

**Guidelines for the Use of
Modified Health Care Protocols in Acute Care Hospitals
During Public Health Emergencies**

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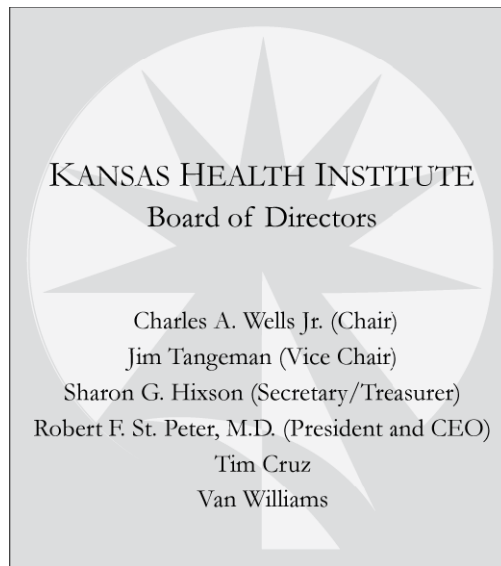
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The Kansas Health Institute is an independent, nonprofit health policy and research organization based in Topeka, Kansas.

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BACKGROUND

These guidelines describe some principles and practices that health care providers and acute care hospitals in Kansas can adopt if resources are scarce during a public health emergency. The guidelines are the product of analysis conducted on behalf of the Kansas Department of Health and Environment (KDHE) by the Kansas Health Institute (KHI) and a panel of experts. In September 2009, KHI produced a report for KDHE that outlined possible general processes and ethical principles to apply when health care resources are scarce.¹ The report also recommended that KDHE develop and distribute as soon as possible to providers guidelines that address potential lack of resource situations that may occur as a result of the current influenza pandemic.

In response to the report, KDHE asked KHI to convene a group of medical experts to review and amend, as deemed necessary, four technical documents developed by other states that the report identified as good references on the subject. The guidelines presented in this document represent the result of the expert panel review and of comments received from health care professionals and administrators during a public comment period that ran from December 2009 to June 2010. The names and affiliation of the members of the review panel are listed in Appendix A of this document.

Since this document's recommended guidelines are adapted from previous publications, the background information and detailed rationale for the guidelines have been considerably shortened since the review panel's goal was to produce a concise list of recommendations that clinicians in Kansas could rapidly review and implement. Those interested in more background information and further justification of the guidelines can review the original source documents, which are listed below:

Minnesota Healthcare System Preparedness Program Standards of Care for Scarce Resources. Available at <http://www.health.state.mn.us/oep/healthcare/index.html>.

Summary of Suggestions from the Task Force for Mass Critical Care Summit, January 26–27, 2007. Available at http://www.chestjournal.org/content/133/5_suppl/1S.full.pdf+html.

¹ The KHI report can be found at: www.khi.org

Tertiary Triage Protocol for Allocation of Scarce Life-Saving Resources in V.H.A. During an Influenza Pandemic. Available at http://www.ethics.va.gov/activities/pandemic_influenza_preparedness.asp.

NYS Workgroup on Ventilator Allocation in an Influenza Pandemic. Allocation of Ventilators in an Influenza Pandemic. Available at <http://www.health.state.ny.us/diseases/communicable/influenza/pandemic/ventilators/index.htm>.

GENERAL PRINCIPLES

- These modified protocols of care should not be considered a substitute for good planning of regional sharing of resources and surge capacity. The activation of the modified protocols should take place only after a declaration of emergency and only after other specified means of procuring additional resources and expanding surge capacity have been exhausted.
- These protocols address primarily hospital triage and should be integrated into broader emergency response plans. For example, the adoption of these protocols could require that some patients be moved after triage to reference hospitals to receive life-saving treatment, or out of acute care hospitals if they do not qualify for life-saving treatment. This and similar issues should be addressed in local and state emergency response plans.
- The establishment of regional networks, when absent, and the strengthening of regional networks that are already in place should be considered a priority. Resource deficiency may be a local or regional problem and could be mitigated by carefully drafted mutual aid and sharing protocols. Regional networks could also play a vital role in assuring that the modified protocols can be implemented throughout the state, with small and large hospitals working together to assure a uniform process of triage and allocation of resources.
- Before these modified protocols are implemented, all key stakeholders should be aware of the specifics to ensure that there is sufficient clarity and consensus to implement them.
- Small hospitals may have difficulty adopting some of the modified protocols proposed in this document. The review panel discussed this issue and concluded that, while modified protocols that provide for the same solution for all may not be always easy to implement, they have the advantage of promoting a fairer and more uniform distribution of resources

