged people are usually far more likely to be hit harder during emergencies.[11]

Practically, this can be addressed by using a statistical measure of advantage and disadvantage that can help turn "equal chances" into "equitable chances."

Approach

In this approach, a ***disadvantage index*** is used to assess patient disadvantage, based on the patient's geographical residence that can be captured via their ZIP code or related metrics (see Box 1). Data for the COVID-19 pandemic has shown strong associations between disadvantage captured in this way and COVID-19 incidence and deaths, such that more disadvantaged groups were hit much harder than more advantaged ones.[12]

The equitable chances criterion uses a weighted randomization process to determine a patient's priority for receiving a needed scarce resource. That means, for example, that among a range of patients who are all assessed the same in terms of their survivability, patients from more disadvantaged areas have a higher chance to receive the scarce resource. How much higher their chance is can be determined through routinely gathered, objective metrics. For example, people from more disadvantaged areas could be priortized in proportion to the extent they have been more affected (such as in terms of the death rates that are typical for people from their neighborhood).

[11] Renuka T, Harald S, Paula L, Monita K. Associations of 4 Geographic Social Vulnerability Indices With US COVID-19 Incidence and Mortality. A*merican Journal of Public Health* 112, no. 11 (November 1, 2022): pp. 1584-1588.

[12] Renuka T, Harald S, Paula L, Monita K. Associations of 4 Geographic Social Vulnerability Indices With US COVID-19 Incidence and Mortality. A*merican Journal of Public Health* 112, no. 11 (November 1, 2022): pp. 1584-1588.

Box 1. Disadvantage Index[13,14]

Disadvantage Index
Disadvantage indices are place-based statistical measures. They assign a numeric score that captures average levels of factors such as income, education, disability and quality of housing of people living in a particular area. These factors are measured at a geographic level (such as a county subdivision or neighborhood, for example). By using a disadvantage index, the areas, and the individuals living within them, can be assigned a "disadvantage score" based on their home address. These scores can be used to account for disadvantage and inequities during the allocation of scarce resources. There are multiple disadvantage indices which differ in numerous ways, including but not limited to the number of measures, type of measures, data source, and geographical level of measurement. Examples include the Social Vulnerability Index (SVI), developed by the US Centers for Disease Control and Prevention, and the Area Deprivation Index (ADI), developed by the University of Wisconsin.

Example allocation steps using the equitable chances criterion:

1. Identify each patient's home address.[15]
2. Determine the disadvantage score (on a scale of one to ten, for example) for each patient based on the disadvantage index for their geographic residence.
3. Determine the additional weighting based on that disadvantage score. Such weights could be directly proportionate to impact. For example, if those with the highest disadvantage score (10) experience three times higher death rates than those with the lowest score, their chances to receive the needed resource are increased 3-fold. If those in the next highest

[13] Social Vulnerability Index: https://www.atsdr.cdc.gov/placeandhealth/svi/index.html
[14] Area Deprivation Index: https://www.neighborhoodatlas.medicine.wisc.edu/
[15] Guidance would indicate the appropriate approach for assigning a disadvantage score for any patient determined to be houseless.

disadvantage score (9) experience twice higher death rates than those with the lowest score, their chances are increased 2-fold. Increases in non-natural numbers, such as a 1.5-fold higher increase, can also be accommodated by dedicated software. An alternative approach to the weighting of chances would be to use a more defined cut-off point. For example, a 20% extra weight (or "chance") is added for each patient with a disadvantage score of 8, 9, or 10 (but not for those with a score of 7 or lower).

4. Randomize patients to identify who will be next in line to receive the scarce resource, with the addition of extra weighting (or extra chances to be drawn) for those patients experiencing the most disadvantage. This would not be done manually, but with customized free-for-public-use software.[16]
5. Determine the priority order for each patient to receive the scarce resource based on the equitable chances randomization outcome.

The ORAAC's Triage Approaches Subcommittee has discussed the opportunity to incorporate additional up-to-date measures within a disadvantage index, when available, which capture who is most impacted by the current emergency (cases, hospitalizations, or deaths, for example). Additional measures can also be added to the disadvantage index, such as occupational data to reflect the geographic proportion of essential workers.

