MARSHALL MEDICAL CENTER

Crisis Triage Protocol

This document is to be implemented when the demand for critical resources is more than the organization has capacity to care for. The Crisis Triage Protocol provides the framework for how decisions are made initially and then in an ongoing manner. The need for ongoing utilization of the Crisis Triage Protocol should be continuously evaluated and triage should be suspended immediately once critical resources are no longer scarce.

Allocation process for ICU admission/ventilation

The purpose of this section is to describe the allocation framework to make initial triage decisions for patients who present with illnesses that typically require critical care resources. The scoring system applies to all patients presenting with critical illness, not merely those with the disease or disorders that have caused the public health emergency. 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 team to assess the patient for critical resource allocation.

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, ethnicity, ability to pay, perceived quality of life, or homelessness.

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

STEP 1: Calculate each patient's SOFA or mSOFA score (or Pediatric Logistic Organ Dysfunction 2 (PELOD-2) score for pediatric patients), 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. 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.

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	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)	<12 (<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 Scale)

Dopamine (Dop), epinephrine (Epi), norepinephrine (Norepi) doses in ug/kg/min SI units in brackets

Adapted from: Ferreira Fl, 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	Prognosis for acute survival (SOFA 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

Status	mSOFA, PELOD-2 or other severity of illness score#)	Or PELOD-2 ≤12	Or PELOD-2 12-13	Or PELOD-2 14-16	Or PELOD-2 ≥ 17

*#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. 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 team should make determinations as needed, about which SOFA, mSOFA or PELOD-2 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.

Resolving "ties'' in priority groups between patients. In the event that there are 'ties' in SOFA, mSOFA, or PELOD-2 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, ethnicity, perceived quality of life, homelessness do NOT define individuals likely to die in the near-term. Comorbid 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 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, NYHA class IV heart failure
- World Health Organization Class 4 pulmonary hypertension
- Severe chronic lung disease with FEV1<20% predicted, FVC<35% predicted, GOLD 4 (D)
- Cirrhosis with a model for end-stage liver disease score >20, Child-Pugh score >8
- Malignant disease with a life expectancy of less than 12 months
- Refractory hematologic malignancy (resistant or progressive despite conventional initial therapy)
- Unwitnessed cardiac arrest, recurrent cardiac arrest, cardiac arrest with no return of spontaneous circulation
- End-stage neurodegenerative disease
- Severe and irreversible neurological event or condition, severe dementia
- Severe circulatory failure, treatment-resistant despite
- Increased vasoactive dose (hypotension and/or persistent inadequate organ perfusion)

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 is 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. Trial duration should be tailored to the patient, 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.

Communication of triage decisions to patients, families, and 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.

The triage team 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 include: 1) solely the attending physician; 2) solely the triage officer; or 3) a collaborative effort between the attending physician and triage officer.

Appeals process for individual triage decisions

It is possible that patients, families, or clinicians will challenge individual triage decisions. 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. 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 an identified triage team member should be prepared to explain the calculation to the patient or family on request.

Decisions to withdraw a scarce resource should have a more robust process for appealing decisions to withdraw or reallocate critical care beds or services. Elements of this appeals process include:

- The individuals appealing the triage decision should explain to the triage team 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 on considerations, other than disagreement with the allocation framework, should immediately be brought to a Triage Review Committee that is independent of the triage team and of the patient's care team. Any triage decision based on the factors such as age, disability, race, sex, sexual orientation, gender identity, immigration status, ethnicity, ability to pay, perceived quality of life, or homelessness. 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 is 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.

References

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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*			**NST**
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*			**NST**
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*			**NST**
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*			**NST**
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*		**NST**	
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. Note: Targets may be adjusted further downward depending on resources available, the patient's Presentation, or measured PaO_2	*Conserve*		**NST**	
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*			**NST**
Oxygen Re-Allocation • Prioritize patients for oxygen administration during severe resource limitations.	*Re-Allocate*			**NST**

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%

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.

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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*	**NST**		
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*	**NST**		
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. • Use family members/lay volunteers to provide basic patient hygiene and feeding if infection control strategies allow for it - releasing staff for other duties.	*Substitute*		**NST**	
	Adapt		**NST**	
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*		**NST**	
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*			**NST**

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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*	**ST (already established)**	**ST**	**ST**
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*	**ST (already established)**	**ST**	**ST**
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*		**NST**	
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*		**NST**	
• 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*			**NST**
• 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*		**NST**	
• 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*		**NST**	
• Eliminate or modify special diets temporarily. • Use blenderized food and fluids for enteral feedings rather than enteral nutrition products if shortages occur.	*Adapt*			**NST**

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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*		**NST**	
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*		**NST**	
	Substitute		**NST**	
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*			**NST**

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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*		**NST**	
• Consider use of select medications beyond expiration date**, especially tablets/capsules • Consider use of veterinary medications when alternative treatments are not available**	*Adapt*			**NST**
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*			**NST**
• Determine patient priority to receive medications in limited stock.	*Re-Allocate*			**NST**

*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.

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RECOMMENDATIONS	*Strategy*	*Conventional*	*Contingency*	*Crisis*
Cache Additional Intravenous (IV) Cannulas, Tubing, Fluids, Medications, and Administration Supplies	*Prepare*	NST		
Use Scheduled Dosing and Drip Dosing When Possible • Reserve IV pump use for critical medications such as sedatives and hemodynamic support.	*Conserve*			NST
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*			NST
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*		NST	
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*			NST
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*			NST
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) NST	(steriliza- tion - central line, etc) NST

Non-scripted Trigger (NST) = Incident Command determines initiation of strategy
Scripted Trigger (ST) = Automatic Standard Operating Procedures (SOP) implemented immediately to prevent delay

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*			NST
Consider Use of Veterinary and Other Alternative Sources for Intravenous Fluids and Administration Sets	*Adapt*			NST

Non-scripted Trigger (NST) = Incident Command determines initiation of strategy
Scripted Trigger (ST) = Automatic Standard Operating Procedures (SOP) implemented immediately to prevent delay