# PATIENT CARE
## STRATEGIES FOR SCARCE RESOURCE SITUATIONS

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# PREFACE

Key operational considerations during a scarce resource sitution:

- Avoiding rationing decisions is always preferred when regional resources can be leveraged to diffuse a disproportionate impact on a hospital through 'load-balancing' across other healthcare facilities. Reducing the time spent in crisis situations and the gravity of the allocation decisions must be a key operational and ethical goal at the facility, regional, and State level
- Shortages and disasters nearly always have disproportionate effects on at-risk and vulnerable communities including communities of color. Greater resource commitment is thus required to equalize, let alone improve, outcomes relative to other groups. Socio-economic information and community indexes can be valuable tools to assure equity of resource allocation at the community level
- Once a patient is hospitalized, however, the SAT recommends that social factors not be used to assign scarce resources for both legal and ethical reasons including that as long as access to hospital care and resources are equal that those resources are equitably distributed
- Assuring access to available care resources offers the greatest opportunity for equity and improves consistency of the care offered within the region
- Equal access to care requires a commitment to maximal and consistent utilization of available healthcare resources. During space scarcity situations, the use of a regional Medical Operations Coordination Center (MOCC) is required to assure that patients have equivalent access to care and that those most in need are prioritized for care without regard to social or financial factors. Clinical staff must be engaged in making load-balancing and prioritization decisions and should be protected by the State in this role. The MOCC should have the ability to assure that critically ill patients in hospitals that do not offer the required services are transferred to a capable receiving hospital
- Implicit triage, or the tendency for bedside clinicians to make rationing decisions on the basis of perceived resource limitations and ability to benefit from care is common. These decisions are often incongruent with the available resources and evidence. Implicit bias is reduced when guidance and consultation is available and there is administrative support at the facility and regional level for specific and recurring resource shortages. The MDH will attempt to provide the best available clinical guidance for scarce resource situations but it is the responsibility of the facility to assure that it is incorporated into a decision and consultation process that relieves the bedside provider of sole responsibility
- In addition to rationing certain resources, clinicians should consider what treatments are non-beneficial. When non-beneficial treatment decisions involve weighing the competition for resources this is ethically defensible but must be clearly delineated from usual medical futility decision-making.
- Providers will still have to make triage decisions at the bedside, particularly in no-notice disaster situations where specific guidance is not available and the resource situation is not well defined. All providers should have a basic understanding of the common biases, priorities, and goals involved in triage decisions (e.g. short term survival prognosis weighed against the resources required and the competition for those resources)

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## Core Clinical Strategies for Scarce Resource Situations

Core clinical categories are practices and resources that form the basis for medical and critical care.



## Resource Reference and Triage Cards

Resource cards address the unique system response issues required by specific patient groups during a major incident. Some of this information is specific to the State of Minnesota's resources and processes.

# Core Clinical Strategies for Scarce Resource Situations

## Summary: Ethical Values For Scarce Resource Situations

All facilities and/or agencies utilizing these strategies are encouraged to review the Ethical Considerations for Crisis Standards of Care website: (https://www.health.state.mn.us/communities/ep/surge/crisis/ethical.html). Efforts should be made to extend supplies and conserve resources. Organizations should triage/re-allocate resources only as a last resort. Patients should receive supportive care and treatment to manage symptoms, including palliative care; this applies to all patients, including those who are not prioritized to receive specific resources.

Allocating scarce life saving resources should NOT be based upon:

- Race, ethnicity, gender, gender identity, sexual orientation or preference, religion, citizenship or immigration status, or socioeconomic status;
- Ability to pay;
- Age as a criterion in and of itself (this does not limit consideration of a patient's age in clinical prognostication of likelihood of short term survival);
- Disability status or comorbid condition(s) as a criterion in and of itself (this does not limit consideration of a patient's physical condition in clinical prognostication of likelihood to of short term survival);
- Predictions about baseline life expectancy beyond the current episode of care (i.e., life expectancy if the patient were not facing the current crisis), unless the patient is imminently and irreversibly dying or terminally ill with life expectancy under 6 months (e.g., eligible for admission to hospice);
- Judgements that some people have greater "quality of life" than others;
- Judgements that some people have greater "social value" than others.

# Summary Card

**Potential trigger events:**

- Mass Casualty Incident (MCI)
- Infrastructure damage/loss
- Pandemic/Epidemic
- Supplier shortage
- Recall/contamination of product
- Isolation of facility due to access problems (flooding, etc)

## How to use this card set:

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 card.
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 24h 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:

- **Prepare -** pre-event actions taken to minimize resource scarcity (e.g., stockpiling of medications).
- **Substitute -** use an essentially equivalent device, drug, or personnel for one that would usually be available (e.g., 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).
- **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 with a better prognosis or greater need.

## Capacity Definitions:

- **Conventional capacity –** The spaces, staff, and supplies used are *consistent with daily practices* within the institution. These spaces and practices are used during a major mass casualty incident that triggers activation of the facility emergency operations plan.
- **Contingency capacity –** The spaces, staff, and supplies used are not consistent with daily practices, but provide care to a standard that is *functionally equivalent* to usual patient care practices. These spaces or practices may be used temporarily during a major mass casualty incident or on a more sustained basis during a disaster (when the demands of the incident exceed community resources).
- **Crisis capacity –** Adaptive spaces, staff, and supplies are not consistent with usual standards of care, but provide sufficiency of care in the setting of a catastrophic disaster (i.e., provide the best possible care to patients given the circumstances and resources available). Crisis capacity activation constitutes a significant adjustment to standards of care (Hick et al, 2009).

This card set is designed to facilitate a structured approach to resource shortfalls at a health care facility. It is a decision support tool and assumes that incident management is implemented and that key personnel are familiar with ethical frameworks and processes that underlie these decisions (for more information see Institute of Medicine 2012 Crisis Standards of Care: A Systems Framework for Catastrophic Disaster Response (http://www.nationalacademies.org) and the Minnesota Pandemic Ethics Project (https://www.health.state.mn.us/communities/ep/surge/crisis/panethics.html)). Each facility will have to determine the most appropriate steps to take to address specific shortages. Pre-event familiarization with the contents of this card set is recommended to aid with event preparedness and anticipation of specific resource shortfalls. The cards do not provide comprehensive guidance, addressing only basic common categories of medical care. Facility personnel may determine additional coping mechanisms for the specific situation in addition to those outlined on these cards.

The content of this card set was developed by the Minnesota Department of Health (MDH) Science Advisory Team in conjunction with many subject matter experts whose input is greatly appreciated. This guidance does not represent the policy of MDH. Facilities and personnel implementing these strategies in crisis situations should assure communication of this to their health care and public health partners to assure the invocation of appropriate legal and regulatory protections in accord with State and Federal laws. This guidance may be updated or changed during an incident by the Science Advisory Team and MDH. The weblinks and resources listed are examples, and may not be the best sources of information available. Their listing does not imply endorsement by MDH. This guidance does not replace the judgement of the clinical staff and consideration of other relevant variables and options during an event.

# OXYGEN

OXYGEN $O_2$

| Recommendations | Strategy | Conventional | Contingency | Crisis |
|---|---|---|---|---|
| **Inhaled Medications**<br>• Restrict the use of oxygen-driven nebulizers when inhalers or air-driven substitutes are available.<br>• Minimize frequency through medication substitution that results in fewer treatments (6h-12h instead of 4h-6h applications). | *Substitute & Conserve* | Yes | Yes | Yes |
| **High-Flow Applications**<br>• Restrict the use of high-flow cannula systems as these can demand flow rates in excess of 40 LPM.<br>• Restrict the use of simple and partial rebreathing masks to 10 LPM maximum.<br>• Restrict use of Gas Injection Nebulizers as they generally require oxygen flows between 10 LPM and 75 LPM.<br>• Eliminate the use of oxygen-powered venturi suction systems as they may consume 15 to 50 LPM.<br>• Place patients on ventilators as soon as possible to avoid prolonged use of bag-valve ventilation at high oxygen flow rates | *Conserve* | Yes | Yes | Yes |
| **Air-Oxygen Blenders**<br>• 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).<br>• Disconnect blenders when not in use. | *Conserve* | Yes | Yes | Yes |
| **Oxygen Conservation Devices**<br>• Use reservoir cannulas at 1/2 the flow setting of standard cannulas.<br>• Replace simple and partial rebreather mask use with reservoir cannulas at flow rates of 6-10 LPM. | *Substitute & Adapt* | | Yes | Yes |
| **Oxygen Concentrators if Electrical Power Is Present**<br>• 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.<br>• Consider the use of two oxygen concentrators for one patient to provide additional oxygen flow if appropriate. | *Substitute & Conserve* | | Yes | Yes |
| **Monitor Use and Revise Clinical Targets**<br>• Employ oxygen titration protocols to optimize flow or % to match targets for $SpO_2$ or $PaO_2$.<br>• Minimize overall oxygen use by optimization of flow.<br>• Discontinue oxygen at earliest possible time.<br>**Starting Example** / **Initiate $O_2$** / **$O_2$ Target**<br>Normal Lung Adults / $SpO_2$ <90% / $SpO_2$ 90%<br>Infants & Peds / $SpO_2$ <90% / $SpO_2$ 90-95%<br>Severe COPD History / $SpO_2$ <85% / $SpO_2$ 90%<br>Note: Targets may be adjusted further downward depending on resources available, the patient's clinical presentation, or measured $PaO_2$ determination. | *Conserve* | | Yes | Yes |
| **Expendable Oxygen Appliances**<br>• 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* | | Yes | Yes |
| **Oxygen Re-Allocation**<br>• Prioritize patients for oxygen administration during severe resource limitations. | *Re-Allocate* | | Yes | Yes |

Resource: Considerations for Oxygen Therapy in Disasters (https://files.asprtracie.hhs.gov/documents/aspr-tracie-ta-oxygen-therapy.pdf).
This ASPR TRACIE fact sheet provides information on the types of oxygen therapy and the types of oxygen supplies generally available, as well as various oxygen storage methods.

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# STAFFING



## Assumptions

Staffing adjustments assume the following are also being done at the facility level:

- Participation in regional inter-hospital load-balancing efforts.
- Restrictions on non-emergency and outpatient services to redirect nursing staff to inpatient care.
- Reduction on chart/screening requirements to increase staff time
- hiring of contract staff as possible.
- Nurse managers/educators pulled into clinical roles.
- OT/Hazard pay and other incentives.
- Mandatory shifts.
- Use of nursing extenders to support basic patient cares (e.g. nursing assistants, hospital volunteers).
- Move staff between selected facilities in a system to maximize staff skill utilization.
- Cancellation of leave/vacation as required.
- Augmented use of telemedicine and virtual services to improve use of staff.

| Category | Conventional | Contingency | Crisis |
|---|---|---|---|
| **Staff Time** | **No OT. Example: 40 hrs/week** | **Increased hours by < 150% of usual. Example: 41-60 hrs/week** | **Increased hours by > 150%. Example: 61+ hrs/ week** |
| Staff Used | Usual Staff on Units | "Step Over Staff" with consistent training from other units.<br>Example: PACU RNs to ICU, nurse educators at bedside, outpatient clinic staff assigned to acute care duties | "Step Up Staff" that do not usually care for patients of current acuity.<br>Example: Intermediate or tele RNs to ICU |
| Staffing Ratios | Usual RN to Patient ratio | Ratio increase < 150% of usual Example: From 1:6 up to 1:9 | Ratio increase > 150% |
| Tiered Staffing (see next page for tactics) | | | Yes |
| Infectious Disease Status | Quarantined/positive staff off work | Quarantined staff used for direct patient care for Infected patients | Infected staff may care for infected patients if they are well enough to do so - e.g. during the end of their isolation period |
| Volunteer/Government providers utilized for direct patient care | | | Yes |

## STAFFING

| Recommendations | Strategy | Conventional | Contingency | Crisis |
|---|---|---|---|---|
| **Staff and Supply Planning**<br>• 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.<br>• Encourage employee preparedness planning (www.ready.gov and other resources).<br>• Cache adequate personal protective equipment (PPE) and support supplies.<br>• Educate staff on institutional disaster response and their potential disaster role(s) and any specific skills/knowledge they may require.<br>• Educate staff on community, regional, and state disaster plans and resources.<br>• Develop facility plans addressing staff's family/pets or staff shelter needs.<br>• Develop rapid on-boarding procedures as well as orientation materials and policies on access, supervision, charting, and limitations for temporary personnel. | *Prepare* | Yes | Yes | Yes |
| **Focus Staff *Time* on Core Clinical Duties**<br>• Minimize meetings and relieve administrative responsibilities not related to event.<br>• Implement efficient medical documentation methods appropriate to the incident.<br>• Cohort patients to conserve PPE and reduce staff PPE donning/doffing time and frequency. | *Conserve* | Yes | Yes | Yes |
| **Use Supplemental Staff**<br>• Bring in equally trained staff (burn or critical care nurses, Disaster Medical Assistance Team [DMAT], other health system or Federal sources).<br>• Bring in equally trained staff from administrative positions (nurse managers, educators, outpaitent staff, etc).<br>• Adjust personnel work schedules (longer but less frequent shifts, etc.) if this will not result in skill/PPE compliance deterioration.<br>• Use family members/lay volunteers to provide basic patient hygiene and feeding – releasing staff for other duties. | *Substitute* | | Yes | Yes |
| | *Adapt* | | Yes | Yes |
| **Focus Staff *Expertise* on Core Clinical Needs**<br>• 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.<br>• Implement tiered staffing where 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).<br>• Limit use of laboratory, radiographic, and other studies, to allow staff reassignment and resource conservation.<br>• Limit availability/indications for non-critical laboratory, radiographic, and other studies.<br>• Reduce documentation requirements.<br>• Restrict elective appointments and procedures. | *Conserve* | | Yes | Yes |
| **Use Alternative Personnel to Minimize Changes to Standard of Care**<br>• Use less trained personnel with appropriate mentoring and just-in-time education (e.g., health care trainees or other health care workers, Minnesota Responds Medical Reserve Corps, retirees).<br>• Use less trained personnel to take over portions of skilled staff workload for which they have been trained.<br>• Provide just-in-time training for specific skills.<br>• Cancel most sub-specialty appointments, screening endoscopies, etc. and divert staff to emergency duties including in-hospital or assisting public health at external clinics/screening/dispensing sites. | *Adapt* | | | Yes |