Justification

This approach seeks to protect the health of all communities and reduce health inequities in Oregon by addressing the disadvantage caused by oppression. Justification for use of the equitable chances criterion also includes:

- Strong association between disadvantage and impact from crisis.[17] Indices can capture the fact that disadvantage is frequently intersectional, cumulative and compounding;

[16] See https://www.covid19reservesystem.org/software

[17] Renuka T, Harald S, Paula L, Monita K. Associations of 4 Geographic Social Vulnerability Indices With US COVID-19 Incidence and Mortality. A*merican Journal of Public Health* 112, no. 11 (November 1, 2022): pp. 1584-1588.

- Recognizes that not everyone has the same chances for resources or survivability at baseline; also recognizes that an allocation framework is not neutral, but capable of adding further to prior inequities suffered by legally protected groups;
- Removes reliance on inaccurate and inequitable survivability estimation tools (such as SOFA and mSOFA, see below);
- Offers the opportunity to update the resource allocation framework based on known, evolving impacts during an emergency with additional data to improve correlation with disadvantage impact.

Drawbacks

- Requires determination of which among several different types of indices will be used
- Requires the development of criteria regarding which segment of the disadvantage spectrum should be prioritized, and by how much their chances should be increased.
- Not all individuals living in a disadvantaged group will, in fact, be disadvantaged; and while some individuals may be highly disadvantaged on each of the dimensions that an index captures, others may only be disadvantaged on one, or a few dimensions. This is an inherent limitation but can be addressed by adjusting the geographic resolution that an index offers.
- This criterion by itself does not consider survivability. If used alone, and for all patient groups simultaneously, a patient with very low likelihood to survive the hospital stay may receive the resource instead of a patient with a very high likelihood to survive. This criterion may be best applied for patients in equal priority groupings (as a tie-breaker, for example, after a survivability criterion is applied).

3. Essential Worker

This approach gives priority for receiving a scarce resource to those whose occupation meets the definition of an ***essential worker***. This guidance is intended for all types of large-scale emergency situations; however, the professional groups that fall under this description will differ from case to case. For example,

in case of a nuclear disaster, a relatively small workforce will be essential. By contrast, in the case of a pandemic such as Covid-19, a much wider range of health care and other professionals need to be considered, with sub-divisions such as front-line and non-front-line workers. The main point here is to recognize that to mitigate the impact of an emergency, professional roles can require special consideration.

Approach

Priority for receiving a needed resource is given to those whose occupation meets the definition of an essential worker*:*

- While there is no single, agreed upon definition, federal and state definitions for essential workers have been used during the COVID-19 pandemic.[18]
- Typically assumes additional exposure or risk based on the occupation.
- May include: healthcare/public health, first responders/public safety, military, public works, educators, social service providers, food production & provision, non-food manufacturing, transportation/public transport.

Prioritization can be achieved at the individual or geographic level.

- *Individual level:* individual assessment is made regarding whether a patient meets the definition of an essential worker.
- *Geographic level*: occupation data collected at geographic level and included as part of a disadvantage index.

Justification

The criterion is also justified by saving the most lives because essential workers are critical for maintaining the functioning of society and essential services, especially those working to address the consequences of an emergency. This criterion can be implemented in different ways. In the most extensive way, all essential workers (of a particular type) might be given priority before any other patients. In another way, and similar to the weights applied via disadvantage

[18] https://www.ncsl.org/labor-and-employment/covid-19-essential-workers-in-the-states

indices, essential workers could receive a score/priority that increases their chances of receiving a scarce resource. In addition:

- Some workers take more risks (experience more exposure, for example) on behalf of the public during an emergency; a higher priority for scarce resources is granted in response to their sacrifices. A term for this is reciprocity.
- Can decide how expansive or specific the priority occupations are (such as including home health workers in the healthcare group along with doctors and nurses in hospitals, for example).
- Offers flexibility: essential workers may vary depending on the type of emergency (a nuclear power plant worker versus a health care worker, for example); essential worker definitions can be updated to ensure the criterion is applicable to the current emergency.

