

## **ANNEX 2: SPECIFIC GUIDANCE FOR HOSPITALS AND OTHER HEALTH CARE FACILITIES**

### **Introduction**

The allocation of resources and services during emergency-induced situations of scarcity must be based on a sound ethical framework. This attachment provides specific guidance to hospitals and other healthcare facilities to assist these entities in planning for resource and service scarcity that may arise during public health emergencies. This attachment applies the general ethical guidance offered in the Ethical Guidelines for Allocation of Scarce Medical Resource and Services During Public Health Emergencies in Michigan (Guidelines) to the specific context of hospital and healthcare facility settings and addresses in detail some considerations that may arise in this context. It also offers potential strategies for implementation of the Guidelines in hospital and healthcare facility settings.

Healthcare facilities, whether individual hospitals, multi-site health systems, or other inpatient care delivery facilities, should review the ethical framework presented in the Guidelines to ensure that their decision-making strategies for allocating scarce resources and services during public health emergencies comport with the principles and considerations outlined in the Guidelines.

This attachment is meant to be a resource for hospitals and healthcare facilities. These Guidelines are not envisioned as a formalized series of instructions but rather a set of criteria that can be employed by decision-makers in various circumstances during a public health emergency using their best professional discretion. Thus, the criteria offered within these Guidelines are meant to be scalable, adaptable, and functional. Some facilities may not have the capacity to implement all of the suggestions offered in this document. Others will choose to adopt different strategies that are nonetheless consistent with the ethical framework presented in the Guidelines. However, it is presumed that many hospitals and healthcare facilities will adapt the approaches and strategies contained in this document, tailored to fit the circumstances of their specific facility.

Extreme or unforeseeable circumstances may challenge the foundations of the framework. In those situations, decision-makers will be expected to use their professional training and prudence to guide allocation decisions. The criteria offered may have to be amended to address unforeseen circumstances and should be periodically reviewed and updated to incorporate new information. Successful implementation of the Guidelines will demand ongoing deliberation, transparency, public education and input, and careful evaluation and oversight.

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## **Background**

Public health emergencies have often led to scarcity of medical resources and services. The history of epidemic outbreaks, natural disasters, and other mass casualty events has demonstrated the need to prepare for mass medical care planning across all medical disciplines and systems. These types of public health emergencies could seriously impact the State of Michigan, its health care and public health systems, its transportation systems, its economy, and its social structure. Hospitals and health care facilities will be faced with higher demands for services. These institutions and systems will experience problems similar to other health systems across the State of Michigan, including increased employee absenteeism, disruption of supply chains, and increased rates of illness and death.

Hospitals and other healthcare facilities will be part of a group of medical providers that will have to plan their response to a significant influx of patients in their respective areas. It is of the utmost importance that they have all of the tools necessary to make ethically sound and important decisions with regard to allocation of scarce medical resources and services. The objectives discussed in this attachment will assist health care professionals in making important decisions that protect the lives and safety of both health care professionals and patients.

## **Ethical Framework**

The Allocation Guidelines developed for the State of Michigan discuss in detail the principles and methods used to develop the ethical framework. This is attachment to that document endorses the same goals, ethical considerations, and allocation criteria. Several specific ethical considerations are highlighted below.

- Professional obligations to individual patients
- Professional and institutional obligations of competence
- Professional and institutional obligations of honesty and transparency
- Distributive justice, including equal treatment, utility
- Fair procedures, including in planning and implementation
- Accountability and legitimacy

Each of the above ethical considerations applies to the overarching aim of the document, which is the distribution of scarce medical resources and services in an ethical fashion within hospitals and other healthcare facilities. Planning and preparation of

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health care professionals and their institutions to respond ethically to situations of resource scarcity underlie both professional and institutional obligations to provide competent and just care to patients. Preparing the community for the types of difficult allocation decisions that may arise through public engagement and education supports obligations of honesty and transparency, and adds legitimacy to and accountability for these difficult decisions if they need to be made later. Distributive justice cautions against the possibility of applying different criteria to allocation schemes across different systems and communities. Cooperation between health systems and developing consistent allocation guidelines, by contrast, supports fairness and distributive justice. Prudent planning to increase stores of certain items proactively can avoid unnecessary shortages and is key to ethical planning. The protection of disabled and marginalized individuals in these circumstances is imperative. Therefore, criteria related to an individual's social utility and expected longevity to make allocation decisions should not occur.

Structuring guidance for hospitals and health systems presents obvious challenges. Each organization has its assets and areas of expertise, which can be vastly different from other organizations. Each organization must proactively examine its plans for continuing to deliver care to the public during a mass casualty incident (MCI), including how it would allocate scarce medical resources and services. The guidance discussed in this attachment is based primarily on a proposal developed by the University of Michigan Health System in collaboration with the Michigan Department of Community Health using the existing medical and ethics literature and ethical guidance documents available from some other states and from the federal agencies charged with health preparedness.<sup>1</sup> This attachment provides an effective example of how a hospital or other healthcare facility can accommodate the ethical considerations and allocation criteria outlined in the Guidelines.

### **Hospital/Health System Ethical Duty to Plan**

Just as the state has a duty to prepare, so do hospitals and health systems. Most hospitals have an incident management team and must drill to fulfill regulatory agency mandates, but specific planning to care for patients in an atmosphere of scarce resources, for at least some period of time while awaiting assistance, must be undertaken. Hospital leadership must have a thorough understanding of the local, regional and state emergency plans, have active relationships with those organizations and exercise their plans. Planning for hospital surge, communications, public messaging, command and control, prevention of further casualties, business continuity, vulnerable population management and security must take place in advance and be communicated to the members of the

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<sup>1</sup> Add citation to University of Michigan Health System Document; AHRQ, "Mass Medical Care with Scarce Resources: The Essentials" AHRQ Pub. 09-0016, September 2009, Phillips, Knebel and Johnson, editors

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hospital organization. It is also extremely important for hospital organizations to have a detailed understanding of the regional prehospital capabilities and those Emergency Medical Services (EMS) entity's plans for care delivery in an MME. ED crowding and high hospital occupancy due to the MME may require an alteration of the normal patterns of EMS operation, including possible differences in activation and transport protocols under the prevailing standard of care. All efforts should be made to coordinate with partners providing prehospital services, including EMS services and Medical Control Authorities. The full guidance for prehospital settings can be found in Attachment #6.

In the normal course of care delivery, many hospitals do not care for certain populations and would transfer such patients out of their facility to a different level of care. During public health emergencies that affect a large region, specialty care facilities may not be able to accommodate these patients or adhere to their normal transfer relationships. "Sheltering in place," or caring for patients not normally kept at a particular facility, may be the most ethical solution, despite the high level of stress this would place on any system. Planning for potential situations where providers would have to practice outside their normal scope includes an assessment of hospital and staff capabilities and providing guidance for surge situations. Such guidance would include a robust plan of how, where and what a surge would entail and what would be expected of staff members AND some potential for augmenting their capabilities through "just in time" training assets. Examples of training modules for one type of mass casualty have been developed by the State Burn Coordinating Center at the University of Michigan:

<http://www.michiganburn.org/index.shtml>

Similar plans could be developed to care for other special populations, such as pediatric or obstetric patients.

### Ethical Resource Allocation Decision Process Urban<sup>2</sup> Hospitals

Recognizing that each hospital organization is unique and planning for the allocation of resources should be proactive, this section proposes the composition and function of a Scarce Resource Allocation Committee (SRAC), Triage Officers Corps for hospital floors or units, and the Clinical Review Committee (CRC) which serves as a decision making body and an appeals forum. Caregivers, physicians, and administrators will need clear guidance regarding how to distribute resources, and family members will need to know that a just and thoughtful process is in place.