throughout the state. When applicable, specific differences in implementation between small and large hospitals and communities are addressed and discussed in the protocols. Additional adjustments may be necessary based on new experiences and evidence. Issues concerning small hospitals are discussed further in a special section of this document.

- Because the field of modified protocols of care is so new, and interventions have not been widely tested, *the panel strongly recommends that all the protocols be labeled as “Interim Recommendations.”* This will facilitate changing and updating the documents as new information becomes available.
- The panel recommends that KDHE issue the protocols as voluntary, not mandatory, guidelines. The panel expects that the declaration of emergency that would trigger the implementation of these protocols would also offer liability protection under the provisions of KSA 48-915 (b) to health care providers and hospitals that implement them in good faith. The panel trusts that such protection will help remove any reservations that institutions and clinicians might have about implementing these protocols, allowing a broader and therefore more effective implementation of the protocols.

SPECIAL ISSUES CONCERNING SMALL HOSPITALS

Small hospitals may have difficulty adopting some of the modified protocols proposed in this document. The review panel discussed this issue and tried to leave as much flexibility as possible in the protocols to account for local circumstances, while assuring a standardized approach to the use of scarce resources throughout the state. Modified protocols that provide for the same solution for all situations may not always be easy to implement, but they have the advantage of promoting a fairer and more uniform distribution of resources throughout the state. During the comment period, questions were raised about the feasibility of implementing the modified protocols in small hospitals; but no evidence surfaced suggesting that implementation in small hospitals would not be possible through careful planning and the establishment of regional networks.

When small hospitals do not have the resources to triage or treat patients locally using the proposed modified protocols, we recommend that they work in close partnership with their referral institutions. It could be possible, for example, to appoint a triage officer in a large

hospital who could conduct triage for patients admitted in a small hospital. The triage could be conducted remotely using teleconferences or, if necessary, telemedicine resources. It is important that triage decisions for critically ill patients occur at the local level, even if the decisions are made by a triage officer in a different institution. As one of the providers told us, “there is no sense in transferring patients who will be very low priority patients when they arrive at the referral center.” Some of these mechanisms of assisted remote triage may already be in place and used occasionally during localized emergencies.

Large hospitals should be ready to assist small hospitals with their triage needs, and to treat their patients and patients transferred from small hospitals using the same set of clinical priority criteria. In the absence of this uniform approach, it is likely that patients in rural areas and those closer to referral hospitals would be treated unequally, creating a situation of geographical disparity that would be in contrast with the principles of distributive justice endorsed in this document. This could also create uncontrolled movement of patients towards large hospitals, in the hope that they could be treated there, which would increase congestion in those institutions.

The adoption of clinical triage criteria specific to small hospitals also was examined. In particular, the use of a modified SOFA score that uses saturation of peripheral oxygen (SpO₂) instead of partial pressure of oxygen in arterial blood (PaO₂) was considered, since some hospitals do not perform the Arterial Blood Gas analysis test (ABG) necessary to measure PaO₂. In the absence of convincing published evidence in support of the modified SOFA score the review panel decided to endorse the use of the unmodified SOFA criteria throughout the state. The panel recommends that hospitals review the requirements for the SOFA assessment and make provisions to assure that they have the capacity to perform the necessary laboratory tests.

APPENDIX A: EXPERT PANEL MEMBERS

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Medicine, Wichita.