Drawbacks

- Can be difficult to determine or confirm someone's occupation at the time of triage.
- There is no single, agreed upon definition or criteria for essential workers.
- There is risk for conflict of interest and bias (for example, health care providers prioritizing each other).
- May disadvantage people with disabilities

4. Multiplier Effect

This approach gives priority for receiving a needed, scarce resource to those individuals who, upon timely recovery, have the potential to save other people's lives based on their occupation. This approach is a subset of the essential worker status priority and may have the greatest effect in the setting of a workforce shortage.

Approach

At the time of scarce resource allocation, assessment would be made as to whether the patient would have the potential to save other people's lives if given the resource. If the assessment determines the patient would have the potential for a multiplier effect, they would receive priority in getting the scarce resource over others. This assessment would be made based on factors such as the nature of the current emergency, the patient's occupation, and the patient's expected time to recovery.

Example occupations with the potential for a multiplier effect include:

- Certain health care workers (intensive care unit staff, for example)
- Firefighters
- Police officers
- Emergency medical technicians

Justification

The criterion is also justified by saving the most lives because providing needed resources to workers who are critical to the functioning of society can have a multiplying effect. For example, more lives can be saved when there are available first responders or health care professionals to care for injured or ill during an emergency. In addition:

- Offers flexibility: workers who have a multiplier effect may vary depending on the type of emergency; definitions can be updated to ensure the criterion is applicable to the current emergency.

Drawbacks

- Can be difficult to determine or confirm someone's occupation at the time of triage.
- There is no single, agreed upon definition or criteria for essential workers.
- There is risk for conflict of interest and bias (for example, health care providers prioritizing each other).

- It can be difficult to predict whether the patient will recover in enough time to save other lives during the emergency.

5. Life Cycle Principle

This approach in prioritizing which patient(s) will receive scarce, life-saving resources focuses on which patients have had the least opportunity to live through life stages.

> *Note: OHA has significant concerns with using this option based on the drawbacks listed below. Further public input will be helpful in order to fully evaluate this option.*

Approach

Patients in an earlier life cycle (also called a "life stage") would be given higher priority for the scarce resource than patients in a later life stage. Classifications for life cycle are made based on age. For example:

- Childhood (0-17 years old)
- Early Adulthood (18-39 years old)
- Middle Age (40-64 years old)
- Older Adults (65 or more years old)

Justification

The underlying justification of the life cycle principle is equality, in that everyone should have the same chance of living through all stages of a life. Justification for use of the life-cycle criterion also includes:

- Patients who have not had the same opportunity to live through life stages are given some priority.
- Age is generally easy to determine and patients can be classified according to their life stages.

- As larger shares of communities of color and disabilities communities have lower life expectancy, the life-cycle principle may improve health equity.[19]

The life cycle approach to scarce resource allocation can counteract the effects of unjust inequities in life expectancy (how long you are expected to live) across groups. Demographically, life expectancy differs across racial and ethnic groups and disability.[20,21] White and non-disabled people are generally growing older than communities of color and disabled people.

Drawbacks

- Requires the development of life stage classifications by age.
- May not fully align with different cultural norms or values.
- Can have community-wide impacts on already scarce access to cultural practices when those in later life cycles (elders, for example) are deprioritized.
- Prioritizing younger people (by prioritizing those in earlier life stages defined by age groupings) could be considered age discrimination.
- Published literature and press reactions suggest mixed public acceptance, and there is potential for significant concern if used.[22,23]

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[19] Persad G, Joffe S. Allocating scarce life-saving resources: the proper role of age. *Journal of Medical Ethics* 2021;47:836-838.

[20]GBD US Health Disparities Collaborators. Life expectancy by county, race, and ethnicity in the USA, 00-19: a systematic analysis of health disparities. *Lancet*. 2002. https://doi.org/10.1016/S0140-6736(22)00876-5

[21] Majer IM, Nusselder WJ, Mackenbach JP, Klijs B, van Baal PH. Mortality risk associated with disability: a population-based record linkage study. Am J Public Health. 2011 Dec;101(12):e9-15.

[22] Jecker NS. Too old to save? COVID-19 and age-based allocation of lifesaving medical care. Bioethics. 2022 Sep;36(7):802-8.

[23] Scire E, Jeong KY, Gaurke M, Prusak B, Sulmasy DP. Rationing with respect to age during a pandemic: a comparative analysis of state pandemic preparedness plans. Chest. 2022 Feb 1;161(2):504-13.