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<sup>2</sup> This section provides a model for hospitals that have access to larger number of resources and personnel, described here as "Urban Hospitals." Of course, some hospitals in urban locations may not have access to sufficient resources to enact all of these recommendations and some hospitals outside urban settings will have the requisite resources to do so.

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### **Trigger Points**

When a public health emergency is imminent, or has been declared by a relevant public health agency, the Medical Care Director, or his/her designee as predetermined in the Incident Management System, will direct the relevant emergency planning committees to:

- Identify resources which are likely to become scarce
- Develop a method (or implement a previously developed method) for tracking such resources
- Establish trigger points which indicate when conservation of a particular resource(s) is necessary

The trigger point(s) depends on the imminent depletion of a certain resource and will vary depending on the resource and the severity of the situation. The trigger point will be established based on the current and projected demand for a resource, and the current supply of this resource. As an example, during the 2009 novel influenza A pandemic outbreak, it became clear early on that N95 respirators and antiviral medication(s) would quickly become scarce and decisions on usage needed to occur immediately. On the other hand, given the low morbidity and mortality associated with this virus in most healthy persons, staffing resources, beds, and ventilators did not need to be considered as scarce resources during this early period.

### **Scarce Resource Allocation Committee (SRAC)**

Once the trigger point is reached for a particular resource, the Incident Management Team must determine whether to activate the Scarce Resource Allocation Committee (SRAC) or a subset of the membership (dependent on the scarce resource) as shown in Figure 1.

**FIGURE 1: Scarce Resource Allocation Committee (SRAC) Description**

<b>Statement of Purpose</b>	SRAC should have the full authority to make necessary allocation decisions to assign or conserve resources for patient care.
<b>Objectives</b>	In the event of a shortage of services, supplies, or staffing, the SRAC should determine when and how these resources should be allocated or conserved. In addition, the SRAC will have responsibility for determining when Triage Protocols will be activated and deactivated.
<b>Scope</b>	All supplies, equipment, staffing (faculty and staff) and any other resource of the hospital or health system organization
<b>Membership</b>	<p>In the event of a disaster declaration and/or the establishment of the Incident Management System (IMS), the SRAC structure should be consistent with this system. At this point, the Incident Commander (or designee) will chair the SRAC.</p> <p>The SRAC composition should include appropriate adult and pediatric representation from each of the following groups:</p> <ul style="list-style-type: none"> <li>• Medical Care Director, e.g. Chief of Staff or designee</li> <li>• Nursing Care Director, e.g. Director of Nursing or designee</li> <li>• Ambulatory Care Medical Director or designee</li> <li>• ICU Medical Director(s) or designees, e.g. Critical care Committee Chairs</li> <li>• Respiratory Therapy Medical Director and Technical Director or designees</li> <li>• Emergency Medicine Medical Director or designee</li> <li>• Admissions/Bed Capacity Manager or designee</li> <li>• Ethicist</li> </ul> <p>Each position on the SRAC should be filled by 3 people who will rotate shifts on the committee. Those members who are off shift should be available to rotate on an appeals committee(see below) if needed.</p>
<b>Timeline</b>	May be activated upon determination of one or more scarce resources.
<b>Voting</b>	In the event that consensus among members of SRAC cannot be reached regarding the assignment or conservation of a scarce resource, the Incident Commander will call for a vote. Voting consists of one vote for the incident commander and one vote for each of the eight groups for a total of nine votes. A simple majority vote will be required, the Incident Commander given the authority to decide in case of tie votes.
<b>Progress Reports</b>	SRAC should attempt to meet face-to-face, however, conference calls will suffice as long as minutes are documented. All decisions made by the SRAC should be documented in meeting minutes, including the rationale for those decisions.

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These particular groups have been recommended because they represent the leadership in clinical care (Chief of Staff, Nursing Director), the leadership in areas most likely to be faced with scarce resources (ICU Directors, Respiratory Care, Emergency Medicine, Admissions/Bed Coordination Center, Ambulatory Care Directors), and experts in the ethics of health care delivery (ethicists). This is one proposed structure for a SRAC, but recognizing that some organizations would not have access to an ethicist, intensive care or ambulatory care leaders (because they do not normally deliver intensive care or ambulatory clinic services), such organizations should consider appropriate equivalent committee members.

In the event that consensus among members of SRAC cannot be reached regarding the assignment or conservation of a scarce resource, the Incident Commander will call for a vote. A voting scheme should be developed, with the Incident Commander given authority to decide in case of tie votes. Ad hoc advisors may be invited by SRAC members to provide expertise as needed. Ad hoc advisors may include representatives from the Office of the General Counsel, Pharmacy, Material Services, Epidemiology, Infection Control, Human Resources, etc. Ad hoc advisors will not be permitted to vote in matters to be decided by the SRAC.

During a mild or time limited MME, the SRAC may only need to meet intermittently and some decisions on specific resource allocation may be left to specialty groups. For example, during the 2009 novel influenza A (H1N1) outbreak, decisions regarding antiviral distribution for treatment and prophylaxis within some health systems were left to a small group including Infectious Diseases, Employee Health, and Infection Control. On the other hand, a severe pandemic or other MME, with more hospitalizations and a higher mortality rate might necessitate daily meetings of the SRAC to make recommendations for allocation of multiple scarce resources.

### **Triage Officers**

During a severe MME, such as a pandemic that leads to multiple scarce resources, a Triage Officer will be assigned to oversee a patient care area, such as an inpatient floor or unit. Triage Officers will be selected from available personnel who normally care for patients on that unit, such as adult and/or pediatric Hospitalists, ICU specialists, Emergency Medicine physicians, Anesthesiologists, and others as assigned by the Medical Care Director. Triage Officers will be selected by SRAC in consultation with the Chairs and/or Service Chiefs. Potential Triage Officers will be identified by the hospital leadership based on the individual's leadership capabilities and clinical skills to meet the needs of the role. Pre-identification of Triage Officers is recommended. Selected Triage Officers will be responsible for thoroughly understanding their institution's allocation processes and triage protocols.

The Triage Officer will have the responsibility to assure that the clinicians caring for the patient perform an assessment, for triage purposes, at 48 and 120 hours (or a time

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deemed appropriate by leadership, given the type of pathology being seen with the particular mass illness) and attests that the assessments are accurate. Triage Protocols for use in such scenarios should be in place and well known to the Triage Officers and other clinicians to ensure transparency and facilitate rapid implementation. Day-to-day clinical care decisions for individual patients will continue to be made by the primary clinician caring for the patient with the supervision of the Triage Officer.

If Triage Protocols need to be implemented to manage a scarce resource (i.e. ICU care or ventilators), the Triage Officer will notify the clinicians within their assigned units to communicate regarding Triage Protocols and collect data about patient assessments as often as needed, but at least daily. The Triage Officers should communicate frequently with the Clinical Review Committee to assess the needs of all patients within the institution. Using the Triage Protocols, the Clinical Review Committee and the Triage Officers will determine which patients no longer meet criteria for the use of a scarce resource. When a patient no longer meets criteria for a particular resource, the Triage Officer will advise the primary clinician to discontinue its use. Decisions to discontinue *any* intervention based on resource conservation will only occur after the SRAC has determined that conservation of that particular resource is necessary.

