

**HOUSTON-HARRIS COUNTY COMMITTEE ON
MEDICAL STANDARDS OF CARE
FOR PANDEMIC INFLUENZA
AND HIGHLY INFECTIOUS RESPIRATORY DISEASES**

Guidance for Healthcare Providers

*Recommended Priority Groups for
Antiviral Medication and Vaccine
and
Recommended Model for Ventilation Triage*

April 2009



Please submit questions or comments to panflucommittee@hcpbes.org

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HOUSTON-HARRIS COUNTY COMMITTEE ON MEDICAL STANDARDS OF CARE FOR PANDEMIC INFLUENZA AND HIGHLY INFECTIOUS RESPIRATORY DISEASES

Background

Current avian influenza activity in Asia and Europe underscores the importance of planning for pandemic influenza in the United States. In response, health officials at the federal, state and local levels have accelerated efforts to coordinate planning to prepare and respond to pandemic influenza. In Texas, decision-making regarding the response to a pandemic ultimately rests at the local level. During a pandemic, local health officials will work with community stakeholders and state partners to review epidemiological data, weigh potential health benefits with potential societal and economic burdens and apply the appropriate response measures.

Key among planning efforts is ensuring the appropriate allocation of scarce medical resources such as vaccines, antiviral medications and ventilators in the event of a pandemic.

The Houston/Harris County Committee on Pandemic Influenza Medical Standards of Care

Recognizing the need to ensure informed and coordinated guidance to the Houston/Harris County medical community in the event of a pandemic, in 2006 Harris County Public Health and Environmental Services and the Houston Department of Health and Human Services convened the *Houston/Harris County Committee on Medical Standards of Care for Pandemic Influenza and Highly Infectious Respiratory Diseases* (“Committee”), consisting of executive leadership from Harris County Public Health and Environmental Services, Houston Department of Health and Human Services, Baylor College of Medicine, Harris County Hospital District, Harris County Medical Society, the Mental Health and Mental Retardation Authority of Harris County and The University of Texas Health Science Center at Houston.

The Committee was charged with developing recommendations for the community standard for allocating scarce medical resources should pandemic influenza or an outbreak of another highly infectious respiratory disease occur. While current federal and state guidelines, such as those regarding proposed priority groups for vaccines and antiviral medications, served to inform Committee deliberations, the Committee aimed to develop and issue consensus recommendations that are applicable, feasible and ethical within the context of the Houston/Harris County population distribution, the current and anticipated availability of local medical care and public health resources and the latest scientific evidence regarding issues such as efficacy of vaccine in preventing illness and efficacy of vaccination strategies for reducing community transmission rates.

The