OROVILLE HOSPITAL CRISIS CARE GUIDELINES

Oroville Hospital has an Emergency Operations Plan that includes the attached Table of Contents. The Oroville Hospital Emergency Operations Plan addresses surge operations and crisis contingencies. Oroville Hospital Executive Leaders are trained and follow the Hospital Incident Command System this includes response to various levels of disaster including Crisis level.

Oroville Hospital agrees with "California SARS-CoV-2 Pandemic Crisis Care Guidelines and we will make our best effort to follow as appropriate for the level of the situation.

Oroville Hospital
Emergency Operations Plan
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California SARS-CoV-2 Pandemic Crisis Care Guidelines

CONCEPT OF OPERATIONS

HEALTH CARE FACILITY SURGE OPERATIONS AND CRISIS CARE

06/2020

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DISCLAIMER

The information contained in this document is meant to provide useful information to health care facilities and systems, but does not in any way alter or diminish health care facilities' and systems' responsibilities during catastrophic public health events. Health care facilities or systems implementing these strategies in crisis situations should assure communication and coordination with their Health Care Coalition (HCC) partners, their Medical and Health Operational Area Coordinator (MHOAC), Regional Disaster Medical and Health Specialist (RDMHS), the California Department of Public Health (CDPH), Emergency Medical System Authority (EMSA), and public safety partners to assure the invocation of appropriate legal and regulatory protections as appropriate in accord with state and federal laws. Recommendations within this document may be superseded by incident specific recommendations by CDPH. Web links and resources listed are provided as examples and their listing does not imply endorsement by CDPH.

Introduction

This document is a framework designed to help health care facilities plan for the COVID-19 pandemic, which may cause overwhelming medical surge. This guidance assumes incident management and incident command practices are implemented and key personnel are familiar with healthcare emergency management planning and processes that underlie scarce resource decision-making.

During a catastrophic public health event that results in medical surge, each health care facility or health care system should use this guidance as a framework to determine the most appropriate steps and actions for their entity based on their environment, hazards, and resources. Since pre-planned actions are always preferred to impromptu decisions, pre-event emergency management planning and training is recommended. This document addresses common categories of health care delivery, triage, staff and space that could arise when available resources are limited or insufficient to meet the medical needs of patients. In California, local or regional HCCs, hospitals and health care systems may determine additional issues and strategies in addition to those outlined in this document.

This document provides an overview of surge capacity and crisis care operational considerations for health care facilities with an emphasis on hospitals for the State of California. In addition to this framework, hospitals and health care systems are encouraged to review federal guidance which can be found on the National Academies of Science webpage.

This document is meant to provide information to support regional or county health entities, including health departments as well as individual health care facility operations, as they develop and implement their operational plans. It is the responsibility of the regional entity or the facility to work with their management team and medical staff to ensure operational plans are in place. This document does not replace the judgment of the regional health care facilities' operational management, medical directors, their legal advisors or clinical staff and consideration of other relevant variables and options during an event. States and national medical

organizations have shared best practices and incorporated relevant medical literature in developing Crisis Care guidelines. California is using this collaborative work as a cornerstone for these guidelines.

California is committed to achieving and sustaining a California for All and to its nation-leading laws and policies, including prohibiting discrimination on such protected bases as, age, disability, race, sex, gender identity and sexual orientation and immigration status.

This document is consistent with the "Guidance Relating to Non-Discrimination in Medical Treatment for Novel Coronavirus 2019 (COVID-19)" issued on March 30, 2020.

Care Continuum

Most health care facilities are familiar with the concepts of surge capacity, the ability to manage a sudden influx of patients[1] and surge capability, the ability to manage patients requiring very specialized medical care.[2] During conventional care, customary routine services are provided through standard operating procedures. During contingency care, care provided is functionally equivalent to routine care but equipment, medications, and even staff may be used for a different purpose or in a different manner than typical daily use (e.g. substituting one antibiotic for another that covers the same classification). The demands of most incidents can be met with conventional and contingency care. Crisis care falls at the far end of the spectrum when resources are scarce and the focus changes from delivering individual patient care to delivering the best care for the patient population.

The goal during a medical surge event is to maximize surge capacity strategies that mitigate the crisis while minimizing the risks associated with deviations from conventional care. Choosing the strategies that are most appropriate to the situation and pose the least risk to the patient and provider first, and then proceeding to riskier strategies as demand increases and options decrease, is the preferred path.

Surge capacity is described across a spectrum of three categories (Figure 1):

- **Conventional:** Usual resources and level of care provided.[3] For example, during a surge in patients, maximizing bed occupancy and calling in additional staff to assist.
- **Contingency:** Provision of functionally equivalent care that may incur a small risk to patients. Care provided is adapted from usual practices. For example, boarding critical care patients in post-anesthesia care areas using less traditional, but appropriate resources.[4]
- **Crisis:** Disaster strategies used when demand forces choices that pose a significant risk to patients but is the best that can be offered under the circumstances. For example, cot-based care, severe staffing restrictions, or restrictions on use of certain medications or other resources.[5]

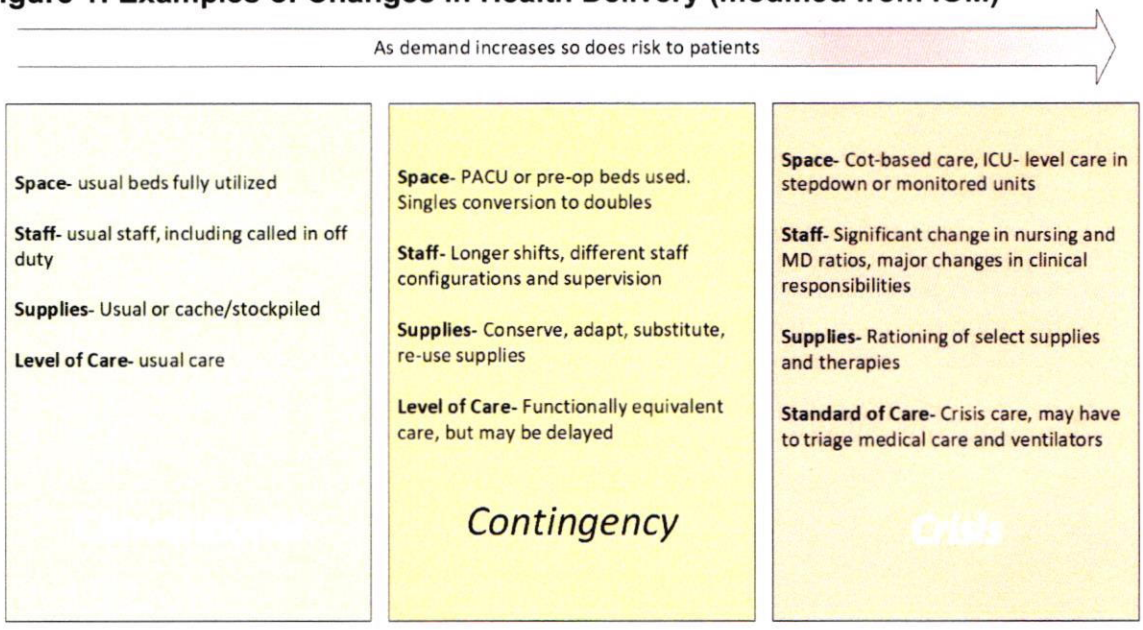
[1,2] ASPR. *2017-2022 Health Care Preparedness and Response Capabilities.* pg. 44

[3] Hick, J. L. Hanfling, D. & Cantrill, S. V. (2012). Allocating Scarce Resources in Disasters: Emergency Department Principles. *Annals of Emergency Medicine, 59*(3), p 178.

[4] Hick, J. L. Hanfling, D. & Cantrill, S. V. (2012). Allocating Scarce Resources in Disasters: Emergency Department Principles. *Annals of Emergency Medicine, 59*(3), p 178.

[5] Hick, J. L. Hanfling, D. & Cantrill, S. V. (2012). Allocating Scarce Resources in Disasters: Emergency Department Principles. *Annals of Emergency Medicine, 59*(3), p 178.

Figure 1: Examples of Changes in Health Delivery (modified from IOM)



Key Points about Crisis Care

- Crisis care is not a separate triage plan. These strategies are extensions of surge-capacity plans.
- Crisis care may occur during long-term events such as pandemics when resource constraints are likely to persist for long periods of time, or during short-term, no-notice events where help will arrive, but too late to solve an acute resource shortfall.
- Health care facilities will not have an option to defer caring for patients in a crisis. Demand, guided by ethics, will drive the choices that have to be made.
- Healthcare decisions, including allocation of scarce resources, cannot be based on age, race, disability (including weight-related disabilities and chronic medical conditions), gender, sexual orientation, gender identity, ethnicity (including national origin and language spoken), ability to pay, weight/size, socioeconomic status, insurance status, perceived self-worth, perceived quality of life, immigration status, incarceration status, homelessness, or past or future use of resources.
- If strategies are not planned for ahead of time, they might not be considered and/or will be difficult to implement.
- Strategies should be proportional to the resources available. As more resources arrive, you should move back toward strategies that are less demand driven (and therefore, back toward contingency and eventually conventional status)

The principles of crisis care must be integrated into Emergency Operations Plans (EOPs) at all levels of health care.