### **Clinical Review Committee**

While decisions to discontinue life sustaining interventions will be made in conjunction with the Triage Officers, in consultation with the primary clinician caring for the patient, any patient, family member or clinician (including the Triage Officer) can request consultation with the Clinical Review Committee (CRC) The makeup and purpose of the CRC is outlined in Figure 2. The CRC will have two functions:

- 1) The CRC will serve as a consultative body that will advise clinicians regarding clinical decision-making in complex patient care situations and identify principles that will serve as guidelines for triage officers.
- 2) The CRC will be involved in all decisions to discontinue a life-saving therapy. The CRC will have real-time information on all currently available life-saving scarce resources in the hospital system. The CRC will also have a list of all patients who, based on objective clinical parameters, have the lowest chance of survival. The CRC will discontinue a life-saving resource for a particular patient only when:
  - The life-saving resource has been depleted throughout the organization and cannot be obtained from any outside source.



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- Another person with a greater chance of survival, based on objective clinical parameters that have been selected for triage guidelines, requires the same life-saving resource.

Once a decision to discontinue a life-saving scarce resource has been made for a particular patient the CRC will instruct the Triage Officer responsible for the patient to withdraw the life-saving scarce resource.

3) The CRC will be the final decision making body for the appeal of Triage Officer clinical decisions. Decisions made by the CRC will be final, and will be determined based on a review of available medical information. Some institutions may feel it is appropriate to have an appeals process even after CRC has considered the case, but should consider whether, in an MME incident, they will have the depth of expertise to staff multiple committees.

**FIGURE 2: Clinical Review Committee**

<b>Statement of Purpose</b>	To act as an advisory body for requested consults from the Triage Officer and act as a final decision making body for all appealed Triage Officer decisions.
<b>Objectives</b>	<p>Consultation:</p> <ul style="list-style-type: none"> <li>• Advise regarding clinical decision making in complex patient care situations</li> <li>• Identify principles that serve as a guide for the Triage Officer</li> </ul> <p>Appeals:</p> <ul style="list-style-type: none"> <li>• Resolve disputed cases of allocation of any scarce clinical resources</li> </ul>
<b>Scope</b>	Any resource allocation decisions that require resolution.
<b>Membership</b>	<p>The CRC will consist of appropriate adult and pediatric providers including the following:</p> <ul style="list-style-type: none"> <li>• Medical Care Director, e.g. Chief of Staff or designee</li> <li>• Triage Officer for that unit (non-voting)</li> <li>• Adult Triage Officer from another unit</li> <li>• Pediatric Triage Officer from another unit</li> <li>• Respiratory Therapy Medical Director or designee</li> <li>• Emergency Medicine Medical Director or designee</li> <li>• Nursing Director or designee (non-voting)</li> <li>• Social Work Director or designee (non-voting)</li> <li>• Ethicist, ad hoc advisor (non-voting)</li> <li>• Office of the General Counsel, ad hoc advisor (non-voting)</li> </ul>
<b>Timeline</b>	Ad hoc activation
<b>Progress Reports</b>	<p>All decisions will be documented in the patient’s medical record. Additionally, the CRC will maintain a list of all patient names, registration numbers, and rendered decision.</p>

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These particular groups have been recommended because they represent those with expertise in relevant areas of medical care delivery and best equipped to make final clinical resource decisions. Some hospital organizations may not have staff who carry titles exactly the same as the proposed member titles in this guideline, but should make appropriate substitutions. In the event that consensus among members of CRC cannot be reached regarding life sustaining interventions, the Medical Care Director will call for a vote. A simple majority vote will be required. Voting abstentions are not permitted; anyone who feels they must recuse themselves will be replaced for that vote with a designee. All decisions will be reported to the Incident Commander and documented in the patient's medical record. Additionally, the committee shall maintain a record of all patient names, registration numbers, and the particular decision rendered by the CRC. Ad hoc advisors may be invited by CRC members to provide expertise as needed. Ad hoc advisors will not be permitted to vote in matters to be decided by the CRC.

**Staffing Resources** Personnel may be the most important scarce resource in an MME, especially if the emergency lasts for weeks or months. Equipment, medications, and vaccines cannot treat or prevent illness without trained personnel to prescribe, administer and oversee their use. Unlike material goods such as medicines, masks, and ventilators, personnel cannot be “stockpiled;” indeed, shortfalls in personnel could be exacerbated, for example, by communicable or infectious related absenteeism.

Most hospital organizations have mechanisms in place for planning human resource needs and strategies, the following ethical guidelines may be useful for allocating scarce human resources during an emergency:

1. As is the case for material resources, institutions should increase the “supply” of scarce human resources by prospectively training individuals whose current roles will be less urgently required during an MME to work in areas of likely shortfall, and consider training community members as well.
2. Professional ethics for clinicians generally discourage or prohibit practice outside the scope of one's expertise. Similarly, legal and ethical standards often prohibit laypersons from providing health services. During conditions of extreme scarcity of trained personnel, however, standards of competence may justifiably be lower than during normal conditions. Employing, for instance, a clinician who normally works in a specialty to instead work in primary care, or providing community volunteers with focused training to administer vaccine could expand capacity and alleviate some of the scarcity of personnel.
3. Individuals who assume the risks and burdens of working during a pandemic (e.g., extended hours and quarantine) should:
  - a. Receive appropriate protection (e.g., vaccine, protective gear) to minimize their risk of infection
  - b. Receive priority for antivirals, antibiotics and other mid-level scarce resources, with the exception of life-sustaining interventions such as ventilators (for which they would not receive special priority). This

priority is consistent with the acceptable allocation criteria detailed in the Guidelines.

- c. Individuals whose contracts or agreements clearly described expectations of continuing to work despite risk, but who failed to adhere to those agreements, should expect appropriate action. Institutions will vary greatly with respect to the ability to manage their workforce in the event of such an event.
- d. The allocation of scarce human resources should be done in a fashion consistent with the guidelines for other resources.

### **Ethical Resource Allocation Decision Process Rural<sup>3</sup> Hospitals**

Smaller hospitals, especially those in rural areas, are faced with limited resources and support from other agencies, potentially smaller, more distant local public health departments, limited technology, a greater reliance on volunteers, limited medical transport units, and greater distances from potential lifesaving or supportive resources.<sup>4</sup>

Advance planning may take a more critical role for medical surge and allocation of scarce resources within this setting. Furthermore, these facilities should recognize their role to also plan to care for populations they might not normally treat, such as pediatrics, obstetrics or critical care patients.

**The members of the hospitals Emergency Management Planning Committee may also be called upon to be a part of a Scarce Resource Allocation Committee (SRAC). The SRAC should have the full authority to make necessary allocation decisions to assign or conserve resources for patient care in the event of a shortage of services, supplies, or staffing. The SRAC should be responsible for determining when and how these resources should be allocated or conserved.**

It is understood that not all rural hospitals have the staffing capacity to fill all the recommended positions in the SRAC. Therefore, it would be reasonable that the hospital leadership looks to different entities from the healthcare services in the community to fill those vacancies. The hospital may look to private healthcare providers such as local pediatricians or internal medicine physicians to help guide decisions in their area of expertise. As well community religious leaders may fill some the roles that might normally be filled by hospital employed ethicists and pastoral care. It will really be up to each hospitals executive committees as well as risk management must decide the roles they would like represented in the SRAC.

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<sup>3</sup> As a contrast to the prior section, this section outlines guidelines for hospitals with less access to medical and personnel resource, here described as “Rural Hospitals.” These hospitals may have limited access to resources and personnel, thus requiring committees that are scalable according to availability.

<sup>4</sup> Manley et al., 2006, p. 80

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Furthermore, it may be advantageous in regional areas that have a large numbers of rural hospitals to form a regional committee to include representation from all involved. This will help to ensure consistent decision making in all areas of the region as well as decrease the burden of dual functioning roles on the staff from the affected hospitals. This type of committee could consist of representation from regional Medical Control Authorities, Healthcare Coalitions and healthcare personnel from areas such as long term care, pediatrics. Integration into the regional emergency operational guidelines and would become active during times of scarce medical resources.