# NUTRITIONAL SUPPORT



| Recommendations | Strategy | Conventional | Contingency | Crisis |
|---|---|---|---|---|
| **Food**<br>• Maintain hospital supply of inexpensive, simple to prepare, long-shelf life foodstuffs as contingency for at least 96 hours with- out 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.<br>• 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. | *Prepare* | Yes | Yes | Yes |
| **Water**<br>• 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.<br>• Consider weight and dispensing issues if using 5 gallon bottles.<br>• Ensure there is a mechanism in place to verify tap water is safe to drink.<br>• Infants: assure adequate stocks of formula and encourage breastfeeding. | *Prepare* | Yes | Yes | Yes |
| **Staff/Family**<br>• 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).<br>• Consider having staff bring own food if practical to do so. | *Prepare* | Yes | Yes | Yes |
| **Planning**<br>• Work with stakeholders to encourage home users of enteral and parenteral nutrition to have contingency plans and alternate deliv- ery options. Home users of enteral nutrition typically receive delivery of 30 days supply and home users of parenteral nutrition typi- cally 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.<br>• 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.<br>• 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* | Yes | Yes | Yes |
| • Liberalize diets and provide basic nutrients orally, if possible. Total parenteral nutrition (TPN) use should be limited and priori- tized for neonatal and critically ill patients. | *Substitute* | Yes | Yes | Yes |
| • Non-clinical personnel serve meals and may assist preparation.<br>• Follow or modify current facility guidelines for provision of food/feeding by family members of patients.<br>• Anticipate and have a plan for the receipt of food donations. If donated food is accepted, it should be non-perishable, prepack- aged, and preferably in single serving portions. | *Adapt* | Yes | Yes | Yes |
| • Collaborate with pharmacy and nutrition services to identify patients appropriate to receive parenteral nutrition support vs. enteral nutrition. Access premixed TPN/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* | | Yes | Yes |
| • Eliminate or modify special diets temporarily.<br>• Use blenderized food and fluids for enteral feedings rather than enteral nutrition products if shortages occur. Examples:<br>• The Oley Foundation: Making Your Own Food for Tube Feeding, Klein, Marsha Dunn, and Suzanne Evans Morris. Homemade Blended Formula Handbook. Tucson: Mealtime Notions LLC, 2007. https://cdn.ymaws.com/oley.org/resource/resmgr/webinars/Oley_Webinar_Blenderized_Tub.pdf | *Adapt* | | Yes | Yes |

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# MEDICATION ADMINISTRATION



| Recommendations | Strategy | Conventional | Contingency | Crisis |
|---|---|---|---|---|
| **Cache/Increase Supply Levels *** | *Prepare* | Yes | Yes | Yes |
| • Patients should have at least 30 days supply of home medications and obtain 90 day supply if pandemic, epidemic, or evacuation is imminent.<br>• Examine formulary to determine commonly-used medications and classes that will be in immediate/high demand. This may involve coordination with insurance companies/pharmacies<br>• Increase supply levels or cache critical medications - particularly for low-cost items and analgesics.<br>• Key examples include: | | | | |
| **Analgesia**: • Morphine, other narcotic and non-narcotic (non-steroidals, acetaminophen) class - injectable and oral narcotic conversion tool (http://www.globalrph.com/narcoticonv.htm). | | | | |
| **Sedation**: • Particularly benzodiazepine (lorazepam, midazolam, diazepam) injectables, ketamine, and anti-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, pralidoxime, epinephrine, local anesthetics, antiemetics, insulin, common oral anti-hyper tensive, diabetes medications, tetanus vaccine and tranexamic acid, anti-epileptics (IV and oral), hypertonic saline,and anti-diarrheals. | | | | |
| **Use Equivalent Medications** | *Substitute* | Yes | Yes | Yes |
| • Obtain medications from alternate supply sources (pharmaceutical distributors, pharmacy caches).<br>• Explore options to compound or obtain from compounding pharmacies. | | | | |
| **Pulmonary**: • Metered dose inhalers instead of nebulized medications. | *Substitute* | | Yes | Yes |
| **Analgesia/ Sedation**: • Consider other medications (e.g. benzodiazepines , dexmedetomidine etc.) for propofol substitution (and other agents in short supply)<br>• ICU analgesia/sedation drips Morphine 4-10mg IV load then 2mg/h and titrate/re-bolus as needed usual 3-20mg/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<br>• Target therapy as soon as possible based upon organism identified. | | | | |
| **Other**: • Beta blockers, diuretics, calcium channel blockers, ace inhibitors, anti-depressants, anti-infectives. | | | | |
| **Reduce Use During High Demand** | *Conserve* | | Yes | Yes |
| • Restrict use of certain classes if limited stocks likely to run out (restrict use of prophylactic/empiric antibiotics after low risk wounds, etc.)<br>• Decrease dose; consider using smaller doses of medications in high demand/likely to run out (reduce doses of medica tions allowing blood pressure or glucose to run higher to ensure supply of medications adequate for anticipated duration of shortage).<br>• Allow use of personal medications (inhalers, oral medications) in hospital. | | | | |

## MEDICATION ADMINISTRATION

| Recommendations | Strategy | Conventional | Contingency | Crisis |
|---|---|---|---|---|
| • Do without - consider impact if medications not taken during shortage (statins, etc.). 2012 Drug Shortage Report (http://www.astho.org/Programs/Preparedness/Coping-With-Drug-Shortages/Drug-Shortage-Report-2012/) | *Conserve* | | | Yes |
| **Modify Medication Administration**<br>• Emphasize oral, nasogastric, subcutaneous routes of medication administration including use of NG sedation and analgesia.<br>• Administer medications by gravity drip rather than IV pump if needed:<br>• *IV drip rate calculation - drops/minute = amount to be infused x drip set/time (minutes) (drip set = qtts/mL - 60, 10, etc.).*<br>• Rule of 6: pt wgt (kg) x 6 = mg drug to add to 100mL fluid = 1mcg/kg/min for each 1 mL/hour<br>• NOTE: For examples, see Dosage Help: Volume/Time - IV Drop Rate Questions (http://www.dosagehelp.com/iv_rate_drop.html) | *Adapt* | | Yes | Yes |
| • Consider use of select medications beyond expiration date.**, especially tablets/capsules<br>• Consider use of veterinary medications when alternative treatments are not available.** | *Adapt* | | | Yes |
| **Restrict Allocation of Select Medications**<br>• 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* | | Yes | Yes |
| • Determine patient priority to receive medications in limited stock. | *Re-Allocate* | | | Yes |

*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.

# HEMODYNAMIC SUPPORT AND IV FLUIDS



| Recommendations | Strategy | Conventional | Contingency | Crisis |
|---|---|---|---|---|
| • Cache Additional Intravenous (IV) Cannulas, Tubing, Fluids, Medications, and Administration Supplies | *Prepare* | Yes | Yes | Yes |
| **Use Scheduled Dosing and Drip Dosing When Possible**<br>• Reserve IV pump use for critical medications such as sedatives and hemodynamic support.<br>• See drip rate calculations on Medication Administration page 4-2. | *Conserve* | | Yes | Yes |
| **Minimize Invasive Monitoring**<br>• Substitute other assessments (e.g., clinical signs, ultrasound) of central venous pressure (CVP).<br>• 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* | | Yes | Yes |
| **Emphasize Oral Hydration Instead of IV Hydration When Possible**<br>**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<br>**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<br>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.<br>NOTE: For further information and examples, see<br>• Rehydration Project http://rehydrate.org/<br>• Managing Acute Gastroenteritis Among Children https://www.cdc.gov/mmwr/preview/mmwrhtml/rr5216a1.htm<br>• Intravenous Fluid Orders-A Primer http://www.ped.med.utah.edu/cai/howto/IntravenousFluidOrders.PDF | *Substitute* | | Yes | Yes |
| **Provide Nasogastric Hydration Instead of IV Hydration When Practical**<br>• Patients with impediments to oral hydration may be successfully hydrated and maintained with nasogastric (NG) tubes.<br>• For fluid support, 8-12F (pediatric: infant 3.5F, < 2yrs 5F) tubes are better tolerated than standard size tubes. | *Substitute* | | Yes | Yes |
| **Substitute Epinephrine for Other Vasopressor Agents**<br>• 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.<br>• Epinephrine 1:1000 (1mg/mL) multi-dose vials available for drip use. | *Substitute* | | Yes | Yes |
| **Re-use CVP, NG, and Other Supplies After Appropriate Sterilization/Disinfection**<br>• Cleaning for all devices should precede high-level disinfection or sterilization.<br>• 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).<br>• Sterilize devices in contact with bloodstream (e.g., ethylene oxide sterilization for CVP catheters). | *Re-use* | | (disinfection –NG, etc) | (sterilization - central line, etc) |

## HEMODYNAMIC SUPPORT AND IV FLUIDS

| Recommendations | Strategy | Conventional | Contingency | Crisis |
|---|---|---|---|---|
| **Intraosseous/Subcutaneous (Hypodermoclysis) Replacement Fluids**<br>• Consider as an option when alternative routes of fluid administration are impossible/unavailable.<br>• Intraosseous route preferred over subcutaneous.<br>**Intraosseous**<br>• 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 0.5mg/kg slow IV push.<br>**Hypodermoclysis**<br>• Cannot correct more than moderate dehydration via this technique.<br>• Many medications cannot be administered subcutaneously.<br>• Common infusion sites: pectoral chest, abdomen, thighs, upper arms.<br>• Common fluids: normal saline (NS), D5NS, D5 1/2 NS (Can add up to 20-40 mEq potassium if needed.)<br>• 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.)<br>• Maximal volume about 3 liters/day; requires site rotation.<br>• Local swelling can be reduced with massage to area.<br>• Hyaluronidase 150 units/liter facilitates fluid absorption but not required; may not decrease occurrence of local edema | *Substitute* | | | Yes |
| **Consider Use of Veterinary and Other Alternative Sources for Intravenous Fluids and Administration Sets** | *Adapt* | | | Yes |

# MECHANICAL VENTILATION/EXTERNAL OXYGENATION

MECHANICAL VENT./EXT. OXYGENATION

| Recommendations | Strategy | Conventional | Contingency | Crisis |
|---|---|---|---|---|
| **Increase Hospital Stocks of Ventilators and Ventilator Circuits, ECMO or bypass circuits** | *Prepare* | Yes | Yes | Yes |
| **Access Alternative Sources for Ventilators/specialized equipment**<br>• Obtain specialized equipment from vendors, health care partners, regional, state, or Federal stockpiles via usual emergency management processes and provide just-in-time training and quick reference materials for obtained equipment. | *Substitute* | Yes | Yes | Yes |
| **Decrease Demand for Ventilators**<br>• Increase threshold for intubation/ventilation.<br>• Decrease elective procedures that require post-operative intubation.<br>• Decrease elective procedures that utilize anesthesia machines.<br>• Use non-invasive ventilatory support when possible.<br>• Attempt earlier weaning from ventilator. | *Conserve* | | Yes | Yes |
| **Re-use Ventilator Circuits**<br>• Appropriate cleaning must precede sterilization.<br>• If using gas (ethylene oxide) sterilization, allow full 12-hour aeration cycle to avoid accumulation of toxic by-products on surface.<br>• Use irradiation or other techniques as appropriate. | *Re-use* | | Yes | Yes |
| **Use Alternative Respiratory Support Technologies**<br>• Use transport ventilators with appropriate alarms - especially for stable patients without complex ventilation requirements. | *Adapt* | | Yes | Yes |
| • Use anesthesia machines for mechanical ventilation as appropriate/capable.<br>• Use bi-level (BiPAP) and high-flow nasal cannula units to support patients in respiratory distress while avoiding intubation.<br>• Consider bag-valve ventilation as temporary measure while awaiting definitive solution/equipment (as appropriate to situation – extremely labor intensive and may consume large amounts of oxygen). | | | | Yes |
| **Assign Limited Ventilators to Patients Most Likely to Benefit if No Other Options Are Available**<br>**SOFA score predictive value for outcome is poor in many conditions and should be used as a relative marker for multi-organ failure (MOF) with higher scores indicating worsening levels of MOF and may be helpful as a neutral comparator** | | | | *Allocate/ Re-allocate* |
| • **STEP ONE:** Assure that end of life wishes are known and documented including for long-term ventilator therapy and other disease-specific interventions. | | | | *Allocate/ Re-allocate* |
| • **STEP TWO:** Assure that no other ventilators or short-term options exist and that the facility has exhausted external options to obtain ventilators or transfer patients. | | | | *Allocate/ Re-allocate* |

## MECHANICAL VENT./EXT. OXYGENATION

| Recommendations | Strategy | Conventional | Contingency | Crisis |
|---|---|---|---|---|

- **STEP THREE:** In consultation with another expert provider or triage team, assess patients receiving mechanical ventilation and those who require mechanical ventilation including condition specific prognosis and current severity of illness. SOFA may be used as a general comparator of degree of illness . Small differences of SOFA scores between patients should not be used to make clinical decisions. SOFA scores do not have good predictive value in critical respiratory illness and may need to be adjusted for patients for end state renal disease.

| Organ system | Score = 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| **RESPIRATORY Pa02/Fi02** | > 400 | < 400 | < 300 | < 200 with resp. support | < 100 with resp. support |
| **HEMATOLOGIC Platelets** | > 150 | < 150 | < 100 | < 50 | < 20 |
| **HEPATIC ilirubin (mg/dl)** | < 1.2 | 1.2 – 1.9 | 2.0 – 5.9 | 6 – 11.9 | > 12 |
| **CARDIOVASCULAR Hypotension** | None | Mean Arterial Pressure < 70 mmHg | Dopamine < 5 or any Dobutamine | Dopamine > 5 or Epi < 0.1 or Nor-Epi < 0.1 | Dopamine > 15 or Epi > 0.1 or Nor-Epi > 0.1 |
| **CENTRAL NERVOUS SYSTEM Glasgow Coma Score** | 15 | 13 - 14 | 10 - 12 | 6 - 9 | <6 |
| **RENAL Creatinine** | <1.2 | 1.2 - 1.9 | 2.0 - 3.4 | 3.5 - 4.9 | >5.0 |

Crisis: *Allocate/ Re-allocate*

- **STEP FOUR:** use prognostic information to determine who will most benefit from the intervention and allocate resources to those needing them according to best evidence for the specific condition, ideally using a regional / state protocol or framework specific to the condition.

| Criteria | Patient keeps resource | | Resource re-allocated or allocated |
|---|---|---|---|
| **Prognosis** | Good prognosis based upon epidemiology of specific disease/ injury. | Indeterminate/intermediate prognosis based upon epidemiology of specific disease/injury and/or | Poor prognosis based upon epidemiology of specific disease/injury (e.g., pandemic influenza). |
| | No major underlying disease. [b] | Underlying disease state expected to limit survival to less than a year after hospital discharge or otherwise affect prognosis. | Severe underlying disease that limits expected survival to less than 6-12 months after hospitalization. |
| **SOFA[a] or other scoring system** | Low potential for death | Intermediate potential for death. | High potential for death. |
| **Duration of need** | Short duration – Short duration conditions such as: angioedema, airway protection, asthma, DKA, pulmonary edema/volume overload, procedural/ post-procedural intubationsubstance abuse/withdrawal, overdose, agitation, seizure. | | Long duration – e.g., ARDS, particularly in setting of preexisting lung disease (estimate > 7 days on ventilator) |
| **Response to mechanical ventilation** | Improving clinical condition over timec. | Stable clinical condition over time. | Worsening clinical condition over time compared to expected course. |