Roles and Responsibilities

The primary focus of this guidance is on the operational strategies for health care facilities during crisis. Health care facilities should be supported by regional HCCs, their MHOAC, RDMHS, CDPH, EMSA, and public safety partners, local EMSA, and state and local government agencies. HCCs includes partnerships between local public health, emergency medical services (EMS), health care facilities, and emergency management that provide planning and response coordination.

Planning and Implementation

Indicators and Triggers

An indicator is a "measurement or predictor of change in demand for health care services or availability of resources."[6] An example of an indicator is a report of several confirmed cases of COVID-19 in the community by the local health department. A trigger is a "decision point about adaptations to health care service delivery" that requires specific action.[7] An indicator may identify the need to transition to contingency or crisis care (but requires analysis to determine appropriate actions), while a trigger event dictates action is needed to adapt health care delivery and resources. It is important for organizations to identify indicators and triggers prior to an event due to the "stress, complexity, and uncertainty inherent in a crisis situation."[8]

There are two types of triggers – scripted and non-scripted. Build scripted triggers into standard operating procedures, which are automatic 'if/then' decisions. Whenever possible, scripted triggers should be developed for frontline personnel (point of entry health care facility staff, reception, etc.) so they have actions they can take immediately to prevent delay. An example may be isolation protocols for individuals showing certain signs or symptoms of a particular disease.

Non-scripted triggers require additional analysis involving supervisory staff. These are often part of an incident action planning cycle. The less specific the information available, the more difficult it is to apply a scripted trigger and the more likely an experienced supervisor or subject matter expert should be involved to process the information and decide on necessary actions. Frontline personnel should have a low threshold for passing indicator information along to supervisors for situational awareness and potential decision-making.

In addition to identifying response specific indicators and triggers, hospitals should determine the trigger or threshold to identify when they are in crisis care whenever possible. For example, if a hospital is providing cot-based care or any intensive care unit (ICU) care is provided outside usual intermediate and pre/post op areas, these are indicators that operations are now into crisis care and should trigger a response action.

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6 Dan Hanfling, John Hick, and Clare Stroud, Editors; Committee on Crisis Standards of Care: A Toolkit for indicators and Triggers; Board on Health Sciences Policy; Institute of Medicine, "Crisis Standards of Care: A Toolkit for Indicators and Triggers" (the National Academies Press, 2013) 2

7 Ibid

8 Ibid

These triggers will vary by facility depending on size and resources. Facility level indicators and triggers should be communicated with health care coalition partners, MHOACs and RDMHSs.

Detailed information on indicators and triggers (including templates for health care facilities) is available in the 2013 IOM/NAM Crisis Standards of Care: A Toolkit for Indicators and Triggers.

How to identify and incorporate Indicators and Triggers in your EOP

1. Do not focus on indicators and triggers in isolation.
2. Determine what response strategies or options you may use during a disaster.
3. Determine what indicators might be available during a disaster that would trigger hospital action.
4. Identify trigger points for your health care facility including, but not limited to:
    a. Implementing triage
    b. Temporarily closing your facility to new admissions or transfers
    c. Canceling elective procedures
    d. Stockpiling or ordering more supplies
    e. Implementing staffing changes
5. Determine what staff actions should happen based on the indicator. These should be specific and tell staff exactly *when* they should take certain actions. This is critical to the success of the response.

Having specific actions staff should take at a clearly defined trigger is critical to the success of the response. Delays in decision-making occur in unfamiliar situations and with unclear authority.

Supply Management

Healthcare facilities are expected to anticipate supply needs and make every effort to procure in advance supplies through usual supply chains and standing vendor contracts. In addition, when resources are scarce, facilities must continue aggressive measures to acquire needed equipment such as ventilators. Such measures can include coordination with healthcare coalition partners and local reserves that may provide a source of supplies otherwise in shortage

When usual supply chain sources are exhausted, supply resource requests can be made through the local MHOAC, who in turn will attempt to fill these requests through regional and state level stores of supplies and various procurement capability.

During declared disasters CDPH and the state EMS authorities track health care resources including hospital med/surge and ICU surge capacity and ventilators, and will help coordinate the allocation and distribution or re-distribution of those scarce resources when available.

Systems are also encouraged in times of scarce resources to explore alternatives to

single-use invasive ventilation by gathering data on the utility and safety of non-invasive ventilation and to investigate the efficacy and safety of splitting ventilators.

Core Strategies

Six core strategies can be employed in anticipation of a shortage of space, supplies, and/or staff. These strategies can help avoid or mitigate a crisis of care situation. When writing an EOP consider how your facility will utilize these strategies:

- **Prepare:** pre-event actions taken to minimize resource scarcity (e.g. stockpiling of personal protective equipment (PPE), medications or supplies, planning, training).
- **Substitute:** use an equivalent device, drug, or personnel for one that would usually be available (e.g. exchanging morphine for fentanyl).
- **Adapt:** use a device, drug, or personnel that are not equivalent but that will provide sufficient care (e.g. anesthesia machine for mechanical ventilation; licensed practical nurse (LPN) with registered nurse (RN) supervision instead of multiple RNs).
- **Conserve:** use less of a resource by lowering dosage or changing utilization practices (e.g. minimizing use of oxygen driven nebulizers to conserve oxygen).
- **Re-use:** re-use (after appropriate disinfection/sterilization) items that would normally be single-use items.
- **Re-allocate:** restrict or prioritize use of resources to those patients who are likely to benefit and survive in the immediate short-term or to those with greater need only in times of actual shortage.

Acute Care Hospitals

1. Review available resources and determine potential strategies to address Crisis Care Guidelines across the surge capacity continuum from conventional to crisis care.
2. Review your hospital's capabilities in managing surge, critical care, infectious disease, isolation, just-in-time training, and pediatrics to meet their objectives.
    a. Involve in this review: nursing, administration, emergency management, emergency services, ancillary and support services—lab, radiology, respiratory therapy, pharmacy, facilities etc.—and physician personnel.
    b. Include critical care if your institution provides those specialties.
3. Determine what number of pandemic patients should be planned for based on suspected hazards. Consider your role in the community and the presence or absence of other health care facilities in the area.
4. Incorporate indicators and triggers (surge capacity information throughout the care continuum) into your EOP.
5. This should also include the notifications to supervisors and partner agencies that need to occur when these triggers are activated. Delegating authority to activate the disaster plan to emergency department (ED) staff or nursing supervisors/charge nurses should be done when possible to facilitate rapid action. The adoption of clear policies helps facilitate decisions as well as provides accountability. Education and training of staff should be conducted to assure successful implementation of the plan.
    a. Keep in mind the training practice of educating to an awareness,

knowledge, and proficiency level. Not all staff members need to be proficient in the plan, but those frontline decision-makers (charge nurses, unit supervisors etc.) should know how to incorporate surge capacity into their respective units prior to an incident. See below for more detail on Health Care Worker Engagement.

   b. Job aids—such as brief task cards or job action sheets—should be widely used to help frontline personnel with initial decisions and actions.
   c. Education prior to crisis events, as well as appropriate reminders integrated into job aids and training materials, should increase awareness of antidiscrimination responsibilities and the role that explicit and implicit bias can play in reinforcing health disparities that affect at-risk populations.

6. During an event response, the facility should review and modify their procedures as needed as part of the incident action planning process. Plans should be adaptable and not "lock in" disaster response protocols for the duration of an incident but allow flexibility and transition toward conventional care as more resources arrive or demand falls, or both.
7. Exercising the plan is an important part of training and testing your plan. It is important when testing any EOP that you really push the exercise into the crisis care mode.
8. Review and updates to the plan should occur when new information is available.

Non-Acute Care Facilities and Services

The role of non-acute care facilities, such as ambulatory care centers, clinics, hospices, home care, skilled nursing facilities, alternative care facilities, etc. is different than that of acute care hospitals during a pandemic. These facilities can provide critical capacity, both outpatient and post-acute care, and may be needed to broaden their scope of care during such incidents.

1. Examine your resources and determine potential contingencies such as:
   a. Extended hours
   b. Conversion of space and staff from specialty care to primary care duties
   c. Changes to charting and administration to enhance work flow (template charts and prescriptions for the event)
   d. Changes to scheduling (e.g. cancel or re-schedule elective procedures and appointments)
   e. Enhanced use of tele-medicine, telephone prescribing, and e-visits to manage workload
   f. Adjust clinic flow to avoid exposing well persons to ill persons
   g. Communicate and implement guidance on scarce resources (e.g. guidelines for prescribing anti-viral medications or administering vaccine)
   h. Increase your normal acuity of patients to support acute care hospitals
   i. Consider the utilization of volunteers to provide check-in and other services
2. The applicable activities to your agency or facility should be incorporated into your EOP.

3. Education and training of staff should be conducted to assure successful implementation of the plan. See below for more detail on Health Care Staff Engagement.
4. Exercising the plan is an important part of training and testing your plan. It is important when testing any EOP that you really push the exercise into the crisis care mode.
5. Coordination with the partners within your health care coalition to promote consistency and coordination of care is necessary.
6. If staff at Non-Acute Care Facilities and Services are making preliminary decisions about when to potentially transfer a patient to an Acute Care facility, such staff also needs to undergo training and education in nondiscrimination principles.