APPENDIX B: INTERIM GUIDELINES FOR TERTIARY TRIAGE PROTOCOL FOR ALLOCATION OF SCARCE RESOURCES IN ACUTE CARE HOSPITALS IN KANSAS²

1) GOAL

1. This protocol should be used in hospitals throughout Kansas to ensure that patients have fair access to life-saving resources when the demand for these resources is greater than the supply and use of resources must be optimized.
2. The application of these guidelines in small hospitals may not be feasible due to the lack of specialized staff. In these cases, hospitals may modify the implementation of these guidelines to fit their situation while preserving the overarching goal of assuring an objective, clinical set of criteria for the allocation of scarce resource. Small hospitals also can partner with larger referral centers and delegate some functions described in this documents to those centers. Communication between small and large hospitals can take place using the best and most appropriate means, such as telephone, radio, telemedicine, or face-to-face consultation.
3. While the protocol refers primarily to pandemic influenza, it is applicable to other public health emergencies that may cause a prolonged shortage of life-saving resources.

2) INITIATION OF THE TRIAGE PROTOCOL

1. Generally, the hospital medical director, in consultation with the hospital administrator, will apply the protocol throughout an affected hospital at his or her discretion. The medical director will take into consideration local or regional declarations of emergency (e.g., state-wide declaration of emergency by the governor).
2. Hospital medical directors must assure that the protocol is applied consistently and fairly whenever and wherever it is initiated.

² Last revised: August 9, 2010

3. Application of the pandemic triage protocol will take place only when augmentation efforts have been exhausted and demand for the life-saving resource exceeds supply. Triggers include (but are not limited to):
 - a. Local or state declaration of emergency.
 - b. Initiation of national disaster medical system and national mutual aid and resource management.
 - c. Surge capacity fully employed within health care facility.
 - d. Attempts at conservation, reutilization, adaptation, and substitution are performed maximally.
 - e. Identification of critically limited resources (ventilators, antibiotics).
 - f. Identification of limited infrastructure (isolation, staff, power).
 - g. Request for resources and infrastructure made to local and regional health officials.
 - h. Current attempt at regional, state, and federal level for resource or infrastructure allocation.
4. The hospital medical director should rescind the application of the pandemic triage protocol when the supply of the life-saving resource is sufficient to meet the demand. This may occur either before or after a declared state of emergency has been rescinded.

3) RESPONSIBILITY STRUCTURE FOR TRIAGE DECISION MAKING

1. Scarce Resource Allocation Team:

- a. The scarce resource allocation team should be a functional team under existing Incident Command Structure (ICS)/Hospital Incident Command Structure (HICS)/Emergency Operations — it should not be a separate structure.
- b. The size and composition of the allocation team will vary depending on local circumstances, the nature of the emergency, and the size of the institution. Members may include (but not be limited to) critical care nurses, respiratory therapists, pharmacists, human resource managers, hospital administrators and legal counsel.
- c. The scarce resource allocation team will:
 - i. Acquire the information necessary to facilitate and oversee informed and ethical triage and scarce resource allocation decisions. Information could include resources (bed census, staffing, projected needs for care, existing medical resources, resource gaps, and projected availability of life-saving and hospice and palliative care resources) and guidelines for the management of the emergency (e.g., up-to-date treatment options and prognostic factors).
 - ii. As part of Incident Command Structure (ICS)/Hospital Incident Command Structure (HICS)/Emergency Operations, make judgments in collaboration with health care organization leaders and staff to implement appropriate alternative standard protocols of care that address the special demands that an emergency imposes on the health care organization or demands that could imminently be expected.
 - iii. Meet often, ideally daily, during an emergency.
 - iv. Advise and assist, as required, and make definitive decisions, if necessary, to resolve uncertainties and disputes that affect the health care organization's capacity to carry out its mission during a public health emergency.

- v. Be involved in the real-time appeals process regarding triage decisions described in this document (excluding decisions made by members of the triage team, which should not be subject to appeal).
- vi. Prepare information briefs to the chief executive officer, chief of staff or designee(s) about the emergency's status and the health care organization's response so that the information may be communicated to appropriate staff and stakeholders.

2. Triage Officer:

- a. The triage officer must be a member of the senior medical staff who is experienced and trained in intensive care and triage protocols.
- b. The triage officer will assess all patients, assign a level of priority for each, and direct attention to the highest-priority patients.
- c. The triage officer, with the assistance of the triage team (when available), will:
 - i. Review all patients for inclusion and exclusion criteria, and facilitate discharge from critical care for patients no longer requiring it.
 - ii. At least every 48 hours, evaluate all patients receiving critical care.
 - iii. Evaluate all patients that have been recommended to receive critical care.
- d. The triage officer is not expected to examine patients, except under circumstances in which examination may be crucial in reaching a triage decision.