Crisis: *Allocate/ Re-allocate*

## MECHANICAL VENT./EXT. OXYGENATION

| Recommendations | Strategy | Conventional | Contingency | Crisis |
|---|---|---|---|---|
| [a] The Sequential Organ Failure Assessment (SOFA) score is commonly used as a comparator of multi-organ function but has severe limitations as above. Unless validated in the specific disease state, specific values of SOFA should not be used to deny resources to a patient.<br>[b] Examples of underlying diseases that predict poor short-term survival include (but are not limited to):<br>Congestive heart failure with ejection fraction < 25% (or persistent ischemia unresponsive to therapy or non-reversible ischemia with pulmonary edema).<br>Severe chronic lung disease including pulmonary fibrosis, cystic fibrosis, obstructive or restrictive diseases requiring continuous home oxygen use prior to onset of acute illn.<br>Central nervous system, solid organ, or hematopoietic malignancy with poor prognosis for recovery.<br>Cirrhosis with ascites, history of variceal bleeding, fixed coagulopathy or encephalopathy.<br>Acute hepatic failure with hyperammonemia.<br>[c] Changes in Oxygenation Index over time may provide comparative data, though of uncertain prognostic significance.<br>OI = MAWP x FiO2/PaO2 where: OI = oxygenation index, MAWP= Mean Airway Pressure, FiO2 = inspired oxygen concentration, PaO2 = arterial oxygen pressure (May be estimated from oxygen dissociation curve if blood gas unavailable.) | | | | *Allocate/ Re-allocate* |
| • **STEP FIVE:** Reassess patients receiving mechanical ventilation at regular intervals. If resources must be re-allocated from those that already are receiving them discuss prognosis with family members of those patients with poor prognosis. Re-allocate resources only if the sickest patient using the resource has a significaltyworse prognosis when compared to a patient needing the resource with features on the far left of the table. | | | | *Allocate/ Re-allocate* |

Note - regional strategies and prioritization for ECMO and other specific therapies may exist that do not follow this table. Be aware of the process for decision-making and any associated tools used in your area. See the ECMO card in this set for further information.

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# BLOOD PRODUCTS



| | Recommendations | Health care Facility | Blood Center | Strategy | Conventional | Contingency | Crisis |
|---|---|---|---|---|---|---|---|
| All Blood Products | Blood bank to closely monitor local and national inventory and coordinate with local suppliers. | yes | | *Prepare* | Yes | Yes | Yes |
| | Blood Bank to develop system-wide communication and coordinate with high blood use departments to adopt conservation effort. | yes | | *Conserve* | Yes | Yes | Yes |
| | Implement Blood Bank Pathologist call schedule for shortage questions. | yes | | *Adapt* | Yes | Yes | Yes |
| | Implement prospective blood utilization review for scheduled transfusions and blood bank order review for unscheduled transfusions; blood bank pathologists to match all transfusions to strict utilization criteria | yes | | *Adapt* | | Yes | Yes |
| | Organization to communicate an urgent call for donations through media and organizational communications | yes | | *Adapt* | | Yes | Yes |
| | Consider rescheduling non-emergent surgeries and procedures that can be delayed without causing immediate patient health impacts | yes | | *Conserve* | | Yes | Yes |
| | Prospectively develop policies to be implemented in times of crisis: e.g. decreasing the size of MTP packs or accepting back into inventory units which may be slightly out of temp | yes | | *Conserve* | | | Yes |
| | Coordinate with patient care team to judiciously use blood products for Massive Transfusion Protocols based on available inventory. | yes | | *Re-allocate* | | | Yes |
| | In the event that routine blood orders cannot be fulfilled, the Blood bank community will meet to come up with contingency plans. | yes | | *Adapt* | | | Yes |
| | Coordinate with FDA and other regulatory agencies to manage donor criteria | | | *Adapt* | Yes | Yes | Yes |
| | Implement thromboelastography based transfusion algorithm | | | *Conserve* | | Yes | Yes |
| Red Blood Cells | Minimize phlebotomy to decrease likelihood of hospital acquired anemia | yes | | *Adapt* | Yes | Yes | Yes |
| | Use cell-saver and auto-transfusion to degree possible. | yes | | *Re-use* | Yes | Yes | Yes |
| | Limit use of O negative RBCs to women of child-bearing potential, Rh negative NICU patients, and chronically transfused O negative patients | yes | | *Conserve* | Yes | Yes | Yes |
| | Use O positive packed cells for emergent transfusion of males and post-menopausal women following local blood bank procedures to conserve O negative. | yes | | *Conserve* | Yes | Yes | Yes |
| | Treat underlying chronic anemia with pharmacological agents | yes | | *Substitute* | Yes | Yes | Yes |
| | Consider reduction in red cell:plasma ratios in the context of a massive transfusion protocol | yes | | *Conserve* | | Yes | Yes |
| | Lower trigger for RBC transfusion to a hgb of 6.0 g/dL based on patient condition | yes | | *Conserve* | | Yes | Yes |
| | Further limit PRBC use, if needed, by using indices other than hemoglobin, e.g. tissue oxygen saturation monitoring; lactate, vitals | yes | | *Conserve* | | | Yes |

## BLOOD PRODUCTS

| | Recommendations | Health care Facility | Blood Center | Strategy | Conventional | Contingency | Crisis |
|---|---|---|---|---|---|---|---|
| Plasma | Consider use of fibrinolysis inhibitors or other modalities to reverse coagulopathic states (tranexamic acid, aminocaproic acid, actived coagulation factor use, or other appropriate therapies | yes | | *Substitute* | Yes | Yes | Yes |
| | Consider reduction in red cell:plasma ratios in massive transfusion protocols in consultation with blood bank medical staff. | yes | | *Conserve* | | Yes | Yes |
| | Consider albumin replacement in plasmapheresis when possible to conserve plasma | yes | | *Substitue* | Yes | Yes | Yes |
| Platelets | Though not true substitute, consider use of desmopressin (DDAVP) to stimulate improved platelet performance in renal and hepatic failure patients. | yes | | *Substitute* | Yes | Yes | Yes |
| | Consider alternatives to apheresis platelets | | yes | *Adapt* | Yes | Yes | Yes |
| | Consider delaying prophylactic use of platelets. Consider half doses. | yes | | *Conserve* | Yes | Yes | Yes |
| | Standardize and implement protocol for refractoriness of platelets and develop Epic tools for early recognition | yes | | *Conserve* | Yes | Yes | Yes |
| | Change prophylactic transfusion trigger to 5,000 /microliter | yes | | *Conserve* | | Yes | Yes |
| | Consider reduction in platelet ratios in the context of a massive transfusion protocol | yes | | *Adapt* | | Yes | Yes |
| | Consider extending the expiration dates of platelets | yes | | *Adapt* | | | Yes |
| | Consider eliminating 24h hold for negative culture results / immediate release of both pool and apheresis platelets. | | yes | *Adapt* | | | Yes |
| Cryo | Require a fibrinogen measurement before thawing cryprecipitate | yes | | *Conserve* | Yes | Yes | Yes |
| | Use fibrinogen concentrates | yes | | *Substitute* | Yes | Yes | Yes |
| | Lower fibrinogen trigger based on patient condition | yes | | *Adapt* | | Yes | Yes |

* FDA approval/variance required via American Association of Blood Banks (AABB)
Resource: ASPR TRACIE Blood and Disaster: Frequently Asked Questions (https://files.asprtracie.hhs.gov/documents/aspr-tracie-blood-and-blood-products-during-disasters-faq.pdf).
This document includes answers to frequently asked questions about blood use during disasters.

# RENAL REPLACEMENT THERAPY



Resource cards are intended to provide incident-specific tactics and planning information to supplement the general strategy cards. They are organized according to The CO-S-TR Model for Initial Incident Assessment (https://www.cambridge.org/core/journals/disaster-medicine-and-public-health-preparedness/article/abs/surge-capacity-concepts-for-health-care-facilities-the-costr-model-for-initial-incident-assessment/71F2DC0270A419AD93F8BE90B9037213).

| | Resource & Recommendations | Strategy | Conventional | Contingency | Crisis |
|---|---|---|---|---|---|
| Command, Control, Communication, Coordination | **General Preparedness Information**<br><br>Compared to other critical care interventions, hemodialysis offers equipment availability, expansion capacity, and care coordination that greatly reduces the risk of contingency and crisis care, at least in our geographic area.<br><br>Disaster dialysis challenges generally result from:<br>1. Lack of clean water sources (each hemodialysis requires about 160 liters ultra-clean water).<br>2. Relocation of dialysis-dependent patients to a new area (evacuation of nursing homes, flood zones, etc.)<br>3. Increase in patients requiring dialysis (crush syndrome, unusual infections).<br><br>**Outpatient**<br>• Primary providers are DaVita and Fresenius – both have extensive contingency plans to increase capacity and relocate patients (including toll-free numbers to access dialysis services).<br>• Midwest Kidney Network (https://www.midwestkidneynetwork.org/living-well/emergency-preparedness) (Multi-state renal planning, quality, and emergency preparedness) has a database of all dialysis patients in the state/ region and assists coodination of activities.<br><br>**Inpatient**<br>• Most facilities lease inpatient services via contract with above or other agencies; some have own nurses and program – plans should account for contingency use of alternate services/leasing services.<br><br>**Patient preparedness**<br>• Patients should have a disaster plan – including specific foods set aside for up to 72h. Note that shelters are unlikely to have foods conducive to renal dietary needs (low sodium, etc.)<br>• Personal planning guidance from the National Kidney Foundation (https://www.kidney.org/sites/default/files/2024-10/11-10-0807_2206_PatBro_PlanForEmergP.pdf)<br><br>**Shortage of Renal Replacement Therapy (RRT) Resources**<br>• Affected facility should contact involved/affected dialysis provider companies and organizations as expert consultants.[1] (MDH EPR and the Renal Network 11 website maintain contact information) | *Prepare* | Yes | Yes | Yes |
| Space | **Relocated Patients Requiring Outpatient Dialysis**<br>• Contact usual outpatient provider network to schedule at new facility – refer patients to 'hotlines' as needed.<br><br>**Excess Patients Requiring Dialysis**<br>• Transfer patients to other facilities capable of providing dialysis.<br>• Consider moving patients to facilities with in-house water purification if water quality is an issue for multiple inpatients requiring dialysis. | *Substitute* | Yes | Yes | Yes |
| | • Consider moving other inpatient or outpatient dialysis staff and equipment to facilities requiring increased dialysis capacity. | *Adapt* | | Yes | Yes |

# RENAL REPLACEMENT THERAPY

| | Resourse & Recommendations | Strategy | Conventional | Contingency | Crisis |
|---|---|---|---|---|---|
| Supplies | **Water Supply**<br>• Quantify water-purifying machines available for bedside dialysis machines.<br>• Identify facilities providing high-volume services that purify their own water and pipe to specific rooms in the dialysis unit, intensive care, etc.<br>• Identify water-purifying and dialysis machines to be obtained through lease agreements. | *Prepare* | Yes | Yes | Yes |
| | **Water Contamination**<br>• Consider alternate sources of highly purified water. | *Prepare* | Yes | Yes | Yes |
| | • Consider transferring stable inpatients to outpatient dialysis centers for dialysis treatments and vice versa. | *Substitute* | | Yes | Yes |
| | • Consider use of MN National Guard water reserves and purification equipment – but must assure adequate purity for dialysis (potable is NOT sufficiently clean). | *Adapt* | | Yes | Yes |
| | **Power Outage or Shortage**<br>• Consider transferring stable inpatients to outpatient dialysis centers for dialysis treatments and vice versa. | *Substitute* | | Yes | Yes |
| | • Consider transferring inpatients to other hospitals.<br>• Consider transfer of outpatients to other facilities for care until issue resolved. | *Adapt* | | Yes | Yes |
| | **Dialysis Catheters, Machines, Reverse Osmosis Machines, and/or Other Supply Shortages**<br>***Note:*** Dialysis catheters and tubing are inexpensive, relatively interchangeable, and supplied by several manufacturers. | | Yes | Yes | Yes |
| | • Stock adequate dialysis tubing sets and venous access catheters (Quinton, etc.) for at least one month's usual use.<br>• Identify provider network and other sources of supplies and machines. | *Prepare* | Yes | Yes | Yes |
| | • Transfer machines/supplies between outpatient centers and hospitals, or between hospitals. | *Substitute* | Yes | Yes | Yes |
| Staff | **Dialysis Staff Shortages**[2]<br>• Non-dialysis nursing staff to take on "routine" elements of dialysis nursing (e.g., taking VS, monitoring respiratory and hemodynamic status, etc.). | *Substitute* | Yes | Yes | Yes |
| | • Dialysis nursing staff to supervise non-dialysis nursing staff providing some dialysis functions .<br>• Outpatient dialysis techs may be used to supervise dialysis runs if provider deficit is critical issue (would be unlikely aside from potentially in pandemic or other situation affecting staff). | *Adapt* | | Yes | Yes |
| Special | **Community Planning**<br>• Medical needs of re-located renal failure patients are substantial; planning on community level should incorporate their medication and dietary needs during evacuation and sheltering activities. | *Prepare* | Yes | Yes | Yes |
| Triage | **Insufficient Resources Available For All Patients Requiring Dialysis**<br>• Change dialysis from 'scheduled' to 'as needed' based on clinical and laboratory findings (particularly hyperkalemia and impairment of respiration) – parameters may change based on demand for resources. | *Conserve* | | Yes | Yes |
| | • Conceivable (but extraordinary, given outpatient dialysis machine resources) situations may occur where resources are insufficient to the point that some patients may not be able to receive dialysis (for example, pandemic when demand nationwide exceeds available resources) – access to dialysis should be considered as part of critical care intervention prioritization (see Mechanical Ventilation Strategies for Scarce Resource Situations). | *Re-allocate* | | | Yes |

# RENAL REPLACEMENT THERAPY

| | Resourse & Recommendations | Strategy | Conventional | Contingency | Crisis |
|---|---|---|---|---|---|
| Treatment | **Crush Syndrome**<br>• Initiate IV hydration and acidosis prevention protocols "in the field" for crush injuries to prevent/treat rhabdomyolysis in hospital settings. | *Conserve* | Yes | Yes | Yes |
| | **Mode of Dialysis**<br>• Restrict to hemodialysis only for inpatient care (avoid continuous renal replacement therapy (CRRT) and peritoneal dialysis (PD) due to duration of machine use (CRRT) and supply issues (PD)). | *Substitute* | | Yes | Yes |
| | **Increased Demand on Resources**<br>• Shorten duration of dialysis for patients likely to tolerate in order to maximize patients per dialysis machine.<br>• Patients to utilize their home "kits" of medication (Kayexalate) and follow dietary plans to help increase time between treatments, if necessary. | *Conserve* | | Yes | Yes |
| Transportation | **Transportation Interruptions**<br>• Dialysis patients may require alternate transportation to assure ongoing access to dialysis treatment.<br>• Chronic patients should coordinate with their service providers/dialysis clinics first for transportation and other assistance during service/transportation interruptions. | *Prepare* | Yes | Yes | Yes |
| | • Emergency management and/or the health and medical sector may have to supplement contingency transportation to dialysis during ice storms or other interruptions to transportation. | *Adapt* | Yes | Yes | Yes |

1 The major national dialysis corporations have extensive experience contending with disasters; their input during any anticipated or actual incident is imperative to optimize the best patient care in Minnesota.