Health Care Staff Engagement

Given the high risk of moral distress in pandemic situations, it is important for staff to understand the goal of crisis care, the ethical principles and legal duties underlying triage decisions, and the specific plans of the institution. However, not all staff need to know every plan word for word. Staff should be divided into tiers for education—knowledge, competency, and proficiency.

- **Knowledge:** awareness of the plan; A floor nurse should understand how the surge plans affect their unit, including use of cots and changes in staffing, but does not need to know details of the plan (e.g. how to activate the plan).
- **Competency:** the ability to do something successfully or efficiently in relationship to the plan; A nursing supervisor should understand when to activate the plans, and who to notify. Frontline clinical staff should know which criteria may be ethically and lawfully considered when making triage decisions.
- **Proficiency:** a high degree of competence or expertise; Staff who are fulfilling incident command roles should understand the facility operations and how to interface with your HCC, where to get help or expertise, and be prepared to adopt proactive crisis care strategies with input from subject matter experts. In general, all health care facilities should have three-deep personnel for each hospital incident command system (HICS) position.

Exercises

Health care facilities should elevate their exercises into a true crisis mode. Often, we are good at testing our plans at a contingency level, but have trouble testing them on a crisis level. At a minimum, health care facilities should provide tabletop and other exercise opportunities—like workshops—to walk through the processes outlined in the EOP for crisis standards of care. Exercise opportunities should include hypotheticals for avoiding discrimination against people with disabilities, older adults, higher weight individuals, and other populations identified in the comment under Key Points.

For example, having clinical staff walk through how they would increase their surge capacity in the ICU with space, staff, and supplies will allow them to become more comfortable with their roles and responsibilities relative to crisis care and will help drive modifications of existing plans. This will also help clinical staff and administrators recognize triggers and have them become second nature to them, thus preventing

hesitation during a real event.

Healthcare workers should get training on:

- Avoiding implicit bias
- Respecting disability rights
- Diminishing the impact of social inequalities on health outcomes

Exercises should also test how your team would interface with your health system partners to emphasize that under no circumstances should a health care facility be providing crisis care in a silo without reaching out for assistance from partners.

Integration with Local or Regional Health System Partners

It is critical that health care facilities ***do not*** work on surge and crisis care plans in isolation, but in concert with their local and regional partners, public health, the MHOAC, and with their parent health systems, as applicable.

Consistency of plans and knowing what other health care facilities in the region are planning is critical to success. Surge strategies and standard procedures do not have to be identical, but if they are similar, it will help greatly in education, training, and mutual aid response. Health care coalitions help coordinate not only planning, but also response activities among partner health care facilities, public health, EMS, and emergency management. During a response, public health and the MHOAC provide situational awareness through information sharing, manage and coordinate resource requests, and facilitate or engage in response coordination role for the delivery of health care services. They may also convene workgroups during planning or a response to help develop regional tactics (e.g. to support alternate care sites or processes during a response or develop common policies such use and conservation of N95 masks). Public Health and the MHOACs will also engage with neighboring MHOACs, RDMHCs, and state agencies to coordinate information and strategies. This coordination assists in maintaining a common operating picture.

The key is to only implement crisis strategies when assistance from regional and state partners is inadequate (either too little or too late) and no "bridging" therapies or patient transfers can address the need.

Assuring regional coordination and leveraging available resources prevents inappropriate transition to crisis standards of care within one hospital or hospital system. Coordination with the regional partners *must* be achieved as soon as possible when a crisis develops so patient care can return to conventional operations as soon as possible. The sooner a crisis is recognized (indicators) and pre-planned resources and coordinating mechanisms are activated (triggers), the shorter the crisis period will be.

Having a good surge capacity plan contributes to the goal of emergency planning to *avoid* crisis care situations.

Public Engagement and Transparency

Health systems should be transparent and engage with the public. Ideally, pandemic planning takes place well in advance with strong public input. In the middle of a crisis, the most robust forms of public input might not be possible, but the values of transparency and public engagement still impact at least three concrete requirements. Health systems must: use public informed documents or guidance to shape the policies they develop; provide open and honest channels of communication with the public during the crisis; and seek meaningful public engagement to the extent possible, including after-the-face review and revision of pandemic policies.

Response

Given the visitor limitations imposed for infection control reasons during COVID-19, reasonable modifications should be made to permit a disabled or older patient to bring a family member, personal care attendant, communicator, or other helper to the hospital with them. Further, hospitals should ensure effective communication for people with disabilities including people who are deaf, people with non-verbal language, people with intellectual and developmental disabilities (I/DD), and people with Alzheimer's or another form of dementia. Hospitals should ensure that they have an appointed Disability Accommodations Specialist or ombudsperson who has the responsibility and authority to ensure that older adults and people with disabilities receive needed accommodations needed for effective COVID treatment.

All emergencies are addressed at the local level. If the emergency exceeds capacity at the local level, response entities will go to the state and when state capacity and resources are reached the federal government will become involved. Federal resources and assistance will all be coordinated through the state. Tribal Nations, as sovereign entities, may request disaster assistance directly from the federal government.

Triage

Triage generally refers to prioritization for care or resources. There are three basic types of triage:

- **Primary triage:** performed at first assessment and prior to any interventions (e.g. triage upon entry to the ED by EMS at the scene)
- **Secondary triage:** performed after additional assessments and initial interventions (e.g. triage performed by surgery staff after an initial CT scan)
- **Tertiary triage:** performed after or during the provision of definitive diagnostics and medical care (e.g. triage performed by critical care staff after intubation and mechanical ventilation with assessment of physiologic variables)

Primary, secondary, and tertiary triage can be categorized as either **reactive triage** or

proactive triage. An individualized clinical assessment of the patient's immediate/shorter-term prognosis (i.e. recovery from COVID-19) should form the basis of the triage decision.

Reactive Triage

Reactive triage occurs in the early phases of the incident when the responders know less information regarding the incident. Physicians and nurses make triage decisions based on their best judgment, through individualized determinations using objective medical evidence. Generally, patients with altered mental status, signs of shock, penetrating torso injury, uncontrolled bleeding, and respiratory distress are highest priority. It is only in primary and secondary mass casualty circumstances when patients may need to be categorize as expectant or "likely to die" and; therefore, to receive palliative care as their only intervention. *Primary and secondary triage are often reactive triage.*

Factors to consider:

- Time required to perform treatment
- More time, skill, and resources may be required to care for people with disabilities, unless doing so poses a direct threat or undue burden. Reasonable accommodations may include interpreter services or other modifications or additional services needed due to a disability.
- Clinical skill requirements (i.e. how much physician/nursing expertise is required)
- Treatment requirements (what are the resource requirements)
- Immediate-term prognosis of the injury

In general, the more victims there are, the more the triage process should prioritize the moderately injured that require interventions that will save their life and can be rapidly performed (e.g. chest tube, airway management, and tourniquet). Finally, if multiple patients present with similar immediate-term prognosis to a hospital that has minimal resources, a first-come, first-served or lottery strategy may have to be implemented.

It is critical to re-evaluate patients as more resources arrive.

Proactive Triage

Proactive triage may be required later in an incident that continues to overwhelm the health care system after initial stabilization and delivery of available resources. The situation and resources are now known. Decisions revolve around whether resources can continue to be expended given the patient prognosis and availability of resources. *Tertiary triage is a form of proactive triage.* Proactive triage of resources should only occur when the following conditions are met and unless specified otherwise, the patient should continue to receive all other means of support. The patient should always have equitable access to medications to control pain and suffering to the degree possible given the circumstances:

Proactive triage conditions to meet:

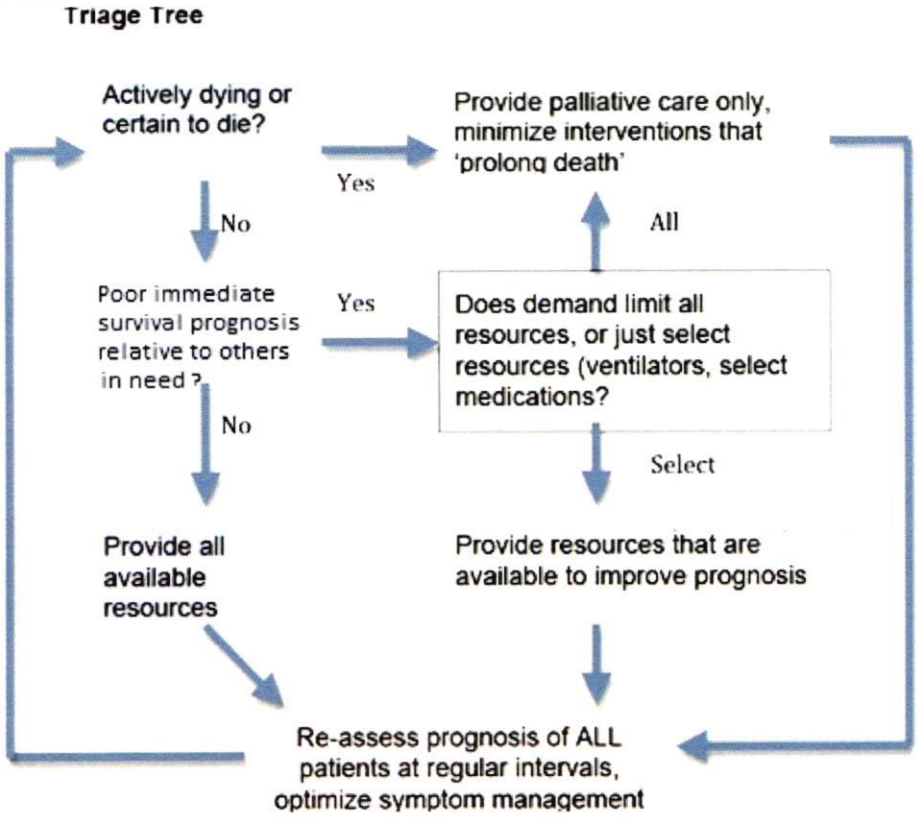
- Critically limited resource(s) and infrastructure are identified.
- Surge capacity is fully employed within health care facilities (and regionally) if capacity/space is the limited resource.
- Maximum efforts to conserve, substitute, adapt, and re-use are insufficient if supplies are the limited resource.
- Patient transfer or resource importation is not possible or will occur too late for bridging therapies (such as bag-valve ventilation or other temporizing measures) to be considered.
- Necessary resources have been requested from local and regional health officials (as applicable).
- A state of emergency has been declared, or other health powers (as applicable) have been activated.
- Regional, state, and federal resources are insufficient or cannot meet demand.