6. Sequential Organ Failure Assessment (SOFA) or modified Sequential Oregon Failure Assessment (mSOFA) Tools

This approach utilizes the SOFA or mSOFA assessment tool to determine a patient's likelihood for hospital survivability in order to prioritize which patient(s) will receive scarce, life-saving resources.

> *Note: OHA has significant concerns with continuing to use this option based on the drawbacks listed below. Further public input will be helpful in order to fully evaluate this option.*

Approach

The SOFA[24] and mSOFA[25] are published tools used to estimate the likelihood of a patient to survive through hospital discharge. These tools were originally developed and studied to determine survivability for patients with overwhelming infection (called sepsis). SOFA and mSOFA tools are scoring systems used to assess the performance of several organ systems in the body (neurologic, respiratory, liver, kidney, and blood pressure/hemodynamics). The scoring systems use certain vital signs, laboratory results, and physical exam components to determine a patient's survivability score based on the data obtained in each category.

Using this criterion, no-one is excluded, and patients are placed in one of several priority groups based on SOFA or mSOFA scores.

- Lower scores suggest a higher likelihood of hospital survival.
- Patients with the lowest SOFA or mSOFA scores receive priority for the scarce resource during triage.

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[24] Vincent JL, de Mendonça A, Cantraine F, Moreno R, Takala J, Suter PM, Sprung CL, Colardyn F, Blecher S. Use of the SOFA score to assess the incidence of organ dysfunction/failure in intensive care units: results of a multicenter, prospective study. Working group on "sepsis-related problems" of the European Society of Intensive Care Medicine. *Crit Care Med*. 1998 Nov;26(11):1793-800. doi: 10.1097/00003246-199811000-00016. PMID: 9824069.

[25] Grisson CK, Brown SM, Kuttler KG, et al. A modified sequential organ failure assessment score for critical care triage. *Disaster Med Public Health Prep*. 2010; 4: 277-284.

However, as listed below under drawbacks, these scores do not accurately predict short-term survival and therefore cannot be considered as using objective clinical data. In addition, there are major equity concerns associated with their use.

Justification

Justification for the use of SOFA and mSOFA tools includes:

- Relatively easy to use; draw on clinical data that can be measured numerically.
- Have been widely used in crisis care guidelines.
- Many hospital teams have been trained in their use.
- Additional modifications (or "equity corrections") may be applied in order to reduce impact on health inequities.

Drawbacks

- Scientifically, studies have shown that SOFA does not accurately predict short-term survival for a respiratory infection such as COVID-19.[26] While developed to help determine prognosis for patients with sepsis, other uses for these tools have major limitations.
- These tools will worsen inequities:
    - The clinical data used in these tools are neither an objective measure of short-term survival nor measure survival equitably across groups. For example, studies have shown that SOFA overestimates the survivability of white patients, and underestimates the survivability of Black patients, and thus has major risks of increasing prior

[26] Raschke RA, Agarwal S, Rangan P, Heise CW, Curry SC. Discriminant Accuracy of the SOFA Score for Determining the Probable Mortality of Patients With COVID-19 Pneumonia Requiring Mechanical Ventilation. *JAMA.* 2021;325(14):1469–1470. doi:10.1001/jama.2021.1545

inequities across racial and ethnic groups[27] and may also worsen inequities for disabled people.

- If applied in an allocation framework, the sets of measures used in this scoring system mean that patients who have been more advantaged for most of their lives have higher chances to receive a needed resource, and those who have been more disadvantaged for most of their lives have lower chances. For example, SOFA includes penalty points for pre-existing speech disability due to its reliance on the Glasgow Coma Scale. There are also penalty points for higher creatinine (a measure of kidney function). However, creatinine not only measures kidney function but simultaneously measures social disadvantage, with Black people far more likely to have higher creatinine scores due to higher levels of kidney diseases that is a result of structural disadvantage and the social determinants of health.[28]

- Major clinician-led consensus documents (by the American College of Chest Physicians Task Force for Mass Critical Care[29] and an expert review by the National Academy of Medicine[30]) caution against using SOFA; several states have stopped using these tools. Acknowledging advances in the debate, the lead authors of the most widely adopted triage guideline during Covid-19

[27] Miller WD, Han X, Peek ME, Charan Ashana D, Parker WF. Accuracy of the Sequential Organ Failure Assessment Score for In-Hospital Mortality by Race and Relevance to Crisis Standards of Care. *JAMA Netw Open.* 2021;4(6):e2113891. doi:10.1001/jamanetworkopen.2021.13891

[28] Schmidt H, Roberts DE, Eneanya ND*. J Med Ethics* 2022;48:126–130.