Jeff this would be the part where you insert the information concerning rural healthcare and having a SRAC formed from different entities from the healthcare services in the community vs each hospital having a SRAC.

### **FIGURE 1: Scarce Resource Allocation Committee (SRAC) Description**

**This is one proposed structure for a SRAC, recognizing that some organizations do not have access to an ethicist, intensive care or ambulatory care leaders (because they do not normally deliver these services), such organizations should consider appropriate equivalent committee members, such as consulting specialty physicians.**

<b>Statement of Purpose</b>	SRAC should have the full authority to make necessary allocation decisions to assign or conserve resources for patient care within the institution.
<b>Objectives</b>	In the event of a shortage of services, supplies, or staffing, the SRAC should determine when and how these resources should be allocated or conserved. In addition, the SRAC will have responsibility for determining when Triage Protocols will be activated and deactivated.
<b>Scope</b>	All supplies, equipment, staffing (faculty and staff) and any other resource of the hospital or health system organization
<b>Membership</b>	<p>In the event of a disaster declaration and/or the establishment of the Incident Management System (IMS), the SRAC structure should be consistent with this system. At this point, the Incident Commander (or designee) will chair the SRAC.</p> <p>The SRAC composition should include available patient group representation (e.g., adult, pediatric, geriatric, obstetric) from each of the following groups:</p> <ul style="list-style-type: none"> <li>• Medical Care Director, e.g. Chief of Staff or designee</li> <li>• Nursing Care Director, e.g. Director of Nursing or designee</li> <li>• Ambulatory Care Medical Director or designee</li> <li>• ICU/Internal Medicine Director(s) or designees</li> <li>• Respiratory Therapy Medical Director or designees</li> <li>• Emergency Medicine Medical Director or designee</li> <li>• Admissions/Bed Capacity Manager or designee</li> </ul>

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	<ul style="list-style-type: none"> <li>• Ethicist or Pastoral Care Representative</li> </ul>
<b>Timeline</b>	May be activated upon determination of one or more scarce resources.
<b>Voting</b>	In the event that consensus among members of SRAC cannot be reached regarding the assignment or conservation of a scarce resource, the Incident Commander will call for a vote. Voting consists of one vote for the incident commander and one vote for each of the eight groups for a total of nine votes. A simple majority vote will be required, the Incident Commander given the authority to decide in case of tie votes.
<b>Progress Reports</b>	SRAC should attempt to meet face-to-face, however, conference calls will suffice as long as minutes are documented. All decisions made by the SRAC should be documented in meeting minutes, including the rationale for those decisions.

These particular groups have been recommended because they represent the leadership in clinical care (Chief of Staff, Nursing Director), the leadership in areas most likely to be faced with scarce resources (ICU Directors, Respiratory Care, Emergency Medicine, Admissions/Bed Coordination Center, Ambulatory Care Directors), and experts in the ethics of health care delivery (ethicists).

In the event that consensus among members of SRAC cannot be reached regarding the assignment or conservation of a scarce resource, the Incident Commander will call for a vote. A voting scheme should be developed, with the Incident Commander given authority to decide in case of tie votes. Ad hoc advisors may be invited by SRAC members to provide expertise as needed. Ad hoc advisors may include representatives from the Office of the General Counsel, Pharmacy, Material Services, Epidemiology, Infection Control, Human Resources, etc. Ad hoc advisors will not be permitted to vote in matters to be decided by the SRAC.

**Key issue planners should anticipate, to the degree possible, the types of health care needs and resource shortfalls that will occur and identify policy and operational adjustments that will be needed in response.**

- Assess surge capacity (beds, ventilators, etc.) to meet expected increased needs.
- Develop plan to expand staff capacity. Determine how the hospital will meet staffing needs.
- Develop contingency plans for staff absences, particularly ED staff.
- Create procedures and policies for use of supplemental providers.
  - Consider volunteers
  - Ensure policies are in place to test and manage deployment of non-hospital personnel at both the community and hospital levels.
  - Ensure that a plan for managing volunteers is in place.
- Initiate discussions of allocation of hospital resources; hospital administrators meet with hospital ethics committee early in planning process:

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- Establish hospital process for scarce resource allocation.
- Develop communication process so the community understands the rationale behind resource allocation policies.
- Stockpile supplies and equipment including PPE equipment (e.g., gloves, masks).
- Estimate increased need for medical equipment/supplies and develop strategy to acquire additional equipment/supplies if needed. Consult with local and State health departments about access to the Strategic National Stockpile.
- Develop facility access guidelines
  - Define essential and non-essential visitors and develop policies for restricting visitors during a pandemic (and mechanisms for enforcing the policies).
  - Plan to limit hospital entry to a few key entrances.
  - Plan for increased security needs.
- Develop a health care risk communication message, including criteria for seeking health care, such as postponement of elective procedures or surgeries. The hospital administration should work with the facility Public Information Officer, the Local Health Departments or the State Of Michigan Public information Officer to get this information out to the general public.

### **Ventilator/ICU Resources**

During a severe MME such as a pandemic respiratory illness, we expect that the number of existing ventilators / ICU beds could be inadequate to meet the needs of patients. There have been several proposed mechanisms for initial triage of patients to critical care units, ventilator use or transport to ED / definitive care.

Hick<sup>5</sup> et al, proposed a triage system for ventilator assignment during an infectious disease disaster for adults. This system uses only clinical and not laboratory assessments and includes a reassessment of resource use for each patient with a requirement for improvement to continue use of the ventilator. Another proposal<sup>6</sup> used the Sequential Organ Failure Assessment (SOFA) score for adult patients in a similar respiratory pandemic scenario to create triage criteria for critical care admission. The SOFA scores require both laboratory and radiology resources. Talmor<sup>7</sup> suggested criteria for ICU admission during a pandemic respiratory disease disaster which used age and clinical criteria for adults over 18 years of age. Other triage criteria for acute mass

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<sup>5</sup> Hick, J.L. and D.T. O'Laughlin, *Concept of operations for triage of mechanical ventilation in an epidemic*. Acad Emerg Med, 2006. **13**(2): p. 223-9.

<sup>6</sup> Christian, M.D., et al., *Development of a triage protocol for critical care during an influenza pandemic*. CMAJ, 2006. **175**(11): p. 1377-81.

<sup>7</sup> Talmor, D., et al., *Simple triage scoring system predicting death and the need for critical care resources for use during epidemics*. Crit Care Med, 2007. **35**(5): p. 1251-6.

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casualty trauma such as START<sup>8</sup> & JumpStart<sup>9</sup> or SALT<sup>10</sup> do not completely address the circumstances covered in this section.

After the Severe Acute Respiratory Syndrome (SARS) epidemic in Toronto Canada, Christian<sup>11</sup> proposed a triage system for ventilator access based on pre-existing health status and SOFA scores. The New York Department of Health was the first U.S. governmental body to issue a proposed triage system for ventilator access during a pandemic influenza event<sup>12</sup>. This system is similar to the Toronto proposal but has fewer exclusion criteria. None of the triage criteria designed for infectious disease disasters have included pediatric specific recommendations and this will be addressed in a subsequent section.

### **Clinical Evaluation:**

When implementation of a scarce resource allocation plan is required, equipment such as ventilators and supplemental oxygen will require a consistent and predictable approach to utilization. Evaluation criteria to predict potential morbidity and mortality of severe cases of a pandemic respiratory illness should be discussed, vetted, and adopted prior to their needed utilization and should use simple and straightforward metrics that most clinicians recognize and can assess. As the physiology of adult and pediatric patients is often quite different, we have determined that separate triage tools are required to evaluate adults and pediatric patients. To comply with the need for equitable access to care, we have used the same expected mortality criteria for both groups.