Before implementing proactive or tertiary triage, facilities must have firmly established triage processes and plans that take into consideration available objective evidence, resources, and have administrative backing of the facility. Every effort should be made to notify in advance local and regional partners to ensure outside resources or assistance is not available.

The Patient Care Strategies for Scarce Resource Situations at the end of this document can assist facilities in decision-making; however, it is ultimately up to the facility to determine and implement its own process. During triage situations, facilities and providers are still subject to federal and state anti-discrimination laws. In situations where proactive triage is required during a prolonged incident, CDPH may convene the Science Advisory Team (SAT) to provide recommendations to the State Public Health Officer. In turn, the State Public Health Officer may provide additional recommendations to California's health system during an incident. SAT team composition will be listed on CDPH's web site and process in place for stakeholder input on membership.

The tertiary (proactive) triage *process* is far more important than the specific clinical decision tools, which may vary based on the event. It is recommended frontline clinicians caring for patients should not be directly involved in the triage process; rather, they should provide clinical knowledge to the decision-making body who will make determinations of care. Facilities should have a Clinical Care Committee and/or Triage Team available for consultation. This function may be provided regionally and remotely. For example, health systems may provide this function for all their health care facilities and the same team may provide assistance to outside health care facilities that wish to refer patients or do not have the resources to make triage decisions. The Clinical Care Committee and/or subject matter experts should provide a process and agree on indications for treatment (e.g. specific medications) or approve decision tools for triage of ICU and other resources based on up to date information on the availability of scarce resources and an understanding on non-discrimination responsibilities.

Figure 2: Basic Triage Tree Based on Objective Medical Evidence



Ethical Considerations

A public health emergency compels transition from individual patient-focused clinical care to population-oriented public health approach with the goal of providing the best possible outcome for the largest number of impacted people. With regards to allocation and reallocation decisions facilities should establish a triage team or committee composed of people who have no clinical responsibilities for the care of the patient.

Basic biomedical ethical principles should be incorporated into decision-making regarding allocation of healthcare resources. These are:

- **Autonomy:** respect for persons and their ability to make decisions for themselves may be overridden by decisions for the greater good; however, patients must still be treated with dignity and compassion
- **Beneficence:** care providers must subordinate their personal and institutional interests and shift from those in the best interest of the patient to those in the best interest of the population as a whole
- **Justice:** equitable distribution of resources, allocation decisions applied consistently across people and across time, transparency and accountability, and fair processes and procedural justice to sustain public trust. In general, triage decisions must meet the five basic requirements outlined in the IOM/NAM 2012 publication:

- **Fair and Equitable:** process recognized as fair, equitable, evidence based, and responsive to specific needs of individuals and the population focused on a duty of compassion and care, a duty to steward resources, a duty to abide by nondiscrimination laws, and a goal of maintaining the trust of patients and the community.
- **Transparency:** in design and decision-making.
- **Consistency**: in application across populations and among individuals with reasonable modifications for disability.
- **Proportionality**: public and individual requirements must be commensurate with the scale of the emergency and degree of scarce resources (i.e. the restrictions on care should not be more restrictive than the situation requires – and this may require re-evaluation as more resources become available).
- **Accountability**: individuals making the decisions and the facilities and governments to support the processes and the providers.

Guiding ethical principles used in defining allocations of scarce resources and proactive or tertiary triage include:

- Duty to implement distributive justice (socially just allocation of goods)
- Duty to care: treat people with dignity and respect, and make decisions based on an individualized assessment based on objective medical evidence
- Duty to plan: steward resources and promote instrumental value
- Duty to transparency (in planning and implementation)

Further, any pandemic planning framework should be designed to achieve the following:

- 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, including those listed in Key Points.
- To ensure that all patients receive individualized assessments by clinicians, based on the best available objective medical evidence.
- 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, including those listed in Key Points.
- To diminish the impact of social inequalities that negatively impact patients' long-term life expectancy by keeping in mind historic disparities and inequalities.

Ethical principles as applied to triage raise considerations of moral equality. Triage must respect equality and human dignity in the following ways, among others:

- **Protection and Provision for Vulnerable Populations**: Health systems should take deliberate, active steps to ensure that vulnerable or marginalized populations receive equal access to scarce resources. These should include, among other things; (1) reaching out to organizations and services designed to serve groups with special needs or groups that are particularly vulnerable or disadvantaged; (2) ensuring access for those with disabilities, limited English proficiency (LEP), and other groups with functional needs; (3)

mitigating or eliminating, as far as possible, the sense of distrust that some historically or currently disadvantaged people might feel towards the medical system in general or a triage system in particular; and (4) being prepared to participate in regional or statewide plans designed to ensure that the same resources are available and in use at similarly situated facilities – a step that helps mitigate or eliminate disparities of access and distribution among facilities.

- **Disability and Return to Previous State of Health**: Some triage protocols make allocation decisions based not only on overall predicted acute-episode survival but also on quality of life after treatment. Such protocols are sometimes viewed with suspicion by individuals with disabilities who fear that they are seen as having lower quality of life than non-disabled individual and; therefore, that they~~l~~ may be assigned lower triage priority in virtue of their disabilities. To ensure non-discrimination against individuals with disabilities, triage protocols must either not score individuals based on their quality of life after treatment, or assess at most how far treatment will return the patient to their own baseline quality of life. Decisions cannot be based on generalized assumptions about a person's disability. The mere fact that a person has diabetes, depression, an intellectual disability, or a mobility impairment, for example, cannot be a basis for denying care or making that person a lower priority to receive treatment. Treatment allocation decisions cannot be made based on misguided assumptions that people with disabilities experience a lower quality of life or that their lives are not worth living.

Surge Capacity

Surge capacity is a measurable representation of ability to manage a sudden influx of patients. It is dependent on a well-functioning HICS structure and the variables of space, supplies, staff and special considerations. All health care facilities are required by the Joint Commission to establish an emergency management process and define an EOP which details actions to increase surge capacity, with specific actions in three categories: space, staff, and supplies. These actions include but are not limited to defining additional treatment space and/or alternate care sites, early discharges, cancelation of surgeries and elective procedures, increasing staffing, and more.

Intensive Care Unit

Pandemics can result in a large need for intensive care. For planning purposes, ICU services should include the ability to provide cardiac monitoring, invasive monitoring, mechanical ventilation, and hemodynamic management. Many facilities do not provide these services, although at a minimum, they should be able to provide initial resuscitation and management awaiting transfer to another facility. In certain situations, a health care facility that normally refers critically ill patients may have to continue to provide care for hours to days longer than usual or may elect to provide ongoing critical care using transport ventilators and other resources. In these cases, critical care consultation should be obtained via phone or telemedicine to provide expert input on the care provided until transfer can be arranged or critical care is no longer required.

The American College of Chest Physicians has guidance documents on ICU surge

published in 2014. The executive summary with all the suggestions can be found at Introduction and Executive Summary Care of the Critically Ill and Injured during Pandemics and Disasters: CHEST Consensus Statement. Each of the sections has a supporting article (e.g. surge capacity logistics) with further details.

According to the key recommendations made by the American College of Chest Physicians, hospitals that provide inpatient critical care should be able to:

- Surge 20% of usual ICU capacity within hours
- Surge 100% of usual ICU capacity within 24 hours using facility or regional healthcare community assets
- Surge 200% of usual ICU capacity within days using regional, state, or federal assets

In order to accomplish this, health care facilities providing ICU services should determine the additional space they can use for ICU level care. Procedural and surgical areas including pre- and post-op care areas are likely targets as they may already have the monitoring equipment necessary for critical care. Health care facilities may wish to create a grid for ICU surge indicating the sequence/preference and numbers of beds (as well as additional supplies needed for those areas) to be used.

Few hospitals will have the ventilator and cardiac monitor resources to achieve a 100-200% surge, but understanding the needs and planning for it is critical to being able to request the necessary assets in a timely manner from regional and federal sources.