2 See Staffing in the Core Clinical Strategies for Scarce Resource Situations card set.

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# BURN TREATMENT



Resource cards are intended to provide incident-specific tactics and planning information to supplement the general strategy cards. They are organized according to The CO-S-TR Model for Initial Incident Assessment (https://www.cambridge.org/core/journals/disaster-medicine-and-public-health-preparedness/article/abs/surge-capacity-concepts-for-health-care-facilities-the-costr-model-for-initial-incident-assessment/71F2DC0270A419AD93F8BE90B9037213).

| | Resource & Recommendations | Strategy | Conventional | Contingency | Crisis |
|---|---|---|---|---|---|
| Command, Control, Communication, Coordination | **General Preparedness Information**<br>This cardset is specifically designed to address supplies and needs during the first 24 hours of care. | *Prepare* | Yes | Yes | Yes |
| Space | • Maximal use of burn beds at Hennepin Healthcare, Regions, and Essentia Health-Duluth. | *Adapt* | Yes | Yes | Yes |
| | • Expand burn units at Hennepin Healthcare and Regions into other ICU spaces at those hospitals. | *Conserve* | | Yes | |
| | • Transfer non-burn ICU patients out of Hennepin Healthcare and Regions to other facilities, if necessary<br>• Forward movement to regional burn centers in adjoining states as required to assure appropriate ongoing care in coordination with MDH-Center for Emergency Preparedness and Response, the Great Lakes Health care Partnership (FEMA Region V - MN, WI, IL, IN, MI, OH), and the ABA Midwest Burn Region (IA,MN,NE,ND, SO,WI, IL and MO).<br>• National Disaster Medical System (NDMS) patient movement may be required in massive incidents. In such an event, a burn transfer coordination point will be designated and contact information circulated to hospitals. | *Adapt* | | | |

| American Burn Association verified burn centers in Minnesota | Referral/Consultation phone numbers | # Burn beds | Surge capacity |
|---|---|---|---|
| Hennepin Healthcare | 1-800-424-4262 | 17 | 25 |
| Regions Hospital (Regions) | 1-800-922-BURN (2876) | 18 | 25 |

- Additional capacity is available at Minnesota Burn Surge Facilities:
  - Essentia Health-Duluth
  - Mayo Clinic St. Mary's Hospital in Rochester
  - Sanford Health-Worthington
  - St. Cloud Hospital
  - Altru-Grand Forks
  - Sanford Health-Fargo
  - Essentia Health-Fargo
  - Abbott Northwestern
  - Children's Hospitals & Clinics
  - Mercy Hospital
  - North Memorial
  - United Hospital
  - University of Minnesota Medical Center-M Health
- For contact information, reference the Minnesota Burn Surge Plan (www.health.state.mn.us/communities/ep/surge/burn/burnsurgeplan.pdf).
- Essentia Health - Duluth and May Clinic St.Mary's do provide some burn services.
- Burn casualties must be stabilized at the receiving hospital and then transferred to a burn center. Burn casualties should initially be transported to the highest level of burn/trauma care that is available in the area.
- Metro Coalition Regional Hospital Resource Center (RHRC), with State Burn Center Medical Directors will coordinate patient placement and transfer per the Minnesota Burn Surge Plan (www.health.state.mn.us/communities/ep/surge/burn/burnsurgeplan.pdf).
- Mass burn incidents are unusual but must be anticipated. The ability of non-burn center hospitals to stabilize successfully and initially treat victims is critical to successful response. All hospitals should plan for incidents considering their relative size and role in the community.
- In a mass burn incident, burn consultation resources will be provided. Resource contacts may be outside of Minnesota (e.g., University of Michigan), because Hennepin Healthcare and Regions staff will be occupied with patient care and transfer activities.

# BURN TREATMENT

| Resource & Recommendations | Strategy | Conventional | Contingency | Crisis |
|---|---|---|---|---|

Supplies: Typical Planning Numbers

## Hospital Outpatient Supply Planning

| Center Type | Burn Center | Level I & II Trauma Centers | Level III & IV Trauma Centers |
|---|---|---|---|
| Number of Outpatients | 100 | 50 | 25 |

Outpatient clinics and urgent care centers may also cache appropriate supplies for their location and patient population.

*Strategy:* Prepare; Increase Supply — Conventional: Yes; Contingency: Yes; Crisis: Yes

**Suggested supplies per patient for first 72 hours (amounts needed will vary) include:**

| Quantity | Item |
|---|---|
| 5 | 8 cm x18 cm (3 x 7 inch) sheets petroleum-impregnated gauze (e.g., Adaptic) |
| 4 | 10 cm (4 inch) rolls of stretchable roller gauze (e.g., Kerlix); variety of sizes suggested |
| 2 | 120g (4oz) tube bacitracin |
| 30 | Tablets of ibuprofen 800 mg and stock liquid form for pediatric use |
| 50 | Opioid analgesic tablets (50 tablets for 5 day supply if 1-2 tablets every 4 to 6 hours); also stock pediatric alternatives |

*Strategy:* Adapt — Conventional: Yes; Contingency: Yes; Crisis: Yes

## Inpatient Supply Planning

Institutions should prepare based on role in community. In contingency/crisis situation, emphasis moves away from silver-impregnated dressings (expensive to stockpile) to bacitracin/petrolatum-impregnated dressings (e.g. Adaptic). If transfer is possible within the first 24 hours, simple dry sterile sheets or dressings are appropriate - see Burn Triage Card for information.

*Strategy:* Prepare; Increase Supply — Conventional: Yes; Contingency: Yes; Crisis: Yes

| Center Type | Burn Center | Level I & II Trauma Centers | Level III & IV Trauma Centers |
|---|---|---|---|
| Number of Inpatients | 50 | 10 | 5 |

Consider stocking, or having plans to obtain supplies sufficient for 2-3 days of care.
Estimated usage of supplies per 24 hours **per patient** is below.

| Quantity | Item |
|---|---|
| 15 | 8 cm x 18 cm (3 x 7 inch) sheets petroleum gauze (about 50 % of total body surface area (TBSA) normal body mass is average for major burn patient). |
| 2 | Bacitracin 120 g (4 oz) tubes (or 1 lb. jar for 2 victims). |
| 10 | Rolls of 10 cm (4 inch) stretchable roller gauze, such as Kerlix |
| 2 | 5 cm (2 inch) rolls stretchable roller gauze (e.g., Kerlix) for fingers/toes/small area wrapping - can also substitute 4 inch and cut in half |
| 250 | Mg of Morphine (or equivalent) 10 mg/hour x 24 hours per patient. Massive doses of opioid analgesia and anxiolytics may be required by burn patients (including any patients that are only receiving palliative care) |
| 1 | Tetanus booster per 2 patients |
| 14 | Liters of IV Fluid - for example from Parkland formula 4mL/kg x 50% BSA = 14 liters of Fluid. Lactated Ringers preferred, but saline is acceptable – may contributed to acidosis |
| 1 | Central line (including 20% pediatric sizes) |

*Strategy:* Adapt — Conventional: Yes; Contingency: Yes; Crisis: Yes

# BURN TREATMENT

| | Resource & Recommendations | Strategy | Conventional | Contingency | Crisis |
|---|---|---|---|---|---|
| Staff | **Staff**<br>• Strongly consider pre-incident training on care of major burns for physician and nursing staff; have quick-reference cards/materials available for burn stabilization. See Minnesota Department of Health Burn Surge webpage for resources and educational videos.<br>• Identify staff with prior burn treatment experience (e.g., military).<br>• Plan for just-in-time training for non-burn nursing and physician staff, reinforcing key points of burn patient care (in cluding importance of adequate fluid resuscitation, urine output parameters, principles of analgesia, etc.) | *Prepare*<br>*Adapt* | Yes | Yes | Yes |
| | • Consider sending burn-trained RN/MD to affected center to assist with triage and initial management if staffing allows.<br>• Burn nurses and physicians provide burn/dressing related care only; other ICU and floor nursing and physician staff provide supportive care. Adjust burn nurse staffing patterns as needed. See Staffing Strategies for Scarce Resource Situations sheet for further considerations. | *Adapt* | | Yes | Yes |
| | • Consider just-in-time training on dressing changes, wound care and monitoring – especially at non-burn centers.<br>• MDH may work with state, ABA Midwest Region, or the Great Lakes Health care Partnership to set up a 'hotline' and/or telemedicine or other virtual means by which non-burn centers may easily consult with burn experts.<br>• National Disaster Medical System (NDMS) personnel and other supplemental staff may be required. | *Conserve*<br>*Adapt*<br>*Substitute* | | Yes | Yes |
| Special | **Special Considerations**<br><br>Consider availability of resources for:<br>• Airway/inhalational injury – extra airway management supplies, bag-valve assemblies, etc.<br>• Pediatric age-appropriate intravenous, intraosseous access devices, medication dosing guides.<br>• Consider carbon monoxide or cyanide poisoning if closed space smoke exposure – consult Poison Control Center.*<br>• Inhalational exposure – aggressive, early airway management for inhalational injuries.<br>• Electrical – high incidence of rhabdomyolysis and internal injuries – increase fluid resuscitation, add bicarbonate to intravenous fluids to alkalinize urine, monitor serum bicarbonate, creatinine, and creatine kinase.<br>• Chemical and radiologic – consider need for specific therapies - consult Poison Control Center.*<br>• Consider need for decontamination - consult Poison Control Center.*<br>• Psychological support for patients, their families and staff. (Do not under-estimate the increased stress and psychological impact of a burn incident, particularly a mass casualty incident, on health care providers.)<br><br>* Poison Control Center 1-800-222-1222 | *Prepare* | Yes | Yes | Yes |

# BURN TREATMENT

Triage

## Resource & Recommendations

### Critical Burns – Transfer to Burn Center As Soon As Possible

- See Burn Triage Card.
- Regardless of the extent of burn involvement, palliation of pain should be considered a priority.

If large number of casualties and very severe burns, triage may have to be implemented based on knowledge of percent burn, age and underlying health issues, combined trauma or other conditions (such as severe inhalational injury). Initially, full support should be provided to as many patients as possible. **A triage table may contribute to decisions made by burn surgeons but should NOT substitute for a more global assessment of patient prognosis.**

(Saffle JR, Gibran N, Jordan M. Defining the ratio of outcomes to resources for triage of burn patients in mass casualties. J Burn Care Rehabil. 2005;26:478-482)

**Burn Size (% total Body Surface area)**

| 0-10% | 11-20% | 21-30% | 31-40% | 41-50% | 51-60% | 61-70% | 71-80% | 81-90% | 91%+ |
|---|---|---|---|---|---|---|---|---|---|
| Very High | Very High | Very High | High | Medium | Medium | Medium | Low | Low | Low/ Expectant |
| Outpatient | Very High | Very High | High | High | High | Medium | Medium | Low | Low |
| Outpatient | Very High | Very High | High | High | High | Medium | Medium | Medium | Low |
| Outpatient | Very High | Very High | High | High | Medium | Medium | Medium | Low | Low |
| Outpatient | Very High | Very High | High | Medium | Medium | Medium | Medium | Low | Low |
| Outpatient | Very High | Very High | Medium | Medium | Medium | Medium | Low | Low | Low |
| Outpatient | Very High | Very High | Medium | Medium | Medium | Low | Low | Low/ Expectant | Low/ Expectant |
| Very High | Very High | Medium | Medium | Low | Low | Low | Low/ Expectant | Low/ Expectant | Low/ Expectant |
| Very High | Medium | Medium | Low | Low | Low/ Expectant | Expectant | Expectant | Expectant | Expectant |

**Outpatient:** Survival and good outcome expected, without requiring initial admission;
**Very High:** Survival and good outcome expected with limited/shortterm initial admission and resource allocation (straightforward resuscitation, LOS <1421 days, 12 surgical procedures); **High**: Survival and good outcome expected (survival > 90%) with aggressive and comprehensive resource allocation, including aggressive fluid resuscitation, admission >1421 days, multiple surgeries, prolonged rehabilitation;
**Medium**: Survival 5090% and/or aggressive care and comprehensive resource allocation required, including aggressive resuscitation, initial admission >1421 days, multiple surgeries and prolonged rehabilitation; **Low:** Survival <50% even with long-term aggressive treatment and resource allocation;
**Expectant:** Predicted survival <10% even with unlimited aggressive treatment.

| Strategy | Conventional | Contingency | Crisis |
|---|---|---|---|
| *Conserve* | Yes | Yes | Yes |
| *Re-Allocate* | | | Yes |

# BURN TREATMENT

| | Resource & Recommendations | Strategy | Conventional | Contingency | Crisis |
|---|---|---|---|---|---|
| Treatment | **Treatment**<br>• Provide stabilizing burn care (airway, fluid management, analgesia, etc. – see Burn Triage Card with initial priorities, wound care, and nursing care). | Adapt | Yes | Yes | Yes |
| | • After stabilizing care, assess need for transfer to burn center. In a mass burn incident, assure coordination with the Metro Regional Hospital Resource Center (RHRC), which will help to prioritize transportation and manage logistics. Patients may have to be held for up to 72 hours at a Burn Surge Facility awating transfer to a Burn Center. | | | | |
| Transport | **Transport**<br>• Initial dressings should be dry, sterile dressing if transfer planned. If transfer will be delayed, adaptic dressings may be applied in consultation with burn center.<br>• In consultation with burn specialist, arrange air medical transport or ground transport as appropriate. If multiple insti tutions are affected, coordinate with the Metro RHRC and your health care coalition.<br>• Obtain consultation with burn experts for ongoing care and triage/transportation prioritization if immediate trans portation/referral is not possible.<br>Hennepin Healthcare: 1-800-424-4262<br>Regions: 1-800-922-2876 (BURN) | Prepare | Yes | Yes | Yes |
| | • Plan for oxygen, fluids, and analgesia requirements during transport.<br>• Consider need for airway intervention prior to transport.<br>• Multi-Agency Coordination Center (MAC) may be used to help prioritize use of transportation assets.<br>• Consider use of Metro Mass Casualty Incident (MCI) buses for large numbers of non-critical patients being transferred (contact MDH-EPR) on-call via State Duty Officer).<br>• Regional transfer may be required – Metro RHRC will coordinate this with MDH-EPR and appropriate state and Federal (NDMS) resources. | Adapt | | | Yes |

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# INITIAL BURN MANAGEMENT AND ASSESSMENT

## Patient Arrives/Initial Assessment

### High risk features? *

- Partial thickness burns > 10% total body surface area (BSA).
- Burns that involve the face, hands, feet, genital area or joints.
- Third degree burns.
- Electrical burns, including lightning injury.
- Chemical burns.
- Inhalation injury.
- Any patient with burns and concomitant trauma.