When a patient presents to the ED, or a decision is required for admission to ICU, or the patient is determined to need ventilator support, the appropriate triage tool will be used to determine whether the patient is allocated a ventilator. We have also included a requirement to systematically review the clinical progress of each patient who is currently receiving mechanical ventilation or ICU care with a requirement of improvement at 48 hours, 120 hours, and daily thereafter. This tool is meant to be a starting place for further clinical decision making tools as conditions evolve in any mass casualty or pandemic event.

In the event of a severe shortage of ventilators or ICU beds, not all patients will be eligible for mechanical ventilation or ICU care. The following inclusion and exclusion

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<sup>8</sup> Benson, M., K.L. Koenig, and C.H. Schultz, *Disaster triage: START, then SAVE--a new method of dynamic triage for victims of a catastrophic earthquake*. Prehosp Disaster Med, 1996. **11**(2): p. 117-24

<sup>9</sup> Romig, L.E., *Pediatric triage. A system to JumpSTART your triage of young patients at MCIs*. JEMS, 2002. **27**(7): p. 52-8, 60-3.

<sup>10</sup> SALT reference

<sup>11</sup> Christian, M.D., et al., *Development of a triage protocol for critical care during an influenza pandemic*. CMAJ, 2006. **175**(11): p. 1377-81.

<sup>12</sup> Is this the New York reference? Powell, T., K.C. Christ, and G.S. Birkhead, *Allocation of Ventilators in a Public Health Disaster*. Disaster Med Public Health Preparedness, 2008. **2**(1): p. 20-26.

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criteria are recommended (Table 3). These criteria have been informed by both the Toronto triage tool and the New York tool. Initiation of ventilatory support could be determined by the following inclusion and exclusion criteria, however it is understood that each institution may have their own policies and procedures for these types of determinations.



**TABLE 3: Inclusion and Exclusion Criteria for Mechanical Ventilation**

<b>Inclusion Criteria</b>	
The patient must have one of the following:	
A.	Requirement for invasive ventilatory support <ul style="list-style-type: none"> <li>• Refractory hypoxemia (SpO<sub>2</sub> &lt; 90% on non-rebreather mask or FIO<sub>2</sub> &gt; 0.85)</li> <li>• Respiratory acidosis (pH &lt; 7.20)</li> <li>• Clinical evidence of impending respiratory failure</li> <li>• Inability to protect or maintain airway</li> </ul>
B.	ADULTS: Hypotension (systolic blood pressure < 90 mm Hg or relative hypotension) with clinical evidence of shock (altered level of consciousness, decreased urine output, or other evidence of end-organ failure) refractory to volume resuscitation requiring vasopressor or inotrope support that cannot be managed in ward setting PEDS: Hypotension (systolic BP < 70 + 2x age (years)) or clinical shock state (as evidenced by altered level of consciousness, decreased urine output, or other evidence of end-organ failure) refractory to volume resuscitation requiring vasopressor or inotrope support that cannot be managed in ward setting
<b>Exclusion Criteria</b>	
The patient is excluded from admission or transfer to critical care if <i>any</i> of the following is present:	
A.	Severe trauma
B.	Severe burns of patient with any 2 of the following: <ul style="list-style-type: none"> <li>• Age &gt; 60 yr</li> <li>• &gt; 40% of total body surface area affected</li> <li>• Inhalation injury</li> </ul>
C.	Cardiac arrest <ul style="list-style-type: none"> <li>• Unwitnessed cardiac arrest</li> <li>• Witnessed cardiac arrest, not responsive to electrical therapy (defibrillation or pacing)</li> <li>• Recurrent cardiac arrest</li> </ul>
D.	Metastatic malignant disease with poor prognosis
E.	Advanced and irreversible immunocompromise
F.	Severe and irreversible neurologic event or condition with highly expected mortality
G.	End-stage organ failure meeting the following criteria: <i>Heart</i> <ul style="list-style-type: none"> <li>• New York Heart Association (NYHA) class III or IV heart failure</li> </ul> <i>Lungs</i> <ul style="list-style-type: none"> <li>• Severe chronic lung disease with FEV<sub>1</sub> &lt; 25% predicted, baseline PaO<sub>2</sub> &lt; 55 mm Hg, or secondary pulmonary hypertension</li> <li>• Previously diagnosed primary pulmonary hypertension with NYHA class III or IV heart failure, or mean pulmonary arterial pressure &gt; 50 mm Hg</li> </ul> <i>Liver</i> <ul style="list-style-type: none"> <li>• Child–Pugh score <sup>3</sup> 7 or Meld scored of &gt; 20</li> </ul>

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Institutions will need to develop clear initiation standards to determine when resource scarcity requires application of these allocation criteria. There also will need to be clear criteria in place to determine if patients currently using resources are obtaining the needed benefit to insure the lowest morbidity and mortality for the population at risk. When patients have improved in condition to the point that the resources are no longer necessary, or when patients are not progressing to the desired health outcomes, these resources may need to be reallocated to insure the stated goal.

Periodic reassessment of the patient's risk for mortality is recommended at specific time points during the course of care to determine if reallocation of resources is the most appropriate available option. Patients will be evaluated for improvement and for worsening potential for mortality at 48 hours and 120 hours by the following adult and pediatric criteria outlined below. This process is not a deviation from normal practices, as health care options for patients often are reassessed during a period of treatment. The difference here is simply that given the shortages of resources, reassessment of the patient's condition may be conducted more rapidly, more consistently, and through the application of different inclusion criteria.

These decisions will be both difficult and necessary, and to insure their fairness there will be a monitoring and appeals process along with these standardized criteria to best insure a cautious and moderated approach to these decisions.

### **Triage of eligible patients:**

Once a patient is deemed eligible for triage by meeting the above inclusion criteria, the appropriate adult or pediatric triage tool will be used to determine initial and continuing use of mechanical ventilation and/or ICU care.

### **Adults:**

It is recommended that for adult care the triage tools proposed by the Toronto and New York guidelines are used. These rely on the use of the Sequential Organ Failure Assessment Score (SOFA score) to determine likelihood of recovery if given adequate treatment. The SOFA score is determined by a multi-organ failure model and includes the measures of respiratory, hematologic, liver, cardiovascular, neurologic and renal function (see Figure 1).

**FIGURE 3: Sequential Organ Failure Assessment (SOFA) Score**

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

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

There is no scoring system for use in the pediatric population that is universally accepted. Some states have published a discussion of their planned method of ethical resource allocation (see UTAH state plan on the state preparedness web at:

[http://extras.mnginteractive.com/live/media/site297/2010/0506/20100506\\_021026\\_04b\\_PEDIATRIC\\_PANDEMIC\\_TRIAGE\\_JANUARY1010.pdf](http://extras.mnginteractive.com/live/media/site297/2010/0506/20100506_021026_04b_PEDIATRIC_PANDEMIC_TRIAGE_JANUARY1010.pdf)

Also see Alaska’s plan on their state web page:

[www.hss.state.ak.us/prepared/assets/conference/Scarce-Resources.pdf](http://www.hss.state.ak.us/prepared/assets/conference/Scarce-Resources.pdf) - 2009-02-13

Of critical care resources for children, the PELOD scoring method, discussed below, is felt to be more easily applied when data may be scarce, but decisions regarding allocation must be based on both clinical and laboratory data.