Inherent in the ICU surge plan is an understanding that the overall acuity at your health care facility will increase markedly and lower acuity patients may need to be discharged to outpatient care, referred to homecare or long-term care, or provided care at an alternate care site. This may necessitate changes in discharge protocols and health care facility policies about what patients will be cared for on what units.

Alternative Care Sites

Alternate Care Sites (ACS) can provide overflow hospital capacity during a pervasive or catastrophic public health event. By providing care to less complex inpatients, an ACS can increase a hospital's capacity to care for higher acuity patients. A hospital may open an on-site ACS or a community site in conjunction with the local health system (via multi-agency coordination) to staff and refer appropriate patients to the facility. Examples of some services available at an ACS include:

- Oxygen
- Intravenous fluids
- Medications
- Basic laboratory testing

Emergency or critical care services are generally not supported at an ACS. Health care services should also be available at community shelters including resources for those with chronic illness. If needed to meet surge demands an ACS should be implemented by HCC partners as part of a regional strategy to address incident demands and may include virtual as well as physical patient contact and interventions. In addition, the state may be able to support regional ACS with state or federal assets.

Palliative Care Services

As institutions change their optimal mode to crisis standards of care, the demand for primary and specialist palliative care will sharply increase. Palliative care plays an important role in responding to a pandemic by assisting with symptom management, decision-support, and emotional and spiritual support for patients and families. As early as possible, health systems and palliative care teams should devise plans to accommodate the surge in demand for palliative care services and the adaptations that will be required to deliver those services, given the unique constraints posted by the circumstances of the pandemic.

Conclusion

Effective crisis care planning for health care facilities depends on multiple factors including the following:

- Crisis conditions may be caused by severe increases in demand and/or facility damage and require immediate facility and regional response, with state actions supporting these response strategies.
- Crisis of care plans should be an extension of hospital surge capacity plans. Integration into the facility all-hazards EOP is important for a seamless response. Formal resource allocation and triage processes may be written into a separate appendix or attachment.
- Crisis conditions should prompt coalition and, when necessary, prompt state actions to assure that resources are obtained to move care back to contingency and then conventional status as soon as possible.
- Having a process to involve subject matter experts at the facility in the incident command process (including creation of a clinical care committee when feasible based on facility/health system size) is critical to assure fairness, adherence to anti-discrimination laws, and best clinical practices given the limitations of the situation.
- Having a triage process in place that includes provider awareness of anti-discrimination principles and the effects of bias are much more important than specific triage decision support tools.

Appendix A: Approach to Ventilator Management

Before implementation of a ventilator allocation/reallocation plan, hospitals must have exhausted every resource to increase available ventilators, including but not limited to health system resources, healthcare coalition partners, and state resources through the MHOAC. Any impending need to implement this management scheme must include notification of health system leadership and CDPH.

The document presents recommendations for ethical and medical best practices for allocating ventilators during a disaster. These recommendations provide guidance but should continue to be reviewed by hospital emergency managers and subject matter experts with the explicit goal of improvement and incorporation into facility EOPs and pandemic planning. Ventilator allocation and reallocation decisions should be performed by a triage team or committee composed of people who have no clinical responsibilities for the care of the patient.

In such extreme scenarios as allocation of scarce essential resources like ventilators, sound ethical principles represent the backbone of an allocation scheme predicated on saving the most lives while respecting human equality. Respect for the moral equality and inherent dignity of each person – regardless of age, disability status, race, or other extraneous factors – requires that all individuals (including people who are undocumented or who are currently incarcerated) be included and evaluated in the same triage pool of individuals receiving treatment in acute care settings. Consistent with the central goal of saving as many lives as possible, triage decisions should be based on medically relevant prognostic factors for surviving the acute critical illnesses. Reasonable accommodations and adherence to all disability laws as noted in the body of the document above must be followed in any scarce resource ventilator allocation scheme. Individuals already on ventilators in chronic care settings should not be triaged unless they present in acute care settings and personal home ventilators belonging to, rented, or used by patients should not be reallocated to other patients.

PART A.1: Triage System

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 below. It is important to emphasize that the patients' treating physicians should not make triage decisions. These decisions may sometimes prioritize public ethics over clinical ethics where the two come into conflict, and; therefore, a triage team with expertise in public health ethics, anti-discrimination responsibilities, the elimination of implicit and explicit bias, and 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 psychological moral distress.

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 and explicit bias, including with regard to age, disability, sex, gender identity, sexual orientation, immigration status, or other factors, including those listed in Key Points.
4. Respecting the rights of all individuals, including individuals with disabilities
5. Diminishing the impact of social inequalities on health outcomes

Triage Officer

A group of triage officers should be appointed. Desirable qualities of triage officers include being a physician with experience managing critically ill patients, strong leadership ability, long-term practical experience working with people with significant disabilities and older adults, expertise in anti-discrimination responsibilities and the elimination of implicit and explicit bias, and effective communication and conflict resolution skills. This individual should 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 (see allocation process below). S/he is expected to make decisions according to the allocation framework described below, which is designed to benefit populations 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 apply the principles and processes of this document to make decisions about which patients should 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, underlying health conditions should not form the basis of the determination regarding the immediate or long-term survivability of the patient.

So that the burden is fairly distributed, triage officers should be nominated by the chairs/directors of the clinical departments that provide care to critically ill patients. The Chief Medical Officer, Chief Executive Officer, and other hospital leadership as needed 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 should 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 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 (to enable 30 minutes of overlap and handoffs on each end). 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 appropriate hospital leadership and incident command.

Triage Mechanism

The triage officer and her/his team-should use the allocation framework, detailed below, 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 should include reassessment to evaluate for clinical improvement or worsening at pre-specified intervals, as detailed below. The triage officer should review the comprehensive list of priority scores for all patients and should communicate with the clinical teams immediately after a decision is made regarding allocation or reallocation of a critical care resource. Underlying health conditions should not form the basis of the determination regarding the immediate or long-term survivability of the patient.

Communication of triage decisions to patients, families, and surrogates

Although the *authority* for triage decisions rests with the triage officer, there are several potential strategies to *communicate* triage decisions to patients, families, and/or surrogates.

Communication or disclosure of such triage decisions to patients and/or their next of kin is a required component of a fair triage process that manifests respect for persons, and takes into account individual needs and preferences.[6] A written, plain language explanation of the triage and appeals process should be provided to the patient, family, and/or surrogate.

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 disclosing on their own, 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, and reflect a public health decision.

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, disability, sex, insurance status, perceptions of social worth, immigration status, and other factors including those listed under Key Points).

Options for palliative care services, as well as referrals to social workers, and spiritual care providers, should be communicated to provide ongoing 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 clearly not 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). Any triage decision based on the factors identified under Key Points on page 5 should be reversed and re-determined using only the relevant, individualized clinical assessment.

- 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 should be final.
- Periodically, the Triage Review Committee should retrospectively evaluate 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, 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. In addition, the Triage Review Committee should have representation consistent with the patient population being served. Institutions could consider including on the Triage Review Committee a lay community member that is not a member of the hospital staff. 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 should be promptly communicated to whomever brought the appeal.

Continual reassessment of Crisis Conditions, Thresholds, and Results of Allocation Policies

The need for ongoing utilization of crisis triage protocol should be continuously evaluated and triage should be suspended immediately once critical resources are no longer scarce. Health system leadership should consult with local health authorities regarding these decisions.

In addition, because widespread acute care triage would be novel, if this is implemented and triage teams perform allocation decision-making over a prolonged time period, health systems should take steps to develop and deploy, in a timely way, a method of tracking the implementation of their policy, defining and describing quality performance of Triage Teams, and longitudinally analyzing the performance. Data collection should include data on morbidity and mortality outcomes to assess trends by demographic factors such as gender, race and ethnicity, geographic location, or socioeconomic status.

At the conclusion of an emergency triggering crisis standards of care and implementation of the triage protocol, a formal report describing the healthy system's experience, patient outcomes, community response ,and lessons learned should be developed and shared with providers, system leaders, governing authorities, patients, and the public. Feedback from these stakeholders should be utilized to evaluate and update, as appropriate, all aspects of the triage framework.

Part A.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 (i.e., illnesses that cannot be managed on a hospital ward in that hospital). The scoring system applies to all patients presenting with critical illness, not merely those with the disease or disorders that have caused the public health emergency. For example, in the setting of a severe pandemic, those patients with respiratory failure from illnesses not caused by the pandemic illness should also be subject to the allocation framework. Chronic ventilator patients using their own ventilators should not have their ventilators reallocated.

This process involves two steps, detailed below:

1. Calculating each patient's Sequential Organ Failure Assessment (SOFA) or modified SOFA (mSOFA) score.
2. Determining each day 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 if available 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.

Ethical goal of the allocation framework. Consistent with accepted standards during public health emergencies, the goals of the allocation framework are to maximize benefit for populations of patients and honor the ethical commitments to ensure meaningful access for all patients, with determinations based on individualized patient assessments, without regard to age, disability, race, sex, sexual orientation, gender identity, immigration status or other factors, including those listed in Key Points.

Note: All patients should have their physician orders for life-sustaining treatment (POLST) forms or advance directives reviewed, updated, and followed, so that patient's wishes can be followed to the extent possible in crisis care.