* Consultation/special consideration recommended for elderly, children <5 years, underlying diseases such as diabetes, or special rehabilitation needs.

Yes →

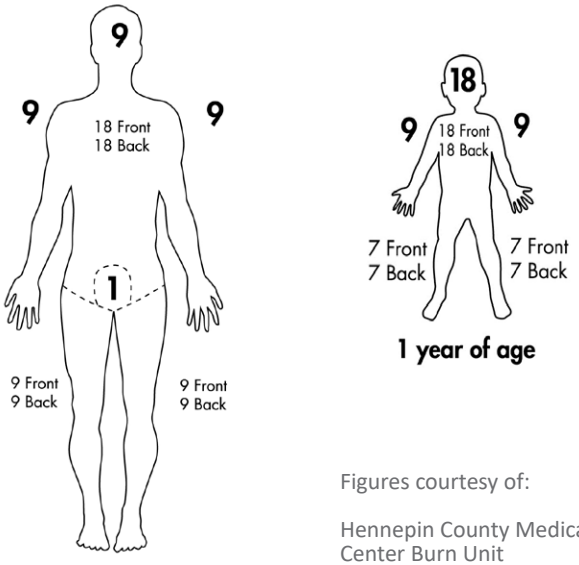
No ↓

### Minor

- Consider outpatient management, consultation/referral to wound/burn clinic or burn center as required.
- Burn care outpatient supplies see Burn Treatment Regional Resource Card.

### Rule of Nines

Numbers expressed in percentages







1 year of age

Figures courtesy of:

Hennepin County Medical Center Burn Unit

| American Burn Association Burn Centers in Minnesota | |
|---|---|
| Hennepin County Medical Center | 1-800-424-4262 |
| Regions Hospital | 1-800-922-BURN (2876) |
| Minnesota Burn Surge (www.health.state.mn.us/communities/ep/surge/burn/index.html) | |

## Initial Interventions:

**Airway/Breathing** – Assess airway and provide oxygen. Consider early intubation for >25% BSA burns. Intubation recommended: stridor, voice change, respiratory distress, circumferential neck burns, carbonaceous sputum, hypoxia, or prolonged transport time and major burn patient.

**Circulation** - Assess vital signs and pulses. Burn shock common >20% BSA. Treat low blood pressure with IV fluids; consider other sources of hypotension. Avoid boluses when possible - increase fluid rates by 10% per hour for low urine output or lower blood pressures.

**Disability** - Assess neurologic status (including sensation and motor); cervical spine protection if trauma/high-voltage (>1000 V) injury.

**Decontamination** – Consider potential for chemical/radiologic contamination. Chemical burns should be irrigated for 30 minutes with body temperature water while consulting Poison Control* about specific treatments.

**Expose/Estimate** - Remove clothing, jewelry, and contact lenses. Protect from hypothermia. Estimate second/third degree burn area (see figures below). Area of patient's hand (including fingers) equals 1% BSA.

**Fluids** - IV access in non-burned tissue if possible. Start Lactated Ringers (LR) 4 mL/kg/% BSA. Give 50% over first 8 hours and rest over 16 hours from time of burn. Children <5 years add 2 ampules D50 to each liter of LR. May use normal saline if no LR available.

**History** – Note time of injury, mechanism, AMPLET (Allergies, Medications, Past surgical and medical history, Last meal, Events sur rounding the incident, Tetanus status).

**Nasogastric or Orogastric** - Insert tube for all intubated patients.

**Pain Control** – Administer analgesia; extraordinary doses may be required to control pain adequately.

**Urine Output** – All electrocutions, intubated patients, and major burns should have indwelling urinary catheter (e.g., Foley). Goal is 0.5mL/kg/hr output adults, 1mL/kg/hr children.

**Wound Care** – Do not remove adherent clothing. Warm, dry dressings over burns - NO wet dressings.

**Special Considerations:**

- Closed space exposure assume carbon monoxide and/or cyanide toxicity - provide 100% oxygen. (Consult Minnesota Regional Poison Control Center at 1-800-222-1222. )
- High-voltage electrical - assume rhabdomyolysis and assess for internal injuries. Normal saline resuscitation untl clear urine output 1-2 mL/kg/hr. Monitor creatine kinase, serum bicarbonate and creatinine. Consult with burn/referral center for ongoing management.

## Secondary Assessment – Critical Burn Features?

- >20% BSA second and/or third degree burns.
- Intubated patient, inhalational injury, or prolonged closed-space smoke exposure.
- Co-existing major trauma, rhabdomyolysis, or other complications.
- Hemodynamic instability not responding to fluid resuscitation.

Yes →

No ↓

## High Priority For Transfer To Burn Center

- Continue fluid resuscitation and analgesia.
- Escharotomies may be required to allow ventilation of patients with circumferential neck, chest or abdominal burns
- Arrange transfer and consultation .
- Some patients in this category may be triaged to receive only palliative care (until/unless additional resources become available).

## Secondary Priority For Transfer

- May have to manage in place awaiting transfer (24-48 hours).
- Obtain consultation from burn center - MDH may organize hotline/alternative resources during mass casualty incidents.
- Cover burns with clean dry linens - no immediate dressings are necessary if transferred in the first 24 hours - after 24 hours consider bacitracin dressings per burn consultation.
- Monitor urine output and provide IV fluids to maintain parameters as above.
- Infection control – providers should gown, glove, and mask.
- Follow cardiorespiratory and renal function.
- Maintain body temperature.
- Consider early use of enteral/tube feedings if oral intake inadequate.
- Analgesia.
- Circulation, Motor and Sensory function (CMS) checks.
- Evaluate for other injuries.

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# PEDIATRICS



Resource cards are intended to provide incident-specific tactics and planning information to supplement the general strategy cards. They are organized according to The CO-S-TR Model for Initial Incident Assessment (https://www.cambridge.org/core/journals/disaster-medicine-and-public-health-preparedness/article/abs/surge-capacity-concepts-for-health-care-facilities-the-costr-model-for-initial-incident-assessment/71F2DC0270A419AD93F8BE90B9037213).

<table>
<tr><th></th><th>Resource & Recommendations</th><th>Strategy</th><th>Conventional</th><th>Contingency</th><th>Crisis</th></tr>
<tr><td rowspan="1">Command, Control, Communication, Coordination</td><td>

**Planning and response considerations:**

Tertiary centers with inpatient pediatric, trauma and PICU capability can provide consultation and transfer support based on patient needs. The following centers can provide real-time consultation in support of pediatric critical care when transfer is difficult or not possible or when highly specialized services (e.g. ECMO) are anticipated to be needed.

- Pediatric hospital resources in Minnesota:

<table>
<tr><th>Trauma Level</th><th>Hospital Name</th></tr>
<tr><td rowspan="4">Level I</td><td>Children’s of Minnesota, Minneapolis</td></tr>
<tr><td>Hennepin County Medical Children’s Hospital</td></tr>
<tr><td>Regions Hospital/Gillette Children’s Specialty Healthcare</td></tr>
<tr><td>Mayo Clinic Hospital/Mayo Eugenio Litta Children’s Hospital</td></tr>
<tr><td rowspan="2">Level II</td><td>North Memorial Health Hospital</td></tr>
<tr><td>Essentia Health St.Mary’s Medical Center (Duluth)</td></tr>
<tr><td>Level III</td><td>University of Minnesota Masonic Children’s Hospital</td></tr>
<tr><td>Level IV</td><td>Children’s of Minnesota, St.Paul</td></tr>
</table>

- Pediatric patients will have to be stabilized (and in some cases treated, for 24 to 48 hours) at initial receiving hospital in major incident – all facilities must be prepared for pediatric cases.
- Facility procedures for patient tracking, unaccompanied minors, and release of minors to family/caregivers.
- Smaller incidents – facility-to-facility coordination.
- Statewide incident impact:
  - MDH will coordinate with health care coalitions to facilitate patient and resource distribution
  - Statewide consultation/referral hotline may be initiated as needed.

</td><td>Prepare</td><td>Yes</td><td>Yes</td><td>Yes</td></tr>
<tr><td rowspan="3">Space</td><td>

**Space:**

- Use maximal beds on pediatric unit and at pediatric centers noted above.
- Prioritize transfer of children < 8 years of age to pediatric specialty centers.
- Surge to non-pediatric, age-appropriate units within hospital .

</td><td>Adapt</td><td>Yes</td><td>Yes</td><td>Yes</td></tr>
<tr><td>

- Distribute non-critical and older pediatric patients from overwhelmed pediatric centers to other accepting facilities.
- Expand acute outpatient care for the minimally injured/ill.

</td><td>Conserve</td><td></td><td>Yes</td><td>Yes</td></tr>
<tr><td>

- Forward movement to regional pediatric centers in adjoining states as required to assure appropriate ongoing care - in coordination with MDH-EPR and Great Lakes Health care Partnership (FEMA V – MN, WI, IL, IN, OH, MI and city of Chicago) and/or National Disaster Medical System (NDMS) patient movement for catastrophic incident (unlikely to only affect pediatric portion of population).

</td><td>Substitute</td><td></td><td></td><td>Yes</td></tr>
</table>

# PEDIATRICS

| | Resource & Recommendations | Strategy | Conventional | Contingency | Crisis |
|---|---|---|---|---|---|
| Supplies | **Outpatient Supply Planning:**<br>• Consider expansion of outpatient pediatric-specific supplies (e.g., crutches, pediatric-specific forms of analgesics) at facility to support discharged patients.<br>**Inpatient Supply Planning:**<br>• Institutions should prepare based on role in community.<br>• As a minimum, recommend each facility be prepared to care for the number of victims listed in the table below, based on their designated trauma level in the MN Trauma System. | *Prepare* | Yes | Yes | Yes |

| | Critically injured[1] | | Non-critical - Age < 18 | |
|---|---|---|---|---|
| MN Trauma System Designation | < 8 years old | < 1 year | "Yellow" patients | "Green" patients |
| Level IV | 2 | 1 | 5 | 10 |
| Level III | 4 | 2 | 10 | 15 |
| Level II | 6 | 3 | 15 | 20 |
| Level I | 8 | 4 | 20 | 30 |

The American Academy of Pediatrics/American College of Emergency Physicians recommended equipment list (www.acep.org/globalassets/new-pdfs/policy-statements/pediatric-readiness-in-the-emergency-department.pdf) is the basis for planning, with emphasis on:

- Airway equipment sufficient for number and age of victims.
- Vascular access equipment, including adequate quantity of intravenous cannulas and intraosseous needles.
- References, charts, or other systems for size/weight-based equipment and drug dosing (reference book, wall charts, Broselow tape, or similar).
- External warming devices.
- State trauma system guidelines also identify pediatric equipment expectations.

1 Assume will require airway management, IV access at minimum

# PEDIATRICS

| | Resource & Recommendations | Strategy | Conventional | Contingency | Crisis |
|---|---|---|---|---|---|
| Staff | Staff:<br>• Pre-incident pediatric medical/trauma critical care training should be conducted for physician and nursing staff expected to provide emergency care. Consider courses such as Advanced Pediatric Life Support, Pediatric Advanced Life Support. | *Prepare* | Yes | Yes | Yes |
| | • Staff that do not regularly provide pediatric emergency care but could be called upon in a disaster should receive pre-incident training and orientation to facility equipment. Scenario-based or other training (simulation and other brief, frequent training) is highly recommended.<br>• Just-in-time training may be required in certain situations for non-pediatric nursing and physician staff reinforcing key points of pediatric or incident-specific patient care (including pediatric assessment triage, importance of fluid management, urine output parameters, principles of analgesia, etc.) | *Adapt* | | Yes | Yes |
| | • In a major incident, adjust pediatric physician and nurse staffing patterns as needed to provide supervision of key aspects of pediatric care. See *Staffing Strategies for Scarce Resource Situations* for further consideration; for example, have critical care staff supervise care at a higher level, delegating many bedside duties to other providers.<br>• MDH may work with in-state and adjacent state experts to set up 'hotline' to provide consultation to non-pediatric centers caring for pediatric patients (for example during pandemic).<br>• National Disaster Medical System and/or other supplemental staff may be required to work in facilities (see *Staffing Strategies for Scarce Resource Situations*). | *Conserve*<br>*Adapt*<br>*Substitute* | | Yes | Yes |
| Special | **Consider availability of resources for:**<br>• Social work/ family support.<br>• Psychological support for children, their families and staff (do not under-estimate the increased stress and psychological impact of a pediatric incident, particularly a mass casualty incident, on health care providers).<br>- Psychological First Aid for Disaster Survivors (www.health.state.mn.us/communities/ep/surge/pediatric/pfa.pdf)<br>- Disaster Mental Health for Children (www.health.state.mn.us/communities/ep/surge/pediatric/mental.pdf)<br>- After a Disaster: Guide for Parents and Caregivers (www.health.state.mn.us/communities/ep/surge/pediatric/disaster.pdf)<br>- More resources:<br>Disaster Behavioral Health and Emergency Preparedness (www.health.state.mn.us/communities/ep/behavioral)<br>• Discharge support and planning, particularly for rehabilitation and other specialty follow-up.<br>• Patient tracking and patient safety, particularly for unaccompanied minors (e.g. banding system to identify children and guardians).<br>• Family/caregiver accommodations. | *Prepare* | Yes | Yes | Yes |
| Triage | **Consider early transfer to a facility providing pediatric intensive care services for:**<br>• Progressing respiratory symptoms/hypoxia.<br>• Shock, or need for ongoing resuscitation.<br>• Critical trauma, including neurotrauma according to usual trauma triage criteria.<br>• Patients with concomitant burns should be transferred to Regions Hospital or Hennepin County Medical Center.<br>• Patients with complex underlying medical conditions may require consultation or special triage considerations. | *Conserve* | Yes | Yes | Yes |