- e. The triage officer should not be involved in day to day care of the patients subjected to triage. Small hospitals unable to maintain this separation of roles should seriously consider the use of a triage officer based in another institution.
- f. The triage officer will make triage decisions based on the allocation protocol, assigning patients to triage categories based on a SOFA score (Tables 2 and 3), and available resources.

3. Triage Team:

- a. In hospitals with sufficient staff resources, a triage team will be set up as a subcommittee of the scarce resource allocation team.
- b. The role of the triage team is to provide information to the triage officer and help facilitate and support his/her decision-making process.
- c. Members of the triage team may include (but not be limited to) an experienced critical care nurse, respiratory therapist, and/or clinical pharmacist. A representative from hospital administration may also be a part of the team to help organize resources and serve as a liaison to hospital leadership.
- d. In larger facilities, it may be necessary to have more than one triage officer and team, with each officer/team assigned to a designated ICU or hospital area.
- e. It is recommended that the triage officer and team members function in shifts lasting no longer than 12 to 16 hours, if feasible.
- f. The triage officer and triage team will:
 - i. Meet often (ideally at least daily) to assess all patients who have clinical indications to receive scarce life-saving resources (e.g., critical care patients

who require ventilators or hemodynamic support) and evaluate exclusion and inclusion criteria to determine the appropriateness of the initiation and continuation of scarce life-saving treatment.

- ii. Develop and maintain a record of triage decisions including the data upon which the decisions were based.
- g. Decisions from the triage team/triage officer cannot be appealed.

4. Review Committee:

- a. In hospitals with sufficient staff resources, a review committee will be created to review the decisions of the triage team.
- b. The review committee (ideally a small group of no more than three individuals) may be composed of experienced professionals who typically no longer provide direct care, such as the chief nursing officer, chief medical officer, chief respiratory therapy supervisor, infection control director, or legal counsel.
- c. The review committee will bring to the attention of the triage officer any concerns about the application of the triage algorithm so that the triage officer may reflect on these concerns when approaching future decisions.
- d. The review committee does not have the authority to change a decision made by the triage officer, except when there is clear evidence that the triage protocol was not applied as planned.

5. Treating Clinicians:

- a. Should not, ideally, have the responsibility of deciding whether to institute or remove a patient from life-saving resources. This decision is up to the triage

team/triage officer. These functions should be kept separated to reduce the emotional impact of these decisions on health care providers.

- b. Will implement a treatment plan consistent with the triage team's decision regarding patient triage category.
- c. Will conduct a DNR discussion with patients who do not qualify under the triage protocol for scarce life-saving resources.
- d. Will offer palliative and other appropriate care.

6. Emergency Physicians:

- a. Because many patients will seek care at the emergency department during pandemic influenza, emergency physicians should be prepared to apply the “*initial assessment tool*” (See Table 3) for patients who have clinical indications for critical care.
- b. Emergency physicians will:
 - i. Apply initial resuscitation, if applicable, with simple measures such as fluids, oxygen by nasal cannula, mask, control of bleeding, etc. (unless other exclusion criteria are present).
 - ii. Report initial assessment to the triage team.

4) ALLOCATION CRITERIA

- 1. The overarching criterion is the degree of medical success or survivability determined by the application of established, objective clinical criteria, including SOFA scores. The guiding question of this assessment is whether the patient is likely to survive with the use of the scarce resource.

2. Once a determination has been made that a patient qualifies for the resource under the SOFA score, and a patient's priority category has been determined, within-category priority will be established on a first-come, first-served basis or on a random selection/lottery basis, depending on feasibility of implementation.
 - a. This second step will be implemented only if resources are still insufficient to meet the needs of all who qualify for the resource, after applying the clinical allocation criteria.

3. Clinical Assessment
 - a. Clinicians will thoroughly assess all patients who present for care.

 - b. Patients with clinical indications for scarce life-saving resources (e.g., critical care patients who require ventilators or hemodynamic support) will be subject to the triage protocol described in this document, unless they elect not to be candidates for critical care.³

4. Exclusion Criteria
 - a. Patients with clinical indications for scarce life-saving resources will be assessed for exclusion criteria to determine the appropriateness of the initiation or continuation of scarce life-saving treatment.