[29] Maves RC, Downar J, Dichter JR, Hick JL, Devereaux A, Geiling JA, et al.; ACCP Task Force for Mass Critical Care. Triage of scarce critical care resources in COVID-19 an implementation guide for regional allocation: an expert panel report of the task force for mass critical care and the American College of Chest Physicians. *Chest* 2020;158:212– 225.

[30] Hick, J. L., D. Hanfling, M. Wynia, and E. Toner. 2021. Crisis Standards of Care and COVID-19: What Did We Learn? How Do We Ensure Equity? What Should We Do? *NAM Perspectives.* Discussion, National Academy of Medicine, Washington, DC. https://doi.org/10.31478/202108e.

(the Pittsburg Model) have dropped SOFA in the most recent version of this guideline.[31]

Part III: Example Multi-Criteria Approaches

This section outlines three potential approaches for the allocation of scarce resources using a combination of the above criteria together (called a "multi-criteria approach"). Existing crisis care guidelines across the United States typically utilize a multi-criteria approach rather than a single criterion for the purposes of resource allocation. When using a multi-criteria approach in crisis care guidance, there are various important factors to consider. These choices include, but are not limited to, which criteria are included, what their underlying justification is, what weight is given to each of those criteria, and the sequence in which they are applied.

The multi-criteria approaches described below (examples A, B and C) are for illustrative purposes only and do not provide the level of detail that would be needed for application in practice. **These examples do not represent recommendations from OHA or ORAAC but serve to illustrate possible combinations that are helpful to solicit comment on.**

In a major health emergency situation, ease of implementation is a feature that needs to be taken seriously. Models such as those described below can all be implemented readily via a methodological approach known as Categorized Priority System (sometimes also called a Reserve System). During the Covid-19 pandemic, systems that combined factors such as survivability, level of disadvantage and essential worker status were successfully developed for purposes including allocating vaccines, tests and treatments. Custom-made, free-of-charge software has been developed to facilitate implementation.[32]

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[31] White DB, Lo B. Mitigating Inequities and Saving Lives with ICU Triage during the COVID-19 Pandemic. *Am J Respir Crit Care Med*. 2021 Feb 1;203(3):287-295. doi: 10.1164/rccm.202010-3809CP. PMID: 33522881; PMCID: PMC7874325.

[32] See https://www.covid19reservesystem.org/research

A. Clinical Prognosis and Equitable Chances

In this multi-criteria approach, the initial priority groups are established based on clinician-determined prognosis[33] for hospital survival (for example, whether patient has ≥ 90% or ≤ 10% chance of surviving the hospital stay). See page 4 for details on the clinician prognosis criterion.

The equitable chances criterion is then applied to determine the order of priority for all patients within each of the prognosis-based groups in the case there are not enough resources to serve everyone. See Table 1 for illustration of the steps in this approach. See page 7 for details regarding the equitable chances criterion.

Table 1. Steps for patient prioritization based on the clinical prognosis and equitable chances multi-criteria approach

Step 1: Clinician Prognosis: assess patient's chance to survive hospitalization. Group 1 gets highest priority for the resource, and Group 3 gets lowest priority for the resource:
Group 1: lowest risk of death (≥ 90% chance of hospital survival)
Group 2: moderate risk of death (89-11 % chance of hospital survival)
Group 3: high risk of death (≤ 10% chance of hospital survival)
Step 2: Equitable Chances Criterion: In the event there are not enough resources for patients in the same prognosis group, apply equitable chances criterion.
Determine the disadvantage score for each patient based on the disadvantage index for their geographic residence. Assign additional equitable chances weighting for patients based on level of disadvantage, proportionate to impact (as measured by disadvantage index). Complete the automated, weighted randomization process (a drawing) using available software to determine who receives the resource. See detailed example below.