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Table 3: The PELOD Scoring System

Organ system	Variable	SCORE				Max score
		0	1	10	20	
Neurologic						20
	Glascow coma score	12-15	7-11	4-6	3	
		AND		OR		
	Papillary reaction	Both reactive		Both fixed		
Cardiovascular						20
	Heart rate					
	< 12 yrs	≤ 195 bpm		> 195 bpm		
	> 12 yrs	≤ 150 bpm		>150 bpm		
		AND		OR		
	Systolic blood pressure					
	< 1 month	> 65 mmHg		35-65mmHg	< 35 mmHg	
	≥ 1month & < 1yr	> 75 mmHg		35-75mmHg	< 35 mmHg	
	≥ 1 yr & < 12 yr	>85 mmHg		45-85 mmHg	< 45 mmHg	
	≥ 12 yr	> 95 mmHg		55-95 mmHg	< 55 mmHg	
Renal						10
	Creatinine					
	< 7 days	< 1.59 mg/dl		≥1.59 mg/dl		
	≥ 7 days & < 1 yr	<0.62 mg/dl		≥ 0.62 mg/dl		
	≥ 1 yr & < 12 yrs	< 1.13 mg/dl		≥ 1.13 mg/dl		
	≥12 yrs	< 1.59 mg/dl		≥ 1.59 mg/dl		
Pulmonary						10
	PaO2/FiO2 ratio	> 70mmHg		≤ 70mmHg		
		AND		OR		
	PaCO2	≤ 90 mmHg		>90 mmHg		
		AND				
	Mechanical vent	No	Yes			
Hematologic						
	WBC	≥ 4.5K	1.5-4.4 K	<1.5		
		AND	OR			
	Platelets	≥ 35 K	< 35			
Hepatic						1
	AST	< 950 IU/L	≥ 950 IU/L			
		AND				

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	Prothrombin time	> 60%	≤ 60%			
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The calculation for determining predicted likelihood of mortality is shown in Table 4. Using this calculation if the PELOD score is > 33 the predicted mortality is 53%; in the validation study a PELOD score >33 had a mortality of 100%. Table 5 gives the predicted PELOD score associated with different mortality probability. To use the PELOD scoring system on a daily basis, the score is calculated as at presentation. If new data is not available (i.e. new laboratory values) the value can either be assumed to be unchanged or normal depending on the physician’s clinical judgment.

**TABLE 4: Calculation for determining predicted likelihood of mortality**

$$P = \frac{1}{1 + \exp(7.64 - 0.3 \times \text{PELOD score})}$$

**TABLE 5: Predicted mortality levels for a given PELOD score**

PELOD Score	Predicted Mortality probability	Predicted Mortality Rate
< 10	0.009	<1%
15	0.04	4%
20	0.1625	16%
22	0.26	26%
24	0.3917	40%
25	0.46	
26	0.53	53%
27	0.61	
28	0.68	68%
>30	0.98	98%

Using similar mortality levels for pediatric and adult patients leads to using a PELOD score of 33 as a reasonable proxy for a SOFA score of 11. The calculated probability of mortality with a score of 33 is 53%, however the validation study showed a 100% mortality at this score. This seems a reasonable compromise since to use a score of 29 (approximately 85% mortality) may prioritize some children who would receive futile allocation of scarce resources.

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**Critical Care Triage Tool – PEDIATRIC PATIENTS (<18 yrs)**

	Initial Assessment		48 Hour Assessment		120 Hour Assessment	
Color Code	Criteria	Priority/Action	Criteria	Priority/Action	Criteria	Priority/Action
Blue	Exclusion Criteria* or PELOD $\geq$ 33*	Medical Mgmt +/- Palliate & d/c	Exclusion Criteria or PELOD > 33 or PELOD 21-33 & no $\Delta$	Palliate & d/c from CC	Exclusion Criteria ** or PELOD > 33 ** or PELOD 21-33 no $\Delta$	Palliate & d/c from CC
Red	PELOD < 21 or Single Organ Failure	Highest	PELOD < 33 and decreasing	Highest	PELOD < 33 and decreasing progressively	Highest
Yellow	PELOD 21-33	Intermediate	PELOD < 21 no $\Delta$	Intermediate	PELOD < 21 minimal decrease (< 3 point decrease in past 72 hrs)	Intermediate
Green	No significant organ failure	Defer or d/c, reassess as needed	No longer ventilator dependant	d/c from CC	No longer ventilator dependant	d/c from CC

\*If exclusion criteria or PELOD > 33 occurs at any time from the initial assessment to 48 hours change triage code to Blue and palliate.

\*\* If exclusion criteria or PELOD > 33 occurs at anytime from 48 – 120 hours change triage code to Blue and palliate.

$\Delta$  = change                      CC = critical care                      d/c = discharge

- **Blue:** High probability of mortality; should be discharged from critical care and should receive medical management and palliative care as appropriate
- **Red:** Highest priority for critical care
- **Yellow:** Intermediate priority for critical care
- **Green:** Low probability of mortality; defer admission/ discharge from critical care

**ADULT Critical Care Triage Tool**

Color Code	Initial Assessment		48 Hour Assessment		120 Hour Assessment	
	Criteria	Priority/Action	Criteria	Priority/Action	Criteria	Priority/Action
Blue (EXPECTANT)	Exclusion Criteria* or SOFA > 11*	Medical Mgmt +/- Palliate & d/c	Exclusion Criteria or SOFA > 11 or SOFA 8 – 11 no Δ	Palliate & d/c from CC	Exclusion Criteria ** or SOFA > 11 ** or SOFA 8 – 11 no Δ	Palliate & d/c from CC
Red	SOFA < 7 or Single Organ Failure	Highest	SOFA < 11 and decreasing	Highest	SOFA score < 11 and decreasing progressively	Highest
Yellow	SOFA 8 - 11	Intermediate	SOFA < 8 no Δ	Intermediate	SOFA < 8 minimal decrease (< 3 point decrease in past 72 hrs)	Intermediate
Green	No significant organ failure	Defer or d/c, reassess as needed	No longer ventilator dependant	d/c from CC	No longer ventilator dependant	d/c from CC

\*If exclusion criteria or SOFA > 11 occurs at any time from the initial assessment to 48 hours change triage code to Blue and palliate.

\*\* If exclusion criteria or SOFA > 11 occurs at anytime from 48 – 120 hours change triage code to Blue and palliate.

Δ = change      CC = critical care      d/c = discharge

- **Blue:** High probability of mortality; should be discharged from critical care and should receive medical management and palliative care as appropriate
- **Red:** Highest priority for critical care
- **Yellow:** Intermediate priority for critical care
- **Green:** Low probability of mortality; defer admission/ discharge from critical care

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The initiation of other, more sophisticated methods of ventilatory support, such as ECMO or HFOV, will be evaluated and allocated using the same criteria as conventional ventilatory support. There is concern that these already scarce resources will become more frequently requested interventions, but their use strains the efficient and maximal use of all available resources and thus will be limited by established medical criteria. External transfers of patients into the hospital should be based on availability of resources and on medical necessity.

The above triage tools were designed to address a pandemic severe respiratory illness. As information about the illness is obtained, the criteria will need to be reviewed and refined. MMEs that are short lived and local or regional, where the expectation of material or other assistance is forthcoming, may not require implementation of such protocols.

### **Oxygen Therapy:**

Given that in the worse case scenario, 15-20% of influenza patients may acquire pneumonia<sup>13</sup> during a pandemic, it is likely that oxygen therapy will be in great demand. In addition, the current needs for oxygen supplementation for COPD, heart failure, cystic fibrosis, and other respiratory diseases will remain the same. As such rationing decisions may need to be implemented. If rationing of oxygen therapy is required; oxygen will be administered based on the following guidelines:

- Ventilated patients
- Adult patients with oxygen saturation < 86% on room air
- Pediatric patients > 1 year with oxygen saturation <88% on room or respiratory rate of >40
- Pediatric patients with oxygen saturation <88% on room air or respiratory rate >60
- Hypoxic patients with pneumonia

It is unlikely that oxygen supplies will be depleted because of the storage capacity of hospitals and the ease of delivery by vendors. If oxygen supplies or personnel required to administer oxygen therapy become scarce, those patients categorized as Blue (expectant) who are not be eligible for ventilators will also not be eligible for oxygen therapy. Every effort will be made using other therapeutic means to keep these dying patients' comfortable (see Palliative Care Section).