 - b. Exclusion criteria are intended to identify and exclude patients with a short life expectancy irrespective of the current acute illness. If an exclusion criterion is present (Table 1), the patient is no longer a candidate for scarce life-saving

³ The triage of patients with a Do Not Resuscitate (DNR) order or other advance directives should take into account the patient's wishes and the likelihood of recovery after life-sustaining measures are applied.

resources, including scarce resources that may be needed for cardiopulmonary resuscitation.

- c. Clinicians should offer palliative and other supportive care to the patient and follow clinical standards for withdrawal of scarce life-saving resources.

5) RE-ASSESSMENT

1. Continued use of the scarce life-saving resources will be reviewed on an established schedule by the triage team (at least once every 48 hours). Patients that continue to meet criteria for inclusion will receive the resources until they either meet an exclusion criterion, or they are re-assessed according to the triage team schedule.
 - a. Patients assigned to the same category will be allocated resources on a first-come, first-served basis or on a random selection/lottery basis, depending on the feasibility of implementation.
 - b. Those that no longer meet the criteria after re-assessment will no longer be eligible for access to the scarce life-saving resources and should be informed of the need for withdrawal of these treatments.

6) SPECIAL CONSIDERATIONS FOR VENTILATORS

1. Allocation of ventilators during a public health emergency will be subject to the same procedures described in this document for other scarce resources. Since ventilators are often an important life-saving resource, this section reviews some special issues related to ventilator allocation. For more details please refer to the following document, from which many of these guidelines have been abstracted:

NYS Workgroup on Ventilator Allocation in an Influenza Pandemic. *Allocation of Ventilators in an Influenza Pandemic*. Available at

<http://www.health.state.ny.us/diseases/communicable/influenza/pandemic/ventilators/index.htm>.

2. Uniform policies are crucial; variations among facilities will lead to inequities. Equitable rationing systems, particularly ones that contemplate limiting access to life-saving treatment, must assure that the same resources are available and in use at similarly situated facilities, i.e., all facilities in one city gripped by the pandemic.
3. The establishment of regional stockpiles should be strongly considered, following the example in New York and other states. Leaders of facilities within a region should be encouraged to work out voluntary plans for loans of equipment and staff in a crisis.
4. As a public health emergency spreads, hospitals should limit the non-critical use of ventilators. Elective procedures that may require the use of ventilators should be canceled and/or postponed during the period of emergency. For an emergency that stretches from days to weeks, such as a pandemic, facilities will need a review system for procedures that decrease morbidity or mortality, but are not of an emergency nature.
5. The ideal interval for re-assessing patients in need of critical care and ventilators has not been well defined. Critical care experts point out that many patients will not show signs of improvement for several days after they start receiving intensive care resources such as ventilators; therefore a re-assessment schedule should allow for sufficient time to pass from when a patient first receives the resources, so that clinical improvement can become evident. Other experts point out that the greatest impact on survival is often made by aggressive action in the first hours of presentation, and a re-assessment schedule that is conducted using long intervals may not identify early enough patients who fail to improve (and whose critical care resources should therefore be re-allocated). These are factors that should be kept in mind when determining a re-assessment schedule. The decision should be based on the clinical characteristics of the emergency and on how acute the need for the re-allocation of

resources is. Many clinicians may not feel comfortable re-assessing patients at intervals longer than 48 hours, and some may prefer even shorter intervals.

6. Distinctions should be maintained between acute and chronic care facilities once triage begins, permitting chronic care facilities to maintain their specific mission. Patients using ventilators in chronic care facilities would not be subjected to acute care triage guidelines. If, however, such patients required transfer to an acute care facility, they would be assessed by the same criteria as all other patients, and might fail to meet criteria for continued ventilator use. Chronically ill patients will be vulnerable to the pandemic; chronic care facilities will have to provide more intensive care on site as part of the general process of expanding care beyond standard locations. Barriers to transfer are appropriate and likely during a phase in which acute care hospitals are overwhelmed.