Description of who is prioritized in this multi-criteria approach :

[33] Such assessments could rest on clinician judgement alone or be assisted by a prognostication tool if it has high accuracy, reliability, and does not result in furthering health inequities. At the time of this document development, no tools with these characteristics had been identified.

- Patients who have the greatest chance to survive hospitalization (a greater than or equal to 90% chance) based on clinician prognosis would be the first group prioritized; and
- Patients within this group who have experienced the greatest disadvantage would have the highest chance of being prioritized in front of other patients who have experienced the least disadvantage, proportionate to the impact the emergency had on this group, for example.

Example:
Suppose there are 10 patients in the intensive care unit (ICU) with respiratory distress needing mechanical ventilation, but only two ventilators are available. Upon prognosis assessment by the triage team, three of the ten patients are determined to have a >90% likelihood to survive the hospital stay. They are therefore placed in Group 1 and will have first priority to receive a ventilator.

In order to determine which of the three patients in Group 1 will receive priority for the two available ventilators, their disadvantage scores are determined based on their geographical residence. By applying the patients' ZIP codes to the disadvantage index, Patient A has a disadvantage score of 2, patient B has a disadvantage score of 8 and patient C has a disadvantage score of 9. Data shows that the death rate from the current emergency associated with a disadvantage score of 8 and above is 25% more than the average death rate of the general population.

All three patients are then entered into a digital "equitable chances drawing". Patients B and C are given 25% extra "weight" (chances) to be identified in the drawing proportionate to their relative disadvantage based on the disadvantage index. The weighted randomization process is then completed using a software system made available to all hospitals. Based on this random drawing with extra chances weight applied as above, the final prioritization is identified as follows:

- Patient B is drawn first and will receive a ventilator.
- Patient A is drawn next and will receive a ventilator.
- Patient C is drawn third and will be on a waiting list for a ventilator.

B. Clinical Prognosis, Life Cycle[34], and Equitable Chances

This multi-criteria approach is similar to the above one, with the addition of life-cycle considerations. The initial priority groups are again established based on clinical prognosis for survival (for example, whether the patient has a ≥ 90% or ≤ 10% chance of surviving the hospital stay). Priority is given to the patients with a higher chance of survival. In the event there are not enough resources for patients in the same prognosis group, patients who are in an earlier life stage would be given priority for the scarce resource over patients in a later life stage. Finally, the equitable chances criterion is applied as a tiebreaker within priority groups if needed. See page 5 for details on the life cycle principle criterion. See Table 2 below for further illustration of these steps.

Table 2. Example steps for patient prioritization based on the clinical prognosis, life cycle, and equitable chances multi-criteria approach

Step 1: Clinician Prognosis: assess patient's chance to survive hospitalization. Group 1 gets highest priority for the resource, and Group 3 gets lowest priority for the resource:
Group 1: lowest risk of death (≥ 90% chance of hospital survival)
Group 2: moderate risk of death (89-11 % chance of hospital survival)
Group 3: high risk of death (≤ 10% chance of hospital survival)
Step 2: Tiebreaker: In the event there are not enough resources to serve everyone within a priority group, patients who are in an earlier life stage (based on age) receive priority for the resource.
Example life stages: • Childhood: 0-17 years old • Early Adulthood: 18-39 years old • Middle Age: 40-64 years old • Older Adults: 65+ years old
Step 3: Second tiebreaker: In the event there are patients in the same prognosis group and the same life stage, apply equitable chances criterion to determine priority.
Determine the disadvantage score for each patient based on the disadvantage index for their geographic residence. Assign additional equitable chances

[34] OHA has significant concerns with using this option.

weighting for patients based on level of disadvantage, proportionate to impact (as measured by disadvantage index). Complete the automated, weighted randomization process (a drawing) using available software to determine who receives the resource. See detailed example below.

Summary of who is prioritized most in this approach:

- Patients who have a greater than or equal to 90% chance to survive hospitalization based on clinician prognosis would be the first group in line for the needed resource;
- Patients in this group who are defined as being in an earlier life stage would have priority over patients in an older life stage; and
- Patients with the same life stage who have experienced the greatest disadvantage would have the highest chance of being prioritized in front of other patients in the same life stage who have experienced the least disadvantage.