STEP 1: Calculate each patient's SOFA or mSOFA score, and assign priority group. Patients who are more likely to survive with intensive care are prioritized over patients who are less likely to survive with intensive care. As summarized in **Table 1**, the SOFA score is a validated, objective measure of probability of survival to hospital discharge. Alternately the mSOFA score can also be used to determine patients' prognoses for hospital survival. Lower scores indicate higher predicted benefit from critical care. If an objective, validated COVID specific scoring system which predicts survival becomes available, this may be used in place of the SOFA or mSOFA score, provided that the system does not use as a factor age, disability, or other characteristics listed in Key Points.

Table 1. SOFA score SOFA Scale**

Variable	0	1	2	3	4
PaO2/FiO2 mmHg	>400	≤ 400	≤ 300	≤ 200	≤ 100
Platelets, x 103/μL (x 106/L)	> 150 (>150)	≤ 150 (≤ 150)	≤ 100 (≤ 100)	≤50 (≤50)	≤ 20 (≤ 20)
Bilirubin, mg/dL (μmol/L)	<1.2 (<20)	1.2-1.9 (20 – 32)	2.0-5.9 (33 – 100)	6.0-11.9 (101 – 203)	>12 (> 203)
Hypotension	None	MABP < 70 mmHg	Dop ≤ 5	Dop > 5, Epi ≤ 0.1, Norepi ≤ 0.1	Dop > 15, Epi > 0.1, Norepi >0.1
Glasgow Coma Score (GCS) *	15	13 – 14	10 - 12	6 - 9	<6
Creatinine, mg/dL (μmol/L)	< 1.2 (<106)	1.2-1.9 (106 – 168)	2.0-3.4 (169 - 300)	3.5–4.9 (301 – 433)	>5 (> 434)

Sequential Organ Failure Assessment (SOFA) score SOFA Scale
Dopamine [Dop], epinephrine [Epi], norepinephrine [Norepi] doses in ug/kg/min SI units in brackets
Adapted from: Ferreira FI, Bota DP, Bross A, Melot C, Vincent JL. Serial evaluation of the SOFA score to predict outcome in critically ill patients. JAMA 2001; 286(14): 1754-1758.
**GCS should not add points to the SOFA score when a patient cannot articulate intelligible words, even if this condition is due to a pre-existing speech disability or chronic ventilation. Clinicians should use clinical judgment to adjust SOFA scores downward where appropriate to account for chronic baseline levels of physiological functional impairment not caused by COVID-19, including for any temporary elevation of a score or score element caused by any patient inability to access a regularly used stabilizing device or treatment (such as a CPAP or BiPAP unit, dialysis, or specific medications).*
***Modified SOFA or other objective, validated, nondiscriminatory survival scoring matrix may be used, including a COVID specific validated scoring system if one becomes available provided that the system does not use as a factor age, disability, or other characteristics listed in Key Points.*

As shown in **Table 2**, priority groups are assigned according to the patient's SOFA or mSOFA score, with group 1 being given the highest priority and group 4 given the lowest priority to receive critical care.

Table 2. Priority group based on SOFA score

Principle	Specification	Priority Group*			
		1	2	3	4
Current Overall Clinical Status	Prognosis for acute survival (SOFA score, mSOFA, or other severity of illness score#)	SOFA score < 6 Or mSOFA<6	SOFA score 6-8 Or mSOFA 6-8	SOFA score 9-11 Or mSOFA 9-11	SOFA score ≥12 Or mSOFA ≥12

#SOFA= Sequential Organ Failure Assessment; note that a different, nondiscriminatory measure of acute physiology that predicts in-hospital mortality could be used in place of SOFA, provided that the system does not use as a factor age, disability, or other characteristics listed in Key Points, but should similarly be divided into 4 ranges.
*Scores range from 1-4, and persons with the lowest score would be given the highest priority to receive critical care beds and services.

Absence of categorical exclusion criteria: A central feature of this allocation framework is that it does not use categorical exclusion criteria to bar individuals from access to critical care services during a public health emergency. There are several ethical justifications for this. First, the use of rigid categorical exclusions would be a major departure from traditional medical ethics and raise fundamental questions of fairness. Second, such restrictive measures are not necessary to accomplish public

health goals during a pandemic or disaster; it is equally feasible to assign all patients a priority score and allow the availability of resources to determine how many patients can receive the scarce resource. Third, categorical exclusion criteria may be interpreted by the public to mean that some groups are "not worth saving," leading to perceptions of unfairness and distrust. In a public health emergency, public trust will be essential to ensure cooperation with restrictive public health measures. Thus, an allocation system should make clear that all individuals are "worth saving" by keeping all patients who would receive critical care during routine clinical circumstances eligible, and by allowing the availability of beds and services to determine how many eligible patients receive them. It is important to note that there are some conditions that lead to immediate or near-immediate death despite aggressive therapy such that during routine clinical circumstances clinicians do not provide critical care services (e.g., cardiac arrest unresponsive to appropriate advanced cardiovascular life support, 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 which SOFA or mSOFA priority groups 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 immediate near-term. 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 hourly), only patients with the highest priority (lowest scores) should receive scarce critical care resources. As scarcity subsides, patients with progressively lower priority (higher scores) should have access to critical care interventions.

Resolving "ties" in priority groups between patients. In the event that there are 'ties' in SOFA or mSOFA priority groups between patients and not enough critical care resources for all patients with the lowest scores, consideration can be given to severe medical co-morbidities and advanced chronic conditions that limit near-term duration of benefit and survival. Patients who do not have a severely limited near-term prognosis for survival are given priority over those who are likely to die in the near-term, even if they survive the acute critical illness. Age, disability, or any other characteristics from the Key Points do NOT define individuals likely to die in the near-term. Co-morbid medical conditions occur in a spectrum of severity, and should only be used in allocation decisions based on the clinical decision that they will impact near-term survival. It should be noted that due to widespread racial and ethnic health disparities, these conditions often have a higher prevalence among communities of color. Given the pervasiveness of implicit bias, it is critical that objective criteria be used to define the severity of a given comorbidity. The following are examples of severely life-limiting comorbidities which may correlate with a significantly increased risk of short-term mortality from critical illness.

- Minimally conscious or unresponsive wakeful state from prior neurologic injury
- American College of Cardiology/American Heart Association Stage D heart failure
- World Health Organization Class 4 pulmonary hypertension
- Severe chronic lung disease with FEV1<20% predicted, FVC<35% predicted
- Cirrhosis with a model for end-stage liver disease score ≥20
- Metastatic Cancer with expected survival ≤ 6 months despite treatment
- Refractory hematologic malignancy (resistant or progressive despite conventional initial therapy)

If after consideration of severe comorbidities there are still ties, a lottery (i.e., random allocation) should be used to break the tie.

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

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 maximizing the benefit for communities of patients would be jeopardized if patients who were determined to be unlikely to survive hospitalization 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 should be allowed a therapeutic trial of a duration to be determined by the clinical characteristics of the disease. The decision about trial duration should 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 should 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 should 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 should 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 severity of illness scores or overall clinical judgment 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 disseminated intravascular coagulation) 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 should be available for consultation. Where palliative care specialists are not available, the treating clinical teams should provide primary palliative care.

References

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Appendix B: Pandemic Patient Care Strategies for Scarce Resource Situations

How to use this Appendix:

1. Recognize or anticipate resource shortfall.
2. Implement appropriate incident management system and plans; assign subject matter experts (technical specialists) to problem.
3. Determine degree of shortfall, expected demand, and duration; assess ability to obtain needed resources via local, regional, or national vendors or partners.
4. Find category of resource on index.
5. Refer to specific recommendations on the pages below.
6. Decide which strategies to implement and/or develop additional strategies appropriate for the facility and situation.
7. Assure consistent regional approach by informing public health authorities and other facilities if contingency or crisis strategies will continue beyond 24 hours and no regional options exist for re-supply or patient transfer; activate regional scarce resource coordination plans as appropriate.
8. Review strategies every operational period or as availability (supply/demand) changes.

Core strategies to be employed (generally in order of preference) during, or in anticipation of a scarce resource situation are:

1. Prepare - pre-event actions taken to minimize resource scarcity (e.g., stockpiling of medications).
2. Substitute - use an equivalent device, drug, or personnel for one that would usually be available (e.g., morphine for fentanyl).
3. Adapt – use a device, drug, or personnel that are not equivalent but that will provide sufficient care (e.g., anesthesia machine for mechanical ventilation).
4. Conserve – use less of a resource by lowering dosage or changing utilization practices (e.g., minimizing use of oxygen driven nebulizers to conserve oxygen).
5. Reuse – reuse (after appropriate disinfection/sterilization) items that would normally be single-use items.
6. Reallocate – restrict or prioritize use of resources to those patients who are likely to benefit and survive in the immediate short-term or to those with greater need only in times of actual shortage.