7. Children in need of ventilators present unique challenges.
 - a. In general, triage using SOFA scores should not be used for children (especially young ones), because the SOFA system has not been adequately tested in children.

 - b. The use of the modified system described in Appendix C of this document (*Interim Guidelines for the Use of Pediatric Ventilators During a Public Health Emergency in Kansas*) is recommended in alternative to the SOFA triage system for children.

 - c. Special expertise, likely to be in short supply, is needed to care for children who may also be especially vulnerable to morbidity and mortality in a pandemic. The establishment of centers of excellence for pediatric patients, particularly during a pandemic, should be considered. Although a pandemic emergency is likely to affect most or all of the state, the required expertise will not be widely distributed and an attempt to concentrate severely ill children needing of intensive care in specialized centers may make sense, if feasible. Transportation of pediatric patients to the

referral centers may be problematic in the middle of a statewide emergency, when the emergency medical system could be under considerable pressure.

- d. Planning assumptions must adequately reflect the needs of infants and children. Many modern ventilators accommodate patients weighing as little as 10 kilograms, but will not support infants.

Table 1. Exclusion Criteria

Severe, chronic disease with a short life expectancy (6 months or less)
Severe burns on patient with any two of the following:
Age > 60 yr
40% of total body surface area affected
Inhalational injury
Cardiac arrest
Unwitnessed cardiac arrest
Witnessed cardiac arrest, not responsive to electrical therapy (defibrillation or pacing)
Recurrent cardiac arrest
Trauma-related arrest
Advanced untreatable neuromuscular disease
Metastatic malignant disease with poor prognosis (life expectancy of 6 months or less)
End-stage organ failure, except when caused by readily reversible volume overload or hypoventilation due to an exogenous agent, such as narcotic, benzodiazepine, or other procedural sedative
Cardiac: NY Heart Association class III or IV
Pulmonary: severe chronic lung disease with FEV1** < 25%
Hepatic: MELD*** score > 20
Renal: dialysis dependent
Neurologic: severe, irreversible neurologic event/condition with high expected mortality

Table 2. Sequential Organ Failure Assessment (SOFA) Score*

Variable	SOFA Score				
	0	1	2	3	4
PaO ₂ /FiO ₂ mmHg	> 400	301 – 400	201 – 300	101 – 200	≤ 100
Platelets, x 10 ³ /μL or x 10 ⁶ /L	> 150	101 – 150	51 – 100	21 – 50	≤ 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 6 – 15 or Epi ≤ 0.1 or Norepi ≤ 0.1	Dop >15 or Epi > 0.1 or 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) or anuric
<p>Note: Clinicians will determine the total SOFA score for each patient by summing the scores for each variable. Dopamine [Dop], epinephrine [Epi], norepinephrine [Norepi] doses in ug/kg/min. SI units are noted in parentheses ().</p> <p>*Adapted from: Ferreira et al., 2001. Explanation of variables: PaO₂/FiO₂ indicates the level of oxygen in the patient's blood. Platelets are a critical component of blood clotting. Bilirubin is measured by a blood test and indicates liver function. Hypotension indicates low blood pressure; scores of 2, 3, and 4 indicate that blood pressure must be maintained by the use of powerful medications that require ICU monitoring, including dopamine, epinephrine, and norepinephrine. The Glasgow coma score is a standardized measure that indicates neurologic function; low score indicates poorer function. Creatinine is measured by a blood test and indicates kidney function.</p>					

Table 3. Life-Saving Resources Triage Tool for INITIAL ASSESSMENT

Initial Criteria	Priority	Action
Exclusion Criteria OR SOFA > 11	None	Do not use life-saving resources Use other resources including palliative measures
SOFA \leq 7 OR Single Organ Failure	Highest	Use life-saving resources, as available
SOFA 8–11	Intermediate	Use life-saving resources, as available
No requirement for life-saving resources	None	Use other medical management Re-assess as needed

Table 4. Life-Saving Resources Triage Tool for 48-HOUR RE-ASSESSMENT*

48 Hour Criteria	Priority	Action
Exclusion Criteria OR SOFA > 11 OR SOFA 8 – 11 and increasing since last assessment	None	Discontinue life-saving resources Use other resources including palliative measures
SOFA < 11 and decreasing since last assessment	Highest	Continue life-saving resources, as available
SOFA < 11 and unchanged since last assessment OR SOFA < 8 and increasing since last assessment	Intermediate	Continue life-saving resources, as available
No longer requiring life-saving resources	None	Discontinue life-saving resources. Re-assess as needed


* Re-assessment should be conducted on a predetermined scheduled, at least every 48 hours.