Patients who are discharged requiring supplemental oxygen will go home with the oxygen masks or nasal cannulae used during their inpatient stay. Outpatients who currently receive home oxygen therapy will be resupplied based on oxygen availability and the guidelines listed above. If oxygen is only used during exertional activities, it should not be renewed.

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<sup>13</sup> Gupta RK, George R, Nguyen-Van-Tam JS. Bacterial pneumonia and pandemic influenza planning. *Emerg Infect Dis.* 2008 Aug;14(8):1187-92



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No specific group should have priority for receiving oxygen therapy. Although direct care providers are a priority group for vaccines and antivirals, oxygen will not, by itself, improve survival and it is not likely to help staff return to work more quickly. As such, there will be no oxygen priority for patients on the basis of occupation.

Establishing the capability of providing oxygen delivery to the 250 bed Acute Care Center (ACC) will require the utilization of a mobile cryogenic bulk oxygen system. A micro-bulk cryogenic oxygen vessel with an 850 gallon capacity would support the 250 bed ACC for 4.06 days based on a utilization rate of 2-4 liters per minute per bed. Resupply would be coordinated with current vendor. Some equipment that would be very useful in maintaining the operation of this system may include:

### **Additional Equipment and Supplies**

- GP45 Cryogenic O<sub>2</sub> vessels (backup to micro-bulk supply): 2 each on carts
- External Vaporizers: 2 – 4 each
- Various shutoff valves (~ 6 each)
- 1” Steel Braid transfer hoses (to be specified by bulk supplier)
- Pressure regulating manifold (1 ea)
- Pressure Adjustable regulators (2 each)
- ½” Steel Braid hoses (2 – 60 each)
- 70 each 12’ high pressure hoses
- 125 each TEE adapters
- 500 each ¼ check valves
- 120 each “Y” blocks with integrated Dial-A-Flow O<sub>2</sub> flowmeters
- Backup supply of size E O<sub>2</sub> cylinders – up to 1 cylinder per bed
- O<sub>2</sub> regulators for E O<sub>2</sub> cylinders
- Cylinder wrenches to connect and remove O<sub>2</sub> regulators onto O<sub>2</sub> cylinders
- 2-wheeled cylinder carriers to transport O<sub>2</sub> cylinders: ~100 + each
- 24 – 36 bank O<sub>2</sub> cylinder racks to store O<sub>2</sub> cylinders: ~ 5 – 8 racks

## ANTIBIOTIC / ANTIVIRAL RESOURCES

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### Antibiotic Resources

During a pandemic or other infectious event, antibiotics will be necessary to treat secondary bacterial pneumonias. There is some evidence that many, if not most, of the deaths in the 1918 pandemic could be attributed to secondary bacterial pneumonias with *Streptococcus pneumoniae* and *Staphylococcus aureus*<sup>14</sup>. These are still the most likely pathogens, however, the need to plan for infections with resistant strains of *S pneumoniae* and methicillin resistant *S aureus*. Antibiotics for bacterial pneumonia include: amoxicillin/clavulanate, flouroquinolones (levofloxacin, gatifloxacin, moxifloxacin), doxycycline, third generation cephalosporins (cetriaxone and cefotaxime) and macrolides (azithromicin, clarithromicin). In addition vancomycin, linezolid, rifampin, and tigecycline will be required for resistant bacteria<sup>15</sup>.

There are currently no national guidelines on how to allocate antibiotics during a pandemic. It has been estimated that 15-20% of influenza patients developed pneumonia during the three pandemics of the 20<sup>th</sup> century<sup>16</sup>. Applying these estimates to the anticipated patient population of a large hospital system, a 1918-type pandemic might lead to tens of thousands of patients needing antibiotic treatment for pneumonia in a 12 week period. Many hospitals have stockpiled some antibiotics, particularly ciprofloxacin and doxycycline, for use during a bioterrorist attack. However, ciprofloxacin is not as active as other flouroquinolones against *S pneumoniae* and, although doxycycline is useful for mild-moderate pneumonias, it is not a first-line agent for severe pneumonias. Other antibiotics would quickly run out during a pandemic. The Strategic National Stockpile (SNS) also contains antibiotics but this cache could not be relied upon as it would be needed in all parts of the country.

During a pandemic, antibiotics should only be used in patients who have suspected or proven bacterial pneumonia. There is no indication for prophylactic use of antibiotics to prevent bacterial pneumonia and this practice should be discouraged. Certain high risk patients (COPD, immunocompromised) might be given antibiotics to start immediately if antivirals fail to prevent worsening of respiratory symptoms. Generally, antibiotics should be allocated to those who are most ill and who have the greatest likelihood for survival. For the sickest inpatients (ICU/Ventilated patients) it is suggested that antibiotics could be distributed based on SOFA scores. For example, patients with a SOFA > 11 (blue range) should not receive antibiotics if these are in short

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<sup>14</sup> Morens DM, Taubenberger JK, Fauci AS. Predominant role of bacterial pneumonia as a cause of death in pandemic influenza: Implications for pandemic influenza preparedness. *J Infect Dis* 2008;198:1-10

<sup>15</sup> Mandell LA, Wunderink RG, Azueto A, et al. Infectious Diseases Society of America/American Thoracic Society Consensus Guidelines on the Management of Community-Acquired Pneumonia in Adults. *Clin Infect Dis* 2007;44:S27-72.

<sup>16</sup> Gupta RK, George R, Nguyen-Van-Tam JS. Bacterial pneumonia and pandemic influenza planning. *Emerg Infect Dis*. 2008 Aug;14(8):1187-92

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supply. Other hospitalized patients should only receive antibiotics when pneumonia is highly suspected or proven based on clinical symptoms, radiologic procedures, and laboratory data. Clinical case definitions based solely on symptoms and exam findings will be developed as needed in case radiology and laboratory services are overextended. Separate definitions will be required for adolescent/adult and pediatric patients. Outpatients will also only receive antibiotics for suspected or proven bacterial pneumonia or other bacterial complications of influenza. Clinical case definitions will be crucial in this population because limited resources and staffing will not allow for a full work-up with labs and X-rays. The use of more cost effective and more available oral antibiotics like doxycycline, ciprofloxacin, and amoxicillin will be necessary in the outpatient setting, even if these are less effective than intravenous antibiotics (ceftriaxone, vancomycin) and more expensive oral antibiotics (moxifloxacin, linezolid).

Beyond prioritizing antibiotics for patients who have a proven or suspected pneumonia and are likely to survive, it does not make sense to stratify people further. Patients with bacterial pneumonias who go untreated are very likely to have their condition worsen and will ultimately die. Denying antibiotics to anyone in this situation seems ethically unsound if that person is likely to survive with the treatment. This is in contrast to the use of antivirals. Antivirals, as treatment, would be used in patients with influenza symptoms regardless of the presence of pneumonia. Prioritizing can be justified because most people (97%) are expected to survive influenza with no treatment in a 1918-like scenario. Antiviral treatment is most likely to help high-risk groups.