# PEDIATRICS

| | Resource & Recommendations | Strategy | Conventional | Contingency | Crisis |
|---|---|---|---|---|---|
| Treatment | **Provide stabilizing care (airway, fluid management, analgesia, etc.) – see Pediatric Triage Card for initial priorities**<br><br>**Special Considerations:**<br>• Airway/Breathing and Circulation (ABCs) are still critical – do not deviate from usual trauma/critical care priorities due to size/age/behavior concerns.<br>• Pediatric airways are small; there is little room between partial and complete obstruction.<br>• Age and height-based estimations are NOT always accurate – always be prepared with a range of equipment sizes, especially for airway interventions.<br>• Assess skin color, capillary refill and heart rate for signs of poor perfusion. Hypotension is a late sign of shock in pediatric patients.<br>• Typically, pediatric patients respond to treatments more quickly than adults. Reassess frequently and alter treatments to fit the response.<br>• Monitor for signs of pain and treat pediatric patients with analgesics via weight-based guidelines, then titrate to effect. Pediatric pain is often inadequately treated.<br>• Hypoglycemia and hypothermia are very common –anticipate, prevent, and correct as necessary.<br>• Monitor IV fluids carefully to control volume delivered in smaller patients (e.g., IV pumps or buretrols).<br>• Double-check medication doses with team members, especially with medication drips as significant errors are common. DO NOT exceed maximum adult dose.<br>• Assessment may be difficult due to age-related and communication-related issues – history from the family/caregivers may be critical.<br>• Do not separate the child from family/guardian if at all possible.<br>• Medical alert bracelets and care plans should be sought for all children. | *Prepare* | Yes | Yes | Yes |
| Transportation | **After stabilizing care, assess need for transfer:**<br>• Plan for oxygen, fluids, and analgesia requirements in transport.<br>• Consider need for airway intervention prior to transport.<br>• Consider plans for caregivers/family transportation .<br>• A mass casualty incident may affect more than one facility requiring coordination with regional health care coalitions to prioritize transportation and manage logistics via Multi-Agency Coordination.<br>• Regional transfer coordination may be required in major disasters – MDH Center for Emergency Preparedness & Response will assist regional health care coalitions and involve appropriate State and Federal (NDMS) resources; in certain situations (such as pandemic, major mass casualty incident) patients may have to receive care in non-pediatric centers.<br>• Ensure that targeted medical record information (including name, allergies, medications given, current medications, age and family contact information) is always with patient.<br>• Arrange transport via air medical transport as appropriate – if multiple institutions affected coordinate with regional health care coalition and/or multi-agency coordination system. | *Prepare*<br>*Adapt* | Yes | Yes | Yes |

# PEDIATRIC INITIAL ASSESSMENT AND INTERVENTIONS - For Mass Casualty Situations

## Patient Arrives/Initial Assessment

### High Risk Features? *

- Hypoxia or respiratory distress.
- Multiple injuries or high-energy mechanism.
- Signs of hypoperfusion/ shock (may be isolated to tachycardia).
- Altered mental status.

* Consultation may be warranted for age <8 years, or underlying complex illness/disease (congenital abnormality, etc.)

Yes →

No ↓

### Minor:

- Assessment, treatment and observation .
- Address psychosocial needs; re-unify with
- family; support as needed.
- Discharge, if able, to secure environment if parent/guardian not accompanying.

### Initial interventions:

**Airway** – Assess and position airway; airway interventions as needed. Children < 5 years have small airways that do not tolerate edema well. Reassess frequently.

**Breathing** – Assess for evidence of respiratory distress (retractions, hypoxia, grunting). Provide oxygen, bronchodilators (e.g., albuterol, epinephrine) and other interventions as needed.

**Circulation** – Assess for signs of hypoperfusion including capillary refill, vital signs, pulses, etc. Fall in blood pressure is late and end-stage. Treat signs of hypo- perfusion aggressively with 20 mL/kg normal saline (and 10 mL/kg packed red blood cells if hemorrhagic shock persists after initial boluses of saline), see Fluid Management (below).

**Disability** – Assess neurologic status (including sensation and motor) and need for cervical spine protection.

**Decontamination** – Consider for chemical/radiologic – brush away loose material, then copious water. Consult Poison Control Center at 1-800-222-1222.

**Expose** – Remove clothing, jewelry and, if mental status altered, contact lenses. Protect from heat loss; hypothermia is common.

**Fluids** – IV fluids (see Fluid Management below) .

**Family** – Avoid separating family/guardians from patients. Identify and notify patient's family/guardians of patient's status when possible.

**Glucose** – Check fingerstick glucose for all significantly ill/injured children. Correct hypoglycemia.

**History** – Note mechanism and time of injury, treatments pre-hospital, underlying diseases, tetanus status, medications/allergies, social history, family history, immunization history.

**Orogastric** – Tube for all intubated patients (due to usual gastric distension).

**Pain control** – Titrated opioid analgesia, IV, intranasal, or subcutaneous as required for comfort (e.g., morphine 0.1 mg/kg or fentanyl 1 mcg/kg IV).

**Temperature/Thermal** – Protect from heat losses; initiate cooling/rewarming or anti-pyresis as indicated. Children lose body heat rapidly.

**Urine output**– Target urine output to 0.5 - 1 ml/kg/hour. Indwelling urinary cathether as needed.

↓

### Secondary Assessment – Critical illness/injury?

- Intubated or progressive respiratory failure.
- Multiple organ systems affected.
- Surgical emergency.
- Evidence of shock (poor perfusion, high lactate, persistent tachycardia) not responding to fluid resuscitation.

Yes →

### High Priority for Transfer to Pediatric Center

- Continue fluid resuscitation .
- Arrange transfer and consultation .
- May have to provide transfers, triage resources, or even provide palliative care as only intervention based on scope of injury/nature of incident. Re-triage as more resources become available or condition changes.

No ↓

### Secondary Priority for Transfer

- May have to manage in place awaiting transfer (24-48 hours) (e.g. isolated orthopedic injuries).
- Obtain consultation from pediatric referral center (during mass casualty incident MDH may organize hotline).
- Diagnostic studies as indicated (minimize ionizing radiation without omitting necessary studies).
- Monitor urine output and provide IV fluids (see Fluid Management).
- Infection control – providers should gown, glove and mask as appropriate for illness/injury.
- Follow cardiorespiratory and renal function, Circulation, Motor and Sensory function (CMS) and glucose checks at regular intervals.
- Maintain body temperature.
- Analgesia.
- Psychological triage and support/family support.

**Fluid Management**

Goals of Fluid Resucitation: Normal vital Signs, Improved signs of perfusion, Urine output 0.5-1 mL/kg/hr

| Type | Fluid | Rates and Notes |
|---|---|---|
| Resuscitation Fluids | NS | Initial bolus 20 mL/kg, over 30-60 min, repeat as needed |
| | PRBCs | Hemorrhagic shock<br>10 mL/kg if not responding to initial 20 mL/kg of crystalloid<br>May use O Neg (or O Pos for males) until type-specific or cross matched available |
| Maintenance Fluids Maximum of 2400 mL/day | D10W | Newborn (first 48 hrs): 3 mL/kg/hr |
| | D101/2NS | Neonate (28 days or less): 4 mL/kg/hr |
| | D5NS | Pediatric patient without renal compromise:<br>• 4 mL/kg/hr first 10 kg<br>• 2 mL/kg/hr next 10 kg<br>• 1 additional mL/kg/hr for each kg over 20 kg |
| Hypo-glycemic Treatment over 15-30 min | D10W | Neonate with BG < 45 give 3 mL/kg IV or IO |
| | D25W | < 4 years with BG < 60 give 2 mL/kg IV or IO |
| | D50W | ≥ 4 years with BG < 60 give 1 mL/kg IV or IO |

**Pediatric planning, response poster and materials:**

Pediatric Surge (www.health.state.mn.us/communities/ep/surge/pediatric)

**Resource list of pediatric emergency equipment:**

Pediatric Readiness in the ED (www.acep.org/globalassets/new-pdfs/policy-statements/pediatric-readiness-in-the-emergency-department.pdf)

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# PALLIATIVE CARE



Resource cards are intended to provide incident-specific tactics and planning information to supplement the general strategy cards. They are organized according to The CO-S-TR Model for Initial Incident Assessment (https://www.cambridge.org/core/journals/disaster-medicine-and-public-health-preparedness/article/abs/surge-capacity-concepts-for-health-care-facilities-the-costr-model-for-initial-incident-assessment/71F2DC0270A419AD93F8BE90B9037213).

## Orientation to Specialty and Goals:

**NOTE:** This card provides a focused description of palliative care management principles in disaster situations. These principles are relevant to **all** patients, as well as those who may receive palliative care as their only intervention due to demand on the health care system relative to their prognosis.

### Specialty Description:

Palliative care has a goal of providing the best possible quality of life for people facing the pain and stress of a serious, but not necessarily terminal, medical condition. It can be appropriate for patients of any age and at any stage of an illness - from diagnosis on - and can be provided along with treatments for the medical condition.



### Principles of Palliative Care:

- **Palliative care should be provided to ALL patients.**
- In a subset of patients, it may be the only care that is able to be provided due to the patient's prognosis and available resources.
- Focuses on human contact and comfort in addition to medical care.
- Increases the physical and mental well-being of the patient.
- Is not abandonment or euthanasia, and does not aim to hasten death (though in some cases, the doses required to relieve severe symptoms may indirectly contribute to the dying process; however, this meets the ethical criteria for the double-effect principle where indirect harm is permissible in the service of a greater good).
- Relieves symptoms and provides physical comfort measures such as control of pain, nausea, dyspnea, temperature regulation, and positioning.
- Assures respectful care, reassurance, and emotional and social support as possible.
- Cultural Diversity may have impact on acceptance of palliative care offerings.

### Disaster Considerations:

- Symptom support should be maintained in hospital and non-hospital environments – this will involve planning by outpatient entities such as hospice care, pharmacies, medical equipment providers as well as inpatient entities such as palliative care hospital-based programs.
- For existing hospice patients, the spectrum of care should be defined.
- For those designated to receive only palliative care key considerations are:
  - Expected survival - hours, days, or weeks – this helps to guide needs, referrals, and resources.
  - Required interventions - this helps guide location of care and support planning.
  - Basis for designation - if the decision for palliative care is based on the lack of a single resource, there must be a plan for re-assessment if the patient's condition improves or more resources become available (i.e., would they qualify to receive additional treatment if more resources become available and how are they contacted/monitored) - see triage tree on pg 11-6.
- Home health and other agencies will need to prioritize services relative to hospice patients during a disaster (as this can have significant impact on patient/family/agency planning).
- Supportive measures should be offered that maintain comfort, but do not prolong the dying process :
  - If death is inevitable, there may be no point in providing intravenous fluids
  - **If death is not certain, other forms of support may be very reasonable as other resources become available.**

# PALLIATIVE CARE

| | Resource & Recommendations | Strategy | Conventional | Contingency | Crisis |
|---|---|---|---|---|---|
| Planning Resources | **Planning Resources:**<br>• General palliative care resources and fact sheets:<br>- Palliative Care Network of Wisconsin (PCNOW) (https://www.mypcnow.org/)<br>- PCNOW: Fast Facts (https://www.mypcnow.org/fast-facts/)<br>• ICU care:<br>- ICU: Integrating Palliative Care (https://www.capc.org/toolkits/icu-integrating-palliative-care/)<br>IPAL-ICU project<br>• General resources in palliative care and non-pharmacologic intervention:<br>- American Academy of Hospice and Palliative Medicine (https://aahpm.org/)<br>- Center to Advance Palliative Care (https://www.capc.org/)<br>- World Health Organization Palliative Care (https://www.who.int/news-room/fact-sheets/detail/palliative-care)<br>- UpToDate—What's new in Palliative Care (https://www.uptodate.com/contents/whats-new-in-palliative-care) | *Prepare* | Yes | Yes | Yes |
| Planning/Communications and Coordination | **Key Minnesota Organizations:**<br>• Minnesota Network of Hospice & Palliative Care (https://www.mnhpc.org/)<br>• Inpatient palliative care programs: Palliative care MD on 24 hour pager for most facilities/systems.<br>• Hospice programs: Majority of State has hospice program coverage and most programs usually have hospice MD on 24 hour pager - check with hospital health systems main contact/referral phone line. | *Prepare* | Yes | Yes | Yes |

## PALLIATIVE CARE

| | Resource & Recommendations | Strategy | Conventional | Contingency | Crisis |
|---|---|---|---|---|---|
| Communications and Coordination | **Communications and Coordination:**<br>• Close coordination between hospitals, home care agencies, and public health is required prior to and during disasters in which increased home care and at-home palliative and hospice services are expected.<br>• Communications, including printed materials and a mechanism for ongoing situational awareness, are required during contingency and crisis events – this may involve conference calls or other means of keeping stakeholder agencies informed and up-to-date.<br>• In major disasters requiring proactive triage to palliative care only, MDH may provide additional guidance and incident-specific resources, which may include a hotline for advice and consultation about palliative care issues. Additional resources for families providing home care would also need to be made available by local and state public health and major health care systems.<br>**Communications with Families and Patients:**<br>• Assure that specific wishes are discussed and documented for therapies such as long-term ventilation, tracheostomy, dialysis, and other treatments relevant to the situation. Review advance care planning in the context of the current situation – proxy designations, advance directives, Physician Orders for Life-Sustaining Treatment (POLST) (https://www.mnmed.org/polst) forms.<br>• Interventions able to be offered may not fulfill all of the preferences expressed in those directives. Questions and Answers About Health Care Directives (www.health.state.mn.us/facilities/regulation/infobulletins/advdir.html).<br>• Describe palliative support as a quality of life and aggressive symptom management framework that is not related to hastening death or euthanasia,<br>• Incorporate relevant cultural variables into palliative care plans. | *Prepare*<br>*Adapt* | Yes | Yes | Yes |
| | • Proactively provide families and patients with up-to-date information on the resources in shortage and any relevant triage criteria/processes being used, as well as any necessary infection prevention measures.<br>• Explain the basis of triage decisions and any re-assessment or potential options. Re-frame goals of care with patient and family.<br>• Maintain hope despite changes in treatment/goals - factors that often decrease hope include feeling de valued, abandoned or isolated (“there is nothing more that can be done”), lack of direction and goals, and unrelieved pain and discomfort. | | | | |