APPENDIX C: INTERIM GUIDELINES FOR THE USE OF PEDIATRIC VENTILATORS DURING A PUBLIC HEALTH EMERGENCY IN KANSAS⁴

This document contains a recommended triage protocol that could be applied when there are many pediatric patients in need of ventilator support and there is a limited supply of ventilators, such as in pandemic influenza. It complements the triage protocols described in Appendix B of this document (*Interim Guidelines for Tertiary Triage Protocol for Allocation of Scarce Resources in Acute Care Hospitals in Kansas*). The protocol is based on similar guidelines developed by clinicians and public health authorities in Minnesota and Wisconsin. The protocol replaces the SOFA score used in adult triage with the Pediatric Logistic Organ Dysfunction (PELOD) score.

⁴ Last revised: October 22, 2009

Compared to other patient(s) requiring and awaiting mechanical ventilation, does this patient have significant differences in prognosis or resource utilization in one or more of the categories below that would justify re-allocation of the ventilator?

Lower Priority				Higher Priority
Category and Variables	LOW	MEDIUM	HIGH	
1. Prognosis — PELOD score: PELOD when available	High potential for death according to predictive model (>35)	Intermediate potential for death according to predictive model (17–34)	Low potential for death according to predictive model (<17)	
2. Prognosis — Oxygenation Index* Data: OI and Δ OI — for ventilated patients	Worsening or very high oxygenation index	Stable and/or intermediate oxygenation index (no or marginal improvement after adequate trial of mechanical ventilation based upon disease process)	Improving or low oxygenation index	
3. Duration of Need: Data includes days ventilated — if applicable — and expected duration of ventilation	3a. Long duration — estimate > 7 days on ventilator (ARDS in septic patient with chronic lung disease) 3b. Prolonged mechanical ventilation with poor or no progress toward weaning	3a. Moderate duration — estimate 3–7 days on ventilator (pneumonia in healthy patient) 3b. Making slow progress toward weaning	3a. Short duration — (estimate < 3 days on ventilator) 3b. Making good progress toward weaning	
4. Duration of Benefit: Data includes prognosis/ duration modifying underlying diseases **	Severe underlying disease with poor short-term prognosis*** OR poor prognosis based upon epidemiology of specific disease	Severe underlying disease with poor long-term prognosis and/or ongoing resource demand (e.g.: home oxygen dependent, dialysis dependent) OR indeterminate / intermediate prognosis based upon epidemiology of specific disease process	No severe underlying disease OR good prognosis based upon epidemiology of specific disease state	

(See table notes on next page)

*Oxygenation Index (OI) = Mean Airway Pressure (MAWP) x Inspired oxygen concentration (FiO2) / arterial oxygen pressure (PaO2)

(PaO2 may be estimated from peripheral oxygen saturation using the oxygen dissociation curve if blood gas measurements are unavailable)

$$\text{OI} = \text{MAWP} \times \text{FiO}_2 / \text{PaO}_2$$

** Underlying disease may include epidemiologic prognostic information for *current* disease — e.g.: pandemic influenza mortality despite treatment in certain patient groups or with certain underlying medical conditions as well as *chronic* underlying conditions. Age is to be used in conjunction with other disease variables *only* to determine duration of benefit, not as stand-alone criteria or affecting prognosis.

***Examples of underlying diseases that may predict poor short-term survival or long-term resource demand may include (but are not limited to)

1. Congenital heart disease with poor chance of long term survival
2. Cardiomyopathy with ejection fraction < 25% and pulmonary edema unresponsive to therapy
3. Severe chronic lung disease including pulmonary fibrosis, cystic fibrosis, obstructive or restrictive diseases requiring continuous home oxygen or mechanical ventilation use prior to onset of acute illness
4. Central nervous system, solid organ, or hematopoietic malignancy with poor prognosis for recovery
5. Liver disease with ascites, history of variceal bleeding, fixed coagulopathy or encephalopathy
6. Acute hepatic failure with hyperammonemia
7. Acute and chronic and irreversible neurologic impairment, which makes patient dependent for all personal cares (e.g.: severe stroke, congenital syndrome, persistent vegetative state, severe dementia etc.)