STRATEGIES FOR SCARCE RESOURCE SITUATIONS

RECOMMENDATIONS	***Strategy***	***Conventional***	***Contingency***	***Crisis***
Inhaled Medications • Restrict the use of oxygen-driven nebulizers when inhalers or air-driven substitutes are available. • Minimize frequency through medication substitution that results in fewer treatments (6 - 12 hour instead of 4 - 6 hour applications).	*Substitute & Conserve*			
High-Flow Applications • Restrict the use of high-flow cannula systems as these can demand flow rates in excess of 40 liters per minute (LPM). • Restrict the use of simple and partial rebreathing masks to 10 LPM maximum. • Restrict use of Gas Injection Nebulizers as they generally require oxygen flows between 10 LPM and 75 LPM. • Eliminate the use of oxygen-powered venturi suction systems as they may consume 15 to 50 LPM. • Place patients on ventilators as soon as possible to avoid prolonged use of bag-valve ventilation at high oxygen flow rates	*Conserve*			
Air-Oxygen Blenders Eliminate the low-flow reference bleed occurring with any low-flow metered oxygen blender use. This can amount to an additional 12 LPM. Reserve air-oxygen blender use for mechanical ventilators using high-flow non-metered outlets. (These do not utilize reference bleeds). • Disconnect blenders when not in use.	*Conserve*			
Oxygen Conservation Devices • Use reservoir cannulas at 1/2 the flow setting of standard cannulas. • Replace simple and partial rebreather mask use with reservoir cannulas at flowrates of 6-10 LPM.	*Substitute & Adapt*			
Oxygen Concentrators if Electrical Power Is Present • Use hospital-based or independent home medical equipment supplier oxygen concentrators if available to provide low-flow cannula oxygen for patients and preserve the primary oxygen supply for more critical applications.	*Substitute & Conserve*			
Monitor Use and Revise Clinical Targets • Employ oxygen titration protocols to optimize flow or % to match targets for SpO2 or PaO2. • Minimize overall oxygen use by optimization of flow. • Discontinue oxygen at earliest possible time. **Starting Example** / **Initiate O_2** / **O_2 Target** Normal Lung Adults / SpO_2 <90% / SpO_2 90% Infant & Peds / SpO_2 <90% / SpO_2 90-95% Severe COPD History / SpO_2 <85% / SpO_2 90% Note: Targets may be adjusted further downward depending on resources available, the patient's Presentation, or measured PaO_2	*Conserve*			
Expendable Oxygen Appliances • Use terminal sterilization or high-level disinfection procedures for oxygen appliances, small & large-bore tubing, and ventilator circuits. Bleach concentrations of 1:10, high-level chemical disinfection, or irradiation may be suitable. Ethylene oxide gas sterilization is optimal but requires a 12-hour aeration cycle to prevent ethylene chlorohydrin formation with polyvinyl chloride plastics.	*Re-use*			
Oxygen Re-Allocation • Prioritize patients for oxygen administration during severe resource limitations.	*Re-Allocate*			

Resource: Consideration for Oxygen Therapy in Disasters This ASPR TRACIE fact sheet provides information on the types of oxygen therapy and the type of oxygen supplies generally available, as well as various oxygen storage methods.

STRATEGIES FOR SCARCE RESOURCE SITUATIONS

RECOMMENDATIONS	***Strategy***	***Conventional***	***Contingency***	***Crisis***
Staff and Supply Planning • Assure facility has process and supporting policies for disaster credentialing and privileging - including degree of supervision required, clinical scope of practice, mentoring and orientation, electronic medical record access, and verification of credentials. • Encourage employee preparedness planning (www.ready.gov and other resources). • Cache adequate personal protective equipment (PPE) and support supplies. • Educate staff on institutional disaster response. • Educate staff on community, regional, and state disaster plans and resources. • Develop facility plans addressing staff's family / pets or staff shelter needs.	*Prepare*			
Focus Staff *Time* on Core Clinical Duties • Minimize meetings and relieve administrative responsibilities not related to event. • Implement efficient medical documentation methods appropriate to the incident. • Cohort patients to conserve PPE and reduce staff PPE donning/doffing time and frequency.	*Conserve*			
Use Supplemental Staff • Bring in equally trained staff (burn or critical care nurses, Disaster Medical Assistance Team, other health system or Federal sources). • Equally trained staff from administrative positions (nurse managers). • Adjust personnel work schedules (longer but less frequent shifts, etc.) if this will not result in skill/PPE compliance deterioration.	*Substitute*			
• Use family members/lay volunteers to provide basic patient hygiene and feeding if infection control strategies allow for it - releasing staff for other duties.	*Adapt*			
Focus Staff *Expertise* on Core Clinical Needs • Personnel with specific critical skills (ventilator, burn management) should concentrate on those skills; specify job duties that can be safely performed by other medical professionals. • Have specialty staff oversee larger numbers of less-specialized staff and patients (e.g., a critical care nurse oversees the intensive care issues of 9 patients while 3 medical/surgical nurses provide basic nursing care to 3 patients each). • Limit use of laboratory, radiographic, and other studies, to allow staff reassignment and resource conservation. • Limit availability/indications for non-critical laboratory, radiographic, and other studies. • Reduce documentation requirements. • Restrict or cease elective appointments, surgeries, procedures, and screening tests.	*Conserve*			
Use Alternative Personnel to Minimize Changes to Standard of Care • Use less trained personnel with appropriate mentoring and just-in-time education (e.g., health care trainees or other health care workers, Medical Reserve Corps, retirees). • Use less trained personnel to take over portions of skilled staff workload for which they have been trained. • Provide just-in-time training for specific skills. • Divert credentialed staff from routine to emergency duties including in-hospital or assisting public health at external clinics/screening/dispensing sites.	*Adapt*			

STRATEGIES FOR SCARCE RESOURCE SITUATIONS

RECOMMENDATIONS	Strategy	Conventional	Contingency	Crisis
Food • Maintain hospital supply of inexpensive, simple to prepare, long-shelf life foodstuffs as contingency for at least 96 hours without resupply, with additional supplies according to hazard vulnerability analysis (e.g., grains, beans, powdered milk, powdered protein products, pasta, and rice). Access existing or devise new emergency/disaster menu plans. • Maintain hospital supply of at least 30 days of enteral and parenteral nutrition components and consider additional supplies based on institution-specific needs. Review vendor agreements and their contingencies for delivery and production, including alternate vendors. • Note: A 30-day supply based on usual use may be significantly shortened by the demand of a disaster. Infant feeding: Support breastfeeding; use local women, infants, and children (WIC) agencies to provide telephone lactation support; assure adequate stocks of formula for those babies who need it.	*Prepare*			
Water • Stock bottled water sufficient for drinking needs for at least 96 hours if feasible (for staff, patients and family/visitors), or assure access to drinking water apart from usual supply. Potential water sources include food and beverage distributors. • Consider weight and dispensing issues if using 5-gallon bottles. • Ensure there is a mechanism in place to verify tap water is safe to drink.	*Prepare*			
Staff/Family • Plan to feed additional staff, patients, and family members of staff/patients in select situations (ice storm as an example of a short-term incident, an epidemic as an example of a long-term incident). Consider having staff bring own food if practical and safe to do so.	*Prepare*			
Planning • Work with stakeholders to encourage home users of enteral and parenteral nutrition to have contingency plans and alternate delivery options. Home users of enteral nutrition typically receive delivery of 30-day supply and home users of parenteral nutrition typically receive a weekly supply. Anticipate receiving supply requests from home users during periods of shortage. Work with vendors regarding their plans for continuity of services and delivery. • Identify alternate sources of food supplies for the facility should prime vendors be unavailable (including restaurants - which may be closed during epidemics). Consider additional food supplies at hospitals that do not have food service management accounts. • Determine if policy on family provision of food to patients is in place, and what modifications might be needed or permitted in a disaster.	*Prepare*			
• Liberalize diets and provide basic nutrients orally, if possible. Total parenteral nutrition (TPN) use should be limited and prioritized for neonatal and critically ill patients. • Non-clinical personnel serve meals and may assist preparation.	*Substitute*			
• Follow or modify current facility guidelines for provision of food/feeding by family members of patients. • Anticipate and have a plan for the receipt of food donations. If donated food is accepted, it should be non-perishable, prepackaged, and preferably in single serving portions.	*Adapt*			
• Collaborate with pharmacy and nutrition services to identify patients appropriate to receive parenteral nutrition support vs. enteral nutrition. Access premixed TPN and partial parenteral nutrition (PPN) solutions from vendor if unable to compound. Refer to Centers for Disease Control (CDC) fact sheets and American Society for Parenteral and Enteral Nutrition (ASPEN) Guidelines. Substitute oral supplements for enteral nutrition products if needed.	*Substitute & Adapt*			
• Eliminate or modify special diets temporarily. • Use blenderized food and fluids for enteral feedings rather than enteral nutrition products if shortages occur.	*Adapt*			