# PALLIATIVE CARE

| | Resource & Recommendations | Strategy | Conventional | Contingency | Crisis |
|---|---|---|---|---|---|
| Space | **Inpatient Space:**<br>• In crisis situations there may be a large number of patients that are receiving palliative care only – cohorted spaces may be an option for these patients. These areas should be:<br>• Comfortable – the maximal physical comfort should be provided to patients and families and the environment and equipment should be as comfortable as possible given the resources available.<br>• Private – as much privacy as possible should be planned for the patients and families. | *Adapt* | | | Yes |
| | **Outpatient Space:**<br>• Facilities should have plans in place with home health care agencies as well as plans for family provision of palliative care. This may include:<br>• Home care/hospice agencies should prioritize services to those with the most limited support or more intensive support needs during a disaster (e.g., prioritize services to those requiring intravenous fluids or medications, oxygen, or other high-intensity therapies - if these can be maintained during the disaster).<br>• Phone banks and other indirect support services for families and patients. | *Conserve*<br>*Adapt* | | | Yes |
| | **Transitions:**<br>• When inpatients are receiving palliative care as their only treatment, they must be cared for in a space appropriate to their remaining life expectancy (i.e., patients with hours to live would not be moved, and patients with days or weeks remaining would be moved to another inpatient area or to home/outpatient care).<br>• Access to pre-printed information for families guiding them in the provision of comfort care including:<br>• Analgesia and other medication dosing per physician or other instructions.<br>• General information about prevention of decubitus ulcers and maintenance of comfort.<br>• The dying process, what to expect, and what to plan for.<br>• Resources that the family can use in case of questions or problems.<br>• Assure that appropriate infection prevention precautions are accounted for (e.g. droplet precautions). | *Substitute*<br>*Adapt*<br>*Conserve* | | | Yes |
| Supplies | **Supplies:**<br>• There is no substitute for pre-event stockpiling of medications to treat key symptoms. Every disaster will require significant quantities of analgesics. The availability of adequate pain and symptom relief should be a key area of disaster planning. | *Prepare* | Yes | Yes | Yes |
| | **Inpatient and Outpatient:**<br>• Anticipate the need for additional stocks of medications to provide analgesia and symptom relief for all patients. Inexpensive but critical medications to stockpile include:<br>- Oral non-opioid analgesics (also valuable as anti-pyretics)<br>- Opioid analgesics<br>- Benzodiazepines<br>- Anti-psychotics<br>- Anti-emetics<br>- Steroids<br>- Diuretics<br>• Outpatient pharmacies should anticipate the need for increased supplies of these agents and support palliative care dosing of these agents that may be in excess of usual recommendations.<br>• Avoid stockpiling or hoarding in the setting of increased demand. | *Adapt* | Yes | Yes | Yes |

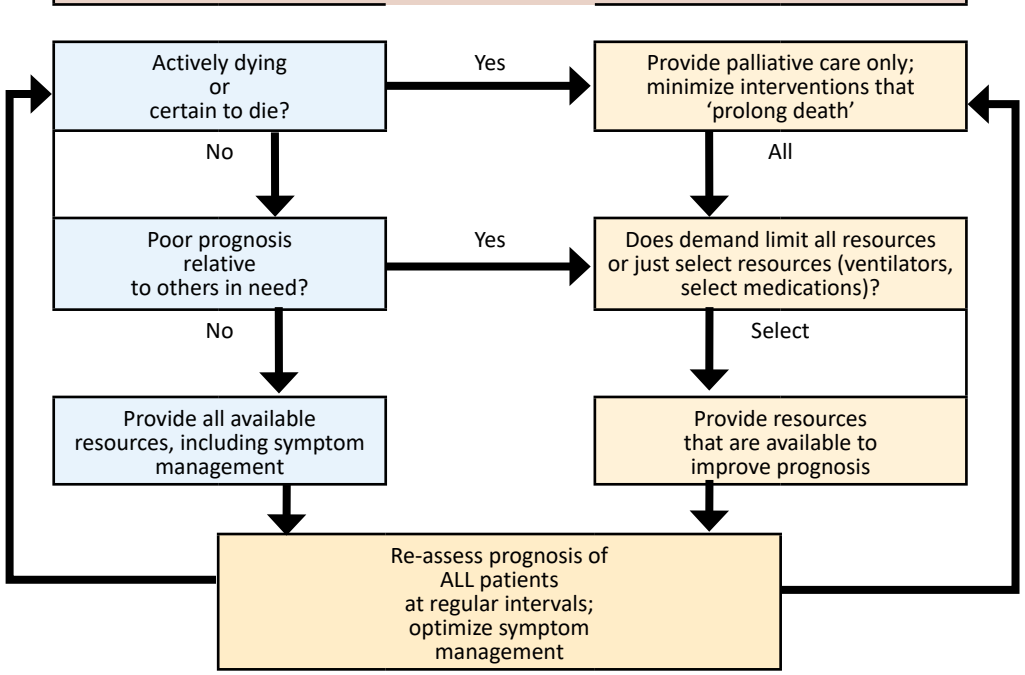
# PALLIATIVE CARE

| | Resource & Recommendations | Strategy | Conventional | Contingency | Crisis |
|---|---|---|---|---|---|
| Staff | • Physician and nursing staff expected to provide disaster palliative care should receive pre-incident palliative care training.<br>• Staff that do not regularly provide palliative care, but could be called upon in a disaster, should receive preincident training and orientation to facility resources.<br>• The facility should identify subject matter experts within their facility/area and obtain their input into palliative care planning. During a response, these experts can provide input on strategies and tactics, as well as provide overall clinical guidance and expertise. | Prepare | Yes | Yes | Yes |
| | • Faith-based and other community resources for non-clinical support may be critical assets for those receiving care at home.<br>• Spiritual resources should be made available to both patient and family if desired and feasible.<br>• Just-in-time training should be provided to nursing and physician staff as required to acquaint them with palliative care priorities, medication dosing, and other issues. | Conserve<br>Adapt<br>Substitute | Yes | Yes | Yes |
| | • Hospice agencies should have plans to adjust staff roles and triage services provided in response to in creased demand.<br>• In case palliative care areas are activated, support these areas with staff that are comfortable with medication administration that can be supervised by staff with more experience. Precise recommendations on staffing are difficult as the needs of the patients can vary greatly, but every attempt should be made to provide adequate personnel to meet the comfort needs of patients – this may involve tiered use of professional and non-professional staff.<br>• Additional staff may have to be drawn from other institutions or fields, or from the Medical Reserve Corps (e.g., to provide broader support to homecare). These staff will also require just-in-time training<br>• Regionally, palliative care teams that can support a facility in crisis or support additional outpatient care may be advantageous. | Conserve<br>Adapt<br>Substitute | | | Yes |
| Special | When triage to 'palliative care only' in disasters is not by patient choice, management of expectations and transitions is critical to the physical and mental well-being of patient, family, and providers.<br>• Consider availability of resources for:<br>- Social work/family resources.<br>- Spiritual support.<br>- Psychological support for patients and their families.<br>- Discharge and/or death support and planning.<br>- Family/caregiver accommodations.<br>- Psychological support for staff. | Prepare | | | Yes |

# PALLIATIVE CARE

| | Resource & Recommendations | Strategy | Conventional | Contingency | Crisis |
|---|---|---|---|---|---|
| Triage | • The need for palliative care should be anticipated in all disaster scenarios.<br>• Triage decisions may be required in minutes (multiple burn victims), over hours (many trauma victims), or over days or weeks (pandemic).<br>• When it is clear that the volume of patients and current level of resources will require prioritizing some patients to palliative care only, triage criteria should be developed whenever possible and a formal triage team put in place (proactive measures may not be possible in the early phase of an incident, but should be implemented as soon as possible).<br>• Location for palliative care should be optimized given the constraints of the incident – patients may be triaged to home, to other facilities, to inpatient units, or to other locations.<br>• Triage is dynamic. As resources allow, it is critical to re-triage patients so that they may receive resources that have become available. Predicted prognosis does not equate with actual outcome in many cases. (See triage tree below). | *Conserve*<br>*Re-allocate*<br>*Adapt* | | | Yes |

**Triage Tree - Resource-dependent palliative care considerations**



PALLIATIVE CARE

| | Resource & Recommendations | Strategy | Conventional | Contingency | Crisis |
|---|---|---|---|---|---|
| Treatment | **Provide Symptomatic Management:**<br>• Do not under-estimate the psychological impact on patients, caregivers and family of these situations. All of these persons may require medical and non-medical treatment for anxiety, grief, complicated grief, post-traumatic stress disorder and mental health issues due to the stress of these events.<br>• Treatment with appropriate doses of medication is important – see the opiate dosing references below as an example, but after initial doses, titrate to appropriate symptom relief as required, rather than to any specific recommended dose of medication.<br>• Adapt with the medications and resources that are available.<br>• Web resource for treatment:<br>Palliative Care Network of Wisconsin: Fast Facts (https://www.mypcnow.org/fast-facts/).<br>• 'WHO ladder' for pain relief:<br>- For mild pain (unless contraindicated) use aspirin, acetaminophen or nonsteroidal anti-inflammatory agents.<br>- If pain persists (mild to moderate) add oxycodone, hydrocodone, or similar oral opioids.<br>- If pain is not controlled, increase the opioid dose (may consider oral hydromorphone or morphine).<br>- Add adjuvant medications to medication regimen as possible/needed to reduce opioid requirements.<br>• The patient's report of pain is the standard assessment tool to gauge if the pain management regime is adequate.<br>• Pediatric and unresponsive/non-verbal patients require alternate methods of assessment of non-verbal cues of distress.<br>• Numerical distress or visual/analog scales can provide standardized assessment.<br>• Adjuvant medical (anti-depressants, etc.) and non-medical treatments (acupuncture, etc.) may be valuable – expert consultation should be obtained in disasters where a longer timeframe allows these treatments to be implemented.<br>- Medical Cannabis/cannabinoid class agents may offer symptom benefits for pain, nausea, anxiety.<br>• Provision of non-medical comforts (company, quiet environment or music, pillows, etc.) is a critical component of palliative care and should be optimized according to patient needs.<br>**Opioid Management Principles for Disaster Situations:**<br>• Oral morphine is the standard opioid from which potencies and conversion ratios are based for most other opioid medications.<br>• Opioids can be given by almost every possible route – oral, sublingual, intravenous, intranasal, intramuscular, rectal, or subcutaneous.<br>• Pain equivalence tables can vary. Incomplete cross tolerance exists when converting between different opioids – consider dose reductions of 25 – 50% for initial doses when switching drugs (depending on clinical circumstances). | *Prepare*<br>*Adapt* | Yes | Yes | Yes |

PALLIATIVE CARE

| | Resource & Recommendations | Strategy | Conventional | Contingency | Crisis |
|---|---|---|---|---|---|
| Treatment (cont.) | • Opioids typically do not have ceiling effects for analgesia. Limitations are usually related to side effects or intolerances.<br>• Patients with sustained-release opioid needs usually require short-acting opioid for breakthrough pain as well as for dose-finding for long-acting opioid dose adjustments. Short-acting breakthrough dose should typically be 10 -15 % of total 24 hour daily requirement of the sustained-release opioid.<br>• When dosing with opioids, remember common side effects and treat accordingly (e.g., constipation, nausea, pruritis, confusion, sedation). Respiratory depression is a rare event related to opioid dosing and usually occurs in the context of multiple drug class utilization, and other underlying chronic clinical conditions.<br>• Fentanyl transdermal patches require good adipose stores to be effective, as the real physiologic reservoir is underlying adipose tissue. If patients are thin, think of other opioid options.<br>• Best opioids to consider in the face of renal insufficiency include methadone, fentanyl, and dilaudid.<br>• Breakthrough dose: ⅓ to ½ of the twelve hour dose or 10-15 % of the 24 hour dose (if >3 breakthrough doses per 24 hr period consistently required, consider retitration of dose).<br>• Titrating dosage, may use the following guideline: (Pain scores from 1-10 with 10 being worst imaginable):<br>- Pain > 7 Increase dose by 50% to 100%<br>- Pain 4 – 7 Increase dose by 25% to 50%<br>- Pain < 4 Increase dose by 25% if indicated/desired<br>• Once a patient has 2 or fewer breakthrough doses and a steady state of medication has been reached, then a continuous release equianalgesic opioid may be initiated. Always start with an instant release before switching to continuous release. Note that continuous release opioids do not have mg/mg equivalence - e.g. a patient requiring 60mg of morphine elixir each day would not be started on 60 mg of MS Contin as an equivalent dose.<br>• Switch from fixed combination acetaminophen/opioids to a single entity opioid when acetaminophen dose > 3000 - 4000 mg/day or as weight appropriate.<br>• Avoid fixed dose combination analgesics in pediatric patients when possible to allow more effective titration and avoid excess acetaminophen dosing.<br>• Consider use of methadone where available particularly for outpatient management of pain. | *Prepare*<br>*Adapt* | Yes | Yes | Yes |
| Tracking | • Assure that patients referred to home care (formally or informally) are tracked by public health and the appropriate agencies. | *Prepare* | Yes | Yes | Yes |