APPENDIX D: INTERIM GUIDELINES FOR STRATEGIES TO ADDRESS SCARCE RESOURCE SITUATIONS IN KANSAS^{5,6}

Core strategies that can 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.

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 — take a resource from one patient and giving it to a patient with a better prognosis or greater need.

Examples of the application of these strategies are presented below. Some examples refer to situations that may take place outside of a public health emergency and may already be addressed by medical staff.

⁵ Last revised: October 27, 2009

⁶ Information adapted from: *Patient Care Strategies for Scarce Resource Situations*, published by the Minnesota Department of Health. Available at <http://www.health.state.mn.us/oep/healthcare/scarcestrategies.html>.

Oxygen

Conserve strategy — Use minimum liter flow to keep O₂ saturation > target (85–95% depending on situation). Use O₂ conserving cannulas (Oxymizer™). No oxygen driven nebs. Eliminate or reduce equipment with high O₂ consumption.

Re-Use strategy — Appropriately disinfect and re-use cannulas, masks, and tubing.

Re-Allocate strategy — May have to base therapy on triage decision tool similar to ventilator allocation.

Medication Administration

Substitute strategy — Use alternative inexpensive medications (morphine, lorazepam, doxycycline) that are easily stockpiled prior to the event.

Adapt strategy — Use morphine and benzodiazepines for sedation drips, when possible. Run drips via gravity rather than IV pump, if needed. Administer more medications via a subcutaneous or intramuscular route rather than intravenously.

Conserve strategy — Give adjunctive non-steroidal and other analgesics/medications including orally when possible.

Re-Allocate strategy — Re-allocation should be considered as the last resort. Re-allocation will increase demands for palliative care and adequate pain control/sedation — focus should be on stockpiling inexpensive options in advance of event.

Hemodynamic Support and IV Fluids

Substitute strategy — Use alternative vasopressor agents such as epinephrine (inexpensive).

Adapt strategy — May have higher threshold to initiate vasopressors, may use gravity drips (e.g., 1mg epinephrine in 100cc NS) instead of infusion pumps. Consider nasogastric fluid replacement rather than IV.

Conserve strategy — Minimize invasive monitoring.

Re-Use strategy — Consider reusing central venous catheters, other tubes and catheters with appropriate sterilization/disinfection.

Mechanical Ventilation

Adapt strategy — Use of anesthesia machines, BiPAP, short-term manual ventilation and other strategies.

Conserve strategy — Adjusted threshold for intubation, decrease elective surgeries to free up ventilators/anesthesia machines.

Re-Use strategy — Re-use of ventilator circuits after appropriate sterilization / disinfection.

Re-Allocate strategy — Re-allocation should be considered as the last resort. Ventilators should be allocated to patients who can most benefit, and allocation should follow a pre-planned process and use decision support tools and expert clinical judgment.

Nutrition

Adapt strategy — Have family or ancillary staff provide meals. Provide simpler meals and offer fewer choices to those that can take oral intake. Use tube feedings instead of total parenteral nutrition when possible. Delay feedings longer than usual.

Conserve strategy — See above.

Re-Use strategy — May need to re-use nasogastric and other feeding equipment with appropriate disinfection.

Staffing

Substitute strategy — Outside, equally-qualified staff brought in to institution via compact agreements or other mechanism (DMAT, Medical Reserve Corps, other local/regional/state/federal sources). Use family or non-professional staff to provide basic patient cares (non-clinical).

Adapt strategy — Less qualified staff from sources as above or volunteers provide basic patient care with critical care nursing and physician staff monitoring larger numbers of patients. Implement just-in-time training and orientation to job duties following pre-planned training programs. Change shift duration. Use family or non-professional staff to provide some clinical care with training/in-service.

Conserve strategy — Reduce administrative demands (teaching and administration, documentation, etc.).