STRATEGIES FOR SCARCE RESOURCE SITUATIONS

RECOMMENDATIONS	***Strategy***	***Conventional***	***Contingency***	***Crisis***
Cache/Increase Supply Levels* • Patients should have at least 30-day supply of home medications and obtain 90-day supply if pandemic, epidemic, or evacuation is imminent. Examine formulary to determine commonly used medications and classes that will be in immediate/ high demand. This may involve coordination with pharmacies. **Analgesia** • Morphine, other narcotic and non-narcotic (non-steroidals, acetaminophen) class - injectable and oral **Sedation** • Particularly benzodiazepine (lorazepam, midazolam, diazepam) injectables, ketamine, and ant i- psychotic agents. **Anti-infective** • Narrow and broad-spectrum antibiotics for pneumonia, skin infections, open fractures, sepsis (e.g.: cephalosporins, quinolones, tetracyclines, macrolides, clindamycin, penam class and extended spectrum penicillins, etc.), select antivirals. **Pulmonary** • Metered dose inhalers (albuterol, inhaled steroids), oral steroids (dexamethasone, prednisone). **Behavioral Health** • Haloperidol, other injectable and oral anti-psychotics, common anti-depressants, anxiolytics. **Other** • Sodium bicarbonate, paralytics, induction agents (etomidate, propofol), proparacaine/tetracaine, atropine, prali-doxime, epinephrine , local anesthetics, antiemetics , insulin, common oral anti-hypertensive, diabetes medications, tetanus vaccine and tranexamic acid, anti-epileptics (IV and oral), hypertonic saline, and antidiarrheals • Increase supply levels or cache critical medications - particularly for low-cost items and analgesics. Key examples include:	*Prepare*			
Use Equivalent Medications • Obtain medications from alternate supply sources (pharmaceutical distributors, pharmacy caches). **Pulmonary** • Metered dose inhalers instead of nebulized medications. **Analgesia/ Sedation** • Consider other medications (e.g. benzodiazepines, dexmedetomidine etc.) for propofol substitution (and other agents in short supply) • ICU analgesia/ sedation drips Morphine 4-10mg IV load then 2mg/h and titrate e/re-bolus as needed usual 3-20m g/h); lorazepam 2-8mg or midazolam 1-5mg IV load then 2-8mg/h drip. **Anti -infective** • Examples: cephalosporins, gentamicin, clindamycin substitute for unavailable broad-spectrum antibiotic • Target therapy as soon as possible based upon organism identified. **Other** • Beta blockers, diuretics, calcium channel blockers, ace inhibitors, anti-depressants, anti-infectives. • Explore options to compound or obtain from compounding pharmacies.	*Substitute* *Substitute*			
Reduce Use During High Demand Restrict use of certain classes if limited stocks likely to run out (restrict use of prophylactic/empiric antibiotics after low risk wounds, etc.) Decrease dose; consider using smaller doses of medications in high demand/likely to run out (reduce doses of medications allowing blood pressure or glucose to run higher to ensure supply of medications adequate for anticipated duration of shortage). • Allow use of personal medications (inhalers, oral medications) in hospital. • Do without - consider impact if medications not taken during shortage (statins, etc.).	*Conserve*			

STRATEGIES FOR SCARCE RESOURCE SITUATIONS

RECOMMENDATIONS	***Strategy***	***Conventional***	***Contingency***	***Crisis***
Modify Medication Administration • Emphasize oral, nasogastric, subcutaneous routes of medication administration. • Administer medications by gravity drip rather than IV pump if needed: *IV drip rate calculation - drops/minute= amount to be infused x drip set/time (minutes) (drip set= qtts/mL - 60, 10, etc.).* • Rule of 6: pt wgt (kg) x 6 = mg drug to add to 100ml fluid = 1mcg/kg/min for each 1 ml/hour NOTE: For examples, see http://www.dosagehelp.com/iv_rate_drop.html	*Adapt*			
• Consider use of select medications beyond expiration date**, especially tablets/capsules • Consider use of veterinary medications when alternative treatments are not available**	*Adapt*			
Restrict Allocation of Select Medications • Allocate limited stocks of medications with consideration of regional/state guidance and available epidemiological information (e.g., anti-viral medications such as olseltamivir).	*Re-Allocate*			
• Determine patient priority to receive medications in limited stock.	*Re-Allocate*			

*Resources:
- ASPR TRACIE Hospital Disaster Pharmacy Calculator. This tool estimates the number of patients that should be planned for based on the size of the emergency department and the role of the hospital.
- ASPR TRACIE Factsheet: Drug Shortages and Disasters. This factsheet can help health care providers prepare for and respond to drug shortages that may arise during and after a disaster.

** Legal protection such as Food and Drug Administration approval or waiver required.

RECOMMENDATIONS	***Strategy***	***Conventional***	***Contingency***	***Crisis***
Cache Additional Intravenous (IV) Cannulas, Tubing, Fluids, Medications, and Administration Supplies	*Prepare*			
Use Scheduled Dosing and Drip Dosing When Possible • Reserve IV pump use for critical medications such as sedatives and hemodynamic support.	*Conserve*			
Minimize Invasive Monitoring • Substitute other assessments (e.g., clinical signs, ultrasound) of central venous pressure (CVP). • When required, assess CVP intermittently via manual methods using bedside saline manometer or transducer moved between multiple patients as needed, or by height of blood column in CVP line held vertically while patient supine.	*Substitute & Conserve*			
Emphasize Oral Hydration Instead of IV Hydration When Possible **Utilize appropriate oral rehydration solution**: Oral rehydration solution: 1 liter water (5 cups) + 1 tsp salt+ 8 tsp sugar, add flavor (e.g., ½ cup orange juice, other) as needed. Rehydration for moderate dehydration 50-100mL/kg over 2-4 hours **Pediatric hydration**: Pediatric maintenance fluids: • 4 ml /kg/h for first 10kg of body weight (40 ml/h for 1st 10 kg) • 2 ml /kg/h for second 10kg of body weight (20 ml/h for 2nd 10kg = 60 ml/h for 20kg child) • 1 ml /kg/h for each kg over 20kg (example - 40 kg child= 60 ml/h plus 20 ml/h = 80 ml/h) Supplement for each diarrhea or emesis NOTE: Clinical (urine output, etc.) and laboratory (BUN, urine specific gravity) assessments and electrolyte correction are key components of fluid therapy and are not specifically addressed by these recommendations. NOTE: For further information and examples, see Rehydration Project: http:// rehydrate.org/	*Substitute*			
Provide Nasogastric Hydration Instead of IV Hydration When Practical • Patients with impediments to oral hydration may be successfully hydrated and maintained with nasogastric (NG) tubes. • For fluid support, 8-12F (pediatric: infant 3.5F, < 2yrs 5F) tubes are better tolerated than standard size tubes.	*Substitute*			
Substitute Epinephrine for Other Vasopressor Agents • For hemodynamically unstable patients who are adequately volume-resuscitated, consider adding 6mg epinephrine (6ml of 1:1000) to 1000ml NS on minidrip tubing and titrate to target blood pressure. • Epinephrine 1:1000 (1mg/ml) multi-dose vials available for drip use.	*Substitute*			
Re-use CVP, NG, and Other Supplies After Appropriate Sterilization/Disinfection • Cleaning for all devices should precede high-level disinfection or sterilization. • High-level disinfection for at least twenty minutes for devices in contact with body surfaces (including mucous membranes); glutaraldehyde, hydrogen peroxide 6%, or bleach (5.25%) diluted 1:20 (2500 ppm) are acceptable solutions. NOTE: chlorine levels reduced if stored in polyethylene containers - double the bleach concentration to compensate) . • Sterilize devices in contact with bloodstream (e.g., ethylene oxide sterilization for CVP catheters).	*Re-use*		(disinfection - NG, etc)	(steriliza- tion - central line, etc)

STRATEGIES FOR SCARCE RESOURCE SITUATIONS

RECOMMENDATIONS	***Strategy***	***Conventional***	***Contingency***	***Crisis***
Intraosseous/Subcutaneous (Hypodermoclysis) Replacement Fluids • Consider as an option when alternative routes of fluid administration are impossible / unavailable. • Intraosseous route preferred over subcutaneous. Intraosseous • Intraosseous infusion is not generally recommended for hydration purposes but may be used until alternative routes are available. Intraosseous infusion requires pump or pressure bag. Rate of fluid delivery is often limited by pain of pressure within the marrow cavity. This may be reduced by pre-medication with lidocaine 0.5 mg / kg slow IV push. Hypodermoclysis Cannot correct more than moderate dehydration via this technique. Many medications cannot be administered subcutaneously. Common infusion sites: pectoral chest, abdomen, thighs, upper arms. Common fluids: normal saline (NS), D5NS, D5 1/ 2 NS (Can add up to 20-40 mEq potassium if needed.) Insert 21/24 gauge needle into subcutaneous tissue at a 45 degree angle, adjust drip rate to 1-2 ml per minute. (May use 2 sites simultaneously if needed.) Maximal volume about 3 liters / day; requires site rotation. Local swelling can be reduced with massage to area. Hyaluronidase 150 units / liter facilitates fluid absorption but not required; may not decrease occurrence of local edema	*Substitute*			
Consider Use of Veterinary and Other Alternative Sources for Intravenous Fluids and Administration Sets	*Adapt*			

Appendix C: Acknowledgments

This guideline is based on guidelines and work done at the University of Pittsburgh and published at: White DB, Lo B. A framework for rationing ventilators and critical care beds during the COVID-19 pandemic. *JAMA*. doi:10.1001/jama.2020.5046. eAppendix. Allocation of Scarce Critical Care Resources During a Public Health Emergency.

Also, the University of California, Allocation of Scarce Critical Resources under Crisis Standards of Care, UN Critical Care Bioethics Working Group, April 16, 2020.

Consultation with experts, including:

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