Example:

Suppose again there are 10 patients in the ICU with respiratory distress needing mechanical ventilation, but only two ventilators are available. There are no options to move patients to another hospital, and so an allocation process must be initiated. Upon prognosis assessment by the triage team, three of the ten patients are determined to have a >90% likelihood to survive the hospital stay. They are therefore placed in Group 1 and will have first priority to receive a ventilator.

In order to determine which of the three patients in Group 1 are prioritized for the two ventilators in this multi-criteria approach, the life cycle principle is then applied. In this next step, each patient's age is verified and used to assign the patient into one of multiple, pre-defined life cycle categories. Patient A is 16 years old and determined to be in the childhood life stage. Patient B is 32 years old and therefore assigned to the early adult life stage. Patient C is 63 and assigned to the middle age group. Based on their age, Patients A and B would receive the ventilator resource since they are in an earlier life stage, and Patient C would be placed on a waiting list.

In this example, the equitable chances criterion is not needed for allocation at this time since there are no further ventilators available and no tie breakers needed once the life cycle criterion was applied.

C. Clinical Prognosis, Essential Worker, Multiplier Effect, and Equitable Chances

In this multi-criteria approach, the initial priority groups are again established based on clinical prognosis for survival (for example, whether the patient has a ≥ 90% or ≤ 10% chance of surviving the hospital stay). Priority is given to the patients with a higher chance of survival. Additional priority is then given to patients within a prognosis group who meet criteria as an essential worker or having a multiplier effect. Finally, the equitable chances criterion is applied as a tiebreaker if needed. See pages 11-14 for details regarding the essential worker and multiplier effect criteria. See Table 3 for further illustration of these steps.

Table 3. Example steps and priority scoring for the clinical prognosis, essential worker, multiplier effect, and equitable chances multi-criteria approach

Step 1: Clinician prognosis	Identify patients who have the lowest risk of death (≥ 90% chance of hospital survival). Assign to Group 1.
Step 2: Multiplier effect	Prioritize any patient within Group 1 who is expected to have a multiplier effect.
Step 3: Essential worker	Prioritize any patient within Group 1 who meets the definition of an essential worker.
Step 4: Equitable chances	Tiebreaker: Determine the disadvantage score for each patient based on the disadvantage index for their geographic residence. Assign additional equitable chances weighting for patients based on level of disadvantage, proportionate to impact (as measured by disadvantage index). Complete the automated, weighted randomization process (a drawing) using available software to determine who receives the resource.
Repeat	Repeat Steps 1-4 next for each prognosis group if adequate resources are available. See example below.

Summary of who is prioritized in this approach:

- Patients who have a greater than or equal to 90% chance to survive hospitalization based on clinician prognosis would be the first group in line for the needed resource;
- Patients in this prognosis group who have an occupation that meets criteria for essential worker or multiplier effect would have next priority; and
- Patients with the same occupation-related priority who have experienced the greatest disadvantage would have the highest chance of being prioritized in front of other patients with the same prognosis and occupation-related priority who have experienced the least disadvantage.

Example:
Suppose again there are 10 patients in the hospital with respiratory distress needing mechanical ventilation, but only two ventilators are available. Upon prognosis assessment by the triage team, three of the ten patients are determined to have a >90% likelihood to survive the hospital stay. They are therefore placed in the first priority group to receive a ventilator.
In order to determine which of the three patients in the first priority group (based on prognosis for hospital survivability) are prioritized for the two ventilators, the multiplier effect criterion is then applied. In this step, each patient's occupation is verified to determine if they have the potential for a multiplier effect. Patient C meets the definition based on their occupation as a critical care nurse. This patient is likely to rapidly recover if they receive the ventilator, so is confirmed to meet the criterion for multiplier effect and is first in-line for a ventilator. The occupation for patients A and patient B are also verified. Neither of these patients meet criteria for multiplier effect. However, Patient B does meet the criteria as an essential worker based on their job working in public transportation. Therefore, patient B is prioritized for a ventilator alongside Patient C. Patient A does not have an occupation that is prioritized by the multiplier effect or essential worker criterion and would be placed on a waiting list.

In this example, the equitable chances criterion is not needed for allocation at this time since there are no further ventilators available and no tie breakers needed once the earlier criteria were applied.