**Key Symptoms and Treatments:**

| Symptom | Pharmacologic Options | Additional Strategies |
|---|---|---|
| Pain | Refer to 'WHO ladder' on page 11- 7 | Integrative therapies, acupuncture, hypnosis, interventional techniques, music therapy, heat/cold therapy, supportive caring |
| Dyspnea | Opioids and oxygen are standard therapy, additional agents of benefit may include benzodiazepines, bronchodilators, and nebulized furosemide (20 mg IV solution with 3 mL normal saline every 4 hours as needed) | Treat underlying cause, oxygen, direct air from fan onto face; integrative therapies, hypnosis. |
| Nausea | Serotonin antagonists (ondansetron), substance P antagonists (apprepitant), dopamine antagonists (procholorperazine), butyrophenones (haloperidol), corticosteroids, benzodiazepines, atypical antipsychotics (olanzapine), cannabinoids, anti-histamines (meclizine) , anticholinergics (scopolamine), substituted benzamide (metoclopramide) | Treat underlying cause; consider interventional options depending on underlying cause (e.g., small bowel obstruction consider nasogastric tube), integrative therapies, hypnosis, acupuncture, music therapy, supportive caring. Consider constipation as possible etiology if on chronic opioids. |
| Anxiety | Benzodiazepines, atypical antipsychotics, cannabinoids, anti-depressants | Treat underlying cause, spiritual support, supportive caring, integrative therapies, hypnosis, relaxation techniques, music therapy |
| Agitation/Delirium | Haloperidol, atypical antipsychotics, sedatives | Provide quiet, dark environment, hydration, support sleep hygiene, minimize stimulation, consider calming soft music<br><br>Identify specific underlying cause if possible:<br><br>Benzodiazepine paradoxical agitation - consider discontinuing<br><br>Opioid neurotoxicity - consider opioid rotation<br><br>Steroid psychosis - consider dose change or elimination<br><br>Opioid withdrawal - consider tapering doses |
| Constipation | Docusate sodium, sennosides, polyethylene glycol, lactulose, magnesium citrate, bisacodyl, glycerine, enemas | Treat underlying conditions, hydration, consider subcutaneous methylnaltrexone for chronic opioid-induced constipation – ensure no mechanical obstruction re: risk of perforation (risk higher in patients on steroids) |
| Diarrhea | Loperamide 2 mg tablets if not contraindicated.<br><br>Other interventions according to cause. | Determine underlying cause and potential therapies |
| Secretion control | Sublingual atropine; 1% eye drops 2-3 drops every 3-4 hours as needed; glycopyrolate (IV 0.4 mg every 4-6 hours, oral 2 mg every 8 hours or appropriate weight-based dose); scopolamine patch | Education for family regarding: death rattle, reposition in bed, very gentle suction +/-, mouth care |
| Skin breakdown/ protection | | Treat underlying cause, gentle repositioning, supportive pads, air mattress, specialty beds |
| Active dying | Aggressive supportive care depending needs. Do not 'prolong dying process' with on-going therapies such as transfusions, IV fluids, artificial nutrition, antibiotics. Stop medications that have no bearing on symptom support management. Focus on the 'patient as person' – not on clinical indicators. Oxygen does not offer symptom benefit for actively dying patients and oxygen delivery devices can be uncomfortable and cause sensations of claustrophobia. | Supportive care of family, education about dying process, spiritual support, psychosocial support, company, listening, storytelling, silence, companionship. Discontinue monitors and vital signs documentation. |

## Dose Conversion Table for Selected Opiods

(Consider dose reduction between opioid in view of incomplete cross tolerance)

| Hydromorphone IV (mg/day) | Hydromorphone PO (mg/day) | Morphine IV (mg/day) | Morphine PO (mg/day) | Fentanyl* Transdermal (mcg/hr) | Oxycodone PO (mg/day) |
|---|---|---|---|---|---|
| 2.5 | 12.5 | 17 | 50 | 25 | 30 |
| 5 | 25 | 33 | 100 | 50 | 65 |
| 7.5 | 37.5 | 50 | 150 | 75 | 100 |
| 10 | 50 | 67 | 200 | 100 | 130 |
| 12.5 | 62.5 | 83 | 250 | 125 | 165 |
| 15 | 75 | 100 | 300 | 150 | 200 |
| 17.5 | 87.5 | 117 | 350 | 175 | 230 |
| 20 | 100 | 133 | 400 | 200 | 265 |
| 22.5 | 112.5 | 150 | 450 | 225 | 300 |
| 25 | 125 | 167 | 500 | 250 | 330 |
| 27.5 | 137.5 | 183 | 550 | 275 | 360 |
| 30 | 150 | 200 | 600 | 300 | 400 |

* Transdermal Fentanyl absorption and response may vary depending on amount of adipose tissue present (i.e. better absorbed in patients with more adipose tissue, worse absorption in thin patients). Also, consider dose reduction (e.g. 25%) if transitioning from transdermal patch to oral opioid equivalent.

# ECMO (Extra-corporeal membrane oxygenation)

ECMO (Extra-corporeal membrane oxygenation)

Resource cards are intended to provide incident-specific tactics and planning information to supplement the general strategy cards. They are organized according to The CO-S-TR Model for Initial Incident Assessment (https://www.cambridge.org/core/journals/disaster-medicine-and-public-health-preparedness/article/abs/surge-capacity-concepts-for-health-care-facilities-the-costr-model-for-initial-incident-assessment/71F2DC0270A419AD93F8BE90B9037213).

| | Resource & Recommendations | Strategy | Conventional | Contingency | Crisis |
|---|---|---|---|---|---|
| Command ,Control, Communication, Coordination | **General Information:**<br>• Extra-corporeal membrane oxygenation (ECMO) is becoming used more frequently for multiple conditions that result in refractory hypoxia (venovenous ECMO) or refractory shock/cardiac arrest (arteriovenous ECMO). However, the resource is not widely available and data on its use and effect on outcomes are incomplete despite many promising small studies.<br>• Fairview, Allina, Children's of Minnesota-Minneapolis, Hennepin Health care, and Masonic Children's provide ECMO in the metropolitan area. Mayo Clinic (St. Marys) provides services in greater Minnesota. Several referring hospitals initiate, but do not provide inpatient care to ECMO patients.<br>• Maximum approximate simultaneous capacity of the ECMO programs in the Twin Cities is about 55 patients under usual conditions (infant ECMO limited to pediatric hospitals) and could be sustained for days to weeks dependent on personnel availability (perfusionists and nurses). Mayo Clinic can support an additional approximately 12 patients.<br>**Procedure:**<br>• In a situation where an institution does not have available ECMO resources for a candidate patient, other Minnesota institutions will be contacted to assist. If two or more institutions are contacted and do not have capacity to assist, the provider/ECMO director will contact the on-call Metro Regional Health care Resource Center (RHRC) officer via Hennepin Healthcare security at 612-873-9911 to arrange an ECMO directors' group page and conference call (see algorithm).<br>• The ECMO directors' group will consist of two designees from each Minnesota ECMO center/system (generally, the ECMO medical director and program coordinator). Their current mobile phone number and e-mail will be kept on file by the Metro RHRC.<br>• The ECMO medical director from the institution requesting the conference call will lead the discussion. If ongoing coordination is required a coordinator will be appointed by consensus. If an on-call position is required, this will be coordinated among the group.<br>• During high demand situations, consultation should be obtained prior to a facility cannulating a patient – a designated on-call ECMO coordinator with knowledge of the capacity of each of the hospitals will be available to provide consultation. | *Prepare* | Yes | Yes | Yes |
| | • During an ongoing incident, such as a pandemic, proactive guidance may need to be developed or adjusted by the ECMO directors' group to account for:<br>- Event-specific changes in prognosis.<br>- Halting or modifying E-CPR programs (enhanced CPR).<br>- Disproportionate pediatric/adult needs for ECMO (e.g. patient selection when adult centers must provide pediatric ECMO and vice/versa).<br>• Limited supply of equipment (circuits, disposables, etc.) and brokering of same.<br>• Decision-making re: potential candidates from referring hospitals in need of inter-hospital transport (e.g. de-emphasize cannulation prior to transfer).<br>• Central transfer process for considering referrals of potential ECMO candidates (daily on-call designee rotating between major centers/systems). | *Reallocate* | | | Yes |
| Space | • ECMO requires intensive care unit space which may be at a premium in epidemic situations. In most cases, space will not be the limiting factor in restricting access to ECMO treatment. | | Yes | | |

# ECMO (Extra-corporeal membrane oxygenation)

| | Resource & Recommendations | Strategy | Conventional | Contingency | Crisis |
|---|---|---|---|---|---|
| Supplies | • Oxygenator/pump – there is no substitute for the pump – one patient, one pump. Once all available pumps are in use, there is essentially no reserve. Additional pumps could be solicited as leased units or loaned units from inter-state facilities though in a national epidemic/pandemic this is not likely to be helpful<br>• Tubing/circuits/sheaths – though the vascular sheaths for cannulation are widely available, the specific circuits for the pumps are proprietary and extremely expensive. Stocking additional circuits is an excellent idea, but unlikely given cost and may be a key limiting factor in nationwide incidents. Availability of the circuits through vendors may be limited during national event. | *Prepare* | Yes | | |
| Staff | • Perfusionist and trained nursing staff may be a key factor in continuing services. These staff often may cover multiple hospitals and most hospitals do not have a large cadre of trained providers.<br>• Training of additional personnel could help mitigate shortages, though providers must be able to keep training current. Illness of providers during an epidemic/pandemic could result in severe shortages of qualified staff.<br>• Most nursing staff are intensive care nurses – because ECMO care is usually 1:1 in a major epidemic/pandemic ECMO may be too resource-intensive to continue as the staff involved could be caring for a larger number of critical care patients. | *Prepare*<br>*Conserve*<br>*Reallocate* | Yes | | Yes |
| Special | • Families should be counseled routinely that ECMO is a limited resource and is considered a trial of therapy rather than a resource assignment. | *Prepare* | Yes | | |
| Triage | **Assumptions:**<br>• Some uses of ECMO are better characterized, allowing a degree of prediction about relative benefit and duration of use.<br>• When ECMO demand is high and prioritization is necessary, those conditions with historically better outcomes and shorter duration of use should generally be prioritized.<br>• When determining if a patient's use of ECMO will be curtailed, providers should assess the relative degree of benefit, anticipated (or actual) duration of use, and the patient's overall prognosis.<br>• Patient and family members will be counseled that ECMO is a highly specialized resource and may have to be withdrawn depending on the patient's prognosis and response to treatment.<br>• Patients should continue to receive all other forms of support (unless other support is subject to other allocation strategies) – this may include transitioning back to high-intensity mechanical ventilation. Routine palliative care team consultation should be considered for all ECMO patients.<br>• Literature on prognosis continues to evolve. The ECMO directors' group will re-evaluate priorities based on current evidence.<br>• The amount of resources required to maintain ECMO patients both directly related to perfusion as well as support staff and supplies (e.g. blood products) may not be sustainable when critical care resources are stressed by an incident. At that point provision of ECMO may need to be restricted or discontinued to allow those resources to be used for other patients. | *Reallocate* | | | Yes |

# ECMO (Extra-corporeal membrane oxygenation)

<table>
<tr><th></th><th>Resource & Recommendations</th><th>Strategy</th><th>Conventional</th><th>Contingency</th><th>Crisis</th></tr>
<tr><td>Triage</td><td>General Priority for ECMO Given Constrained Critical Care Resources:
<table>
<tr><th>Tier (Predicted Survival)</th><th>Short Duration (<5 days)</th><th>Long Duration (>5 days)</th></tr>
<tr><td>First Tier (>60%)</td><td>Cardiac arrest or cardiogenic shock due to deep accidental hypothermia (rewarming)<br><br>Pediatric post-cardiotomy<br><br>Acute hypercarbic respiratory failure due to status asthmaticus.</td><td>Acute respiratory failure due to infection respecially influenza), single-organ failure<br><br>Acute respiratory failure due to trauma (drowning, pulmonary contusion, etc.), single-organ failure</td></tr>
<tr><td>Second Tier (30-60%)</td><td>Poisoning-induced cardiogenic shock<br><br>Massive pulmonary embolism<br><br>Refractory VF/VT cardiac arrest with favorable prognostic features extracorporeal CPR [E-CPR])</td><td>Acute respiratory failure from any cause with multi-organ failure (including kidney injury requiring dialysis or hypotension requiring vasopressor support)</td></tr>
<tr><td>Third Tier (<30%)</td><td>Adult post-cardiotomy<br><br>Cardiac arrest with non-shockable rhythm or unfavorable prognostic features, including most adult, in-hospital cardiac arrest</td><td>Bridge to lung transplantation for irreversible respiratory failure<br><br>Acute respiratory failure and severe immunocompromise (e.g. stem cell transplant <240 days post-transplant)<br><br>Cardiovascular collapse refractory to vasopressors in the setting of multi-organ failure of any cause (e.g. septic shock).</td></tr>
</table></td><td></td><td></td><td></td><td>Yes</td></tr>
<tr><td>Treatment</td><td>• Selected surgeries may need to be deferred if possible if the need for post-operative ECMO is high.<br>• Consideration should be given to earlier and more aggressive trials of lung recovery (weaning) during the veno-venous ECMO course to limit duration of therapy when demand is high.</td><td>Conserve</td><td></td><td>Yes</td><td></td></tr>
<tr><td>Transport</td><td>• Transportation of a patient on ECMO requires a specialized transport team including a perfusionist and/or trained nurse.<br>• Ground, rotor-wing, and fixed wing ambulances may be used for transport but not all ambulances can accommodate an ECMO patient, the team, and the equipment. Hospitals should identify critical care transport providers prior to an incident that can coordinate the movement of cannulated patients.</td><td>Prepare</td><td>Yes</td><td></td><td></td></tr>
</table>

# ECMO (Extra-corporeal membrane oxygenation)

## Adult Veno-Venous (VV) Extracorporeal Membrane Oxygenation (ECMO) Eligibility Criteria for COVID-19 ARDS

| Inclusion Criteria[1] | Exclusion Criteria[2] |
|---|---|
| Severe Acute respiratory distress syndrome (ARDS)<br>• Patient fulfills oxygenation and/or ventilation criteria for severe ARDS.<br>• On FIO2 ≥ 80%, PEEP ≥ 10, and VT ≤ 6 mL/kg PBW<br>• PaO2/FIO2 < 50 for more than 3 hours<br>• PaO2/FIO2 < 80 for more than 6 hours<br>• pH < 7.25, PaCO2 > 60 mm Hg with RR > 35 for more than 6 hours<br>• Mechanical Ventilation has been optimized, including trial of neuromuscular blockade and prone position.<br>Other Indications<br>• Other indications such as severe hypercarbic respiratory failure (e.g. status asthmaticus) or severe air leak syndrome considered on case-by-case basis. | • > 7 days of high intensity (potentially injurious) mechanical ventilation<br>• Unacceptable risk of hemorrhage with therapeutic anticoagulation<br>• Age > 60<br>• Marker(s) of poor short-term prognosis in relation to underlying disease<br>- Multi-system organ failure<br>- Pre-ECMO cardiac arrest<br>- Suspected severe hypoxic-ischemic brain injury<br>• Premorbid conditions that would limit life expectancy to less than a few years and/or preclude a reasonable chance of recovery after ECMO support<br>- Advanced malignancy<br>- Advanced chronic organ failure (e.g. liver, kidney, lung, immunocompromised state)<br>- Progressive neurodegenerative diseases (e.g. ALS, Alzheimer's dementia) |

1 Adapted from the EOLIA trial (NEJM: Extracorporeal Membrane Oxygenation for Severe Acute Respiratory Distress Syndrome (https://www.nejm.org/doi/10.1056/NEJMoa1800385)) and Bullen et al (PubMed: How I Select Which Patients With ARDS Should Be Treated With Venovenous Extracorporeal Membrane Oxygenation (https://pubmed.ncbi.nlm.nih.gov/32330459/)).

2 For evidence of the prognostic implications of exclusion criteria in the setting of COVID-19, see Barbaro et al (Lancet: Extracorporeal membrane oxygenation support in COVID-19: an international cohort study of the Extracorporeal Life Support Organization registry (https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(20)32008-0/fulltext)).