### **Antiviral Resources**

Antivirals including oseltamivir, zanamivir, rimantadine, and amantadine have been shown to decrease the duration of influenza symptoms, decrease hospitalization rates, decrease antibiotic use, and decrease mortality due to influenza<sup>17 18 19</sup>. Furthermore, these drugs have been used as chemoprophylaxis to prevent acquisition of influenza either after exposure to a case or pre-exposure during the entire influenza season<sup>20</sup>. The most effective antivirals for both treatment and chemoprophylaxis are the neuraminidase inhibitors, oseltamivir and zanamivir, and, as such, the CDC has recommended that these drugs be stockpiled for a potential pandemic and the agency has proposed priority groups that should receive these drugs in the event of an influenza pandemic<sup>21</sup>.

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<sup>17</sup> Bowles SK, Lee W, Simor AE, et al. Use of oseltamivir during influenza outbreaks in Ontario nursing homes, 1999-2000. *J Am Geriatr Soc* 2002;50:608-16

<sup>18</sup> Kaiser L, Wat C, Mills T, Mahoney P, Ward P, Hayden F. Impact of oseltamivir treatment on influenza-related lower respiratory tract complications and hospitalizations. *Arch Intern Med* 2003;163:1667-72

<sup>19</sup> Whitley RJ, Hayden FG, Reisinger KS, et al. Oral oseltamivir treatment of influenza in children. *Pediatr Infect Dis J* 2001;20:127-33

<sup>20</sup> Ward P, Smith I, Small J, Suter P, Dutkowski R. Oseltamivir (Tamiflu®) and its potential for use in the event of an influenza pandemic. *J Antimicrob Chemother* 2005;55(Suppl S1):i5-i21

<sup>21</sup> <http://www.hhs.gov/pandemicflu/plan/appendixd.html>

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While treatment and post-exposure chemoprophylaxis with antivirals are financially feasible strategies for protecting our health care workers, pre-exposure prophylaxis an entire hospital workforce is financially prohibitive. As a result the following protocol has been proposed for the use of antivirals for hospital staff:

### Assumptions:

- No vaccine will be available to protect staff exposed to influenza patients.
- Personal Protective Equipment will provide adequate protection against influenza if used properly.
- Antivirals have little effect if administered 48 hours after the onset of influenza symptoms (fever, myalgias, and cough)..
- Certain staff on flu wards, in the ED and at the Alternate Care Centers (ACCs) will be at a much higher risk of becoming infected.
- Staff might not present to work if they are not afforded adequate protection.

### **Antiviral Distribution Protocol:**

Many hospitals intend to stockpile enough antivirals to treat and give chemoprophylaxis to at-risk workers. The Michigan Strategic National Stockpile (MISNS) has a limited cache of antivirals for distribution as indicated by the incident.

Any private stockpiling efforts are within the control of individual hospitals to manage and distribute as they see fit consistent with the ethical allocation criteria included in the Guidelines. The state stockpile will be distributed under the ethical allocation criteria included in the Guidelines.

## **PALLIATIVE CARE RESOURCES**

Regardless of modeling or assumptions, a major pandemic event will require significant resources to care for dying patients and their families. Minimum expected case fatality rate up to 3% based on historical influenza pandemic data. The impact of pandemic death (Table 1) will stress all parts of the healthcare system and require clear, executable strategies for supporting very large numbers of patients and their families through the end of life.

The ethical imperative to provide pandemic palliative care is well-supported under the framework used to create guidelines for ventilator allocation; specifically, obligations to individual patients, institutional competence and utility. Planning for palliative care resource allocation must also be guided by justice and fair distribution of resources, and administered honestly and transparently with specific processes for accountability to patients and families, institutional partners and state and community stakeholders.

In addition to the ethical imperative, palliative care is now recognized as a core institutional competency by multiple organizations including the Joint Commission (JCAHO) and the National Quality Forum (NQF). Palliative Medicine is also now a

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recognized American Board of Medical Specialties (ABMS) subspecialty and formal palliative care clinical services are now present in 70% of larger U.S. hospitals, creating not only an infrastructure for palliative care delivery, but also an expectation from patients, families and communities of available, responsive and competent care for patients through end of life.

Formal palliative care clinical guidelines have been developed and widely endorsed (*available at nationalconsensusproject.org*), and stress the importance of care in four key areas: physical symptom management (pain, dyspnea, nausea, etc); psychological symptom management (anxiety, depression, agitation, delirium); support for family and close persons; and spiritual care for patients and loved ones. Quality palliative care is also to be delivered by an interdisciplinary team skilled in integrating services across these domains, frequently consisting of physicians and advanced-practice nurses, social workers, and spiritual care providers.

As with all clinical resources mobilized for pandemic care, palliative care providers are limited and will need to be allocated based upon need and availability. Unlike some resources that can be concentrated geographically (i.e. ventilators, critical care providers), palliative care support will be needed across all care settings, including inpatient and intensive care, the alternative care center (ACC), and outpatient and community contact points. It should be assumed that patients with life-threatening illness could (and will) receive care in all parts of the system, which creates a formidable task to source palliative care throughout.

The broad need for palliative care during a pandemic does not dictate that resources be distributed evenly among settings, but that reasonable efforts be made to provide support likely to be most useful in each. For instance, it is expected that patients who require mechanical ventilation (whether or not they receive it) by definition have life-limiting illness, and thus a high mortality risk. In fact, those who require mechanical ventilation but do not receive it (per established protocols or CRC action) are most likely to require prompt, competent palliative care. The distribution of palliative care resources is thus closely connected to ventilator allocation, and should be integrated into the universal triage process for pandemic response.

### **Palliative Care Resource Allocation**

Pandemic palliative care resources can broadly be divided into personnel and non-personnel categories. Non-personnel resources include oxygen, space (particularly private space) and medications for control of anticipated symptoms among those severely ill with influenza (e.g. opioids for breathlessness, benzodiazepines for anxiety/restlessness, anticholinergic medications for respiratory secretions, etc.). It is reasonable to assume that patients sufficiently ill to succumb to pandemic influenza may also have other substantive illness (advanced cancer, congestive heart failure, dementia, etc.) which expands the list of probable symptoms to include significant pain, nausea/vomiting, and agitation, as well as other significant clinical events such as non-

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respiratory infections, congestive heart failure exacerbations, myocardial infarctions, seizures, and others.

As many of these resources are finite, if not scarce, it is possible (and perhaps likely) that allocation for palliative care will compete with allocation for potentially curative care. Oxygen is a good candidate for such a conflict, if supplies become critically low. There is a fairly sound argument for allocating oxygen to those patients with the highest likelihood of survival, assuming that oxygen supplementation improves survival. Since alternative resources can ease the suffering of those who might benefit from palliation, prioritizing oxygen to probable survivors can be justified, if sufficient medications (e.g. opioids, benzodiazepines, anti-cholinergics, etc.) are available to manage the dying patients's distress acceptably. As with all potential scarce resources, distribution will be guided by SRAC.

### **Palliative Care Protocols**

Given the personnel constraints described above, it will be necessary to develop written palliative care protocols to help unit providers care for patients and families through the end of life. These protocols would provide concise but complete descriptions of assessments and interventions for symptom management and support. Training and acclimation to these protocols will need to occur as part of routine pandemic preparedness training for staff.

### **Ethical Planning includes Assessment for the Use of Alternative Care Sites**

The State of Michigan has a long established a regional healthcare coalition planning structure. Each hospital organization should understand the capabilities of their institution and their local or regional healthcare coordinators to set up an Alternative Care Site (ACS) in the event of an MME. Understandably, rural regions with small hospitals may not have robust ACS planning in place, but their leaders should be familiar with the region's capabilities within the MEMS framework. An ACS could potentially relieve some of the burden on the hospital if the patient surge could be managed with resources that are easily delivered in such a venue, such as minor respiratory care, IV fluids and medications, some noninvasive oxygen delivery and even humane palliative care for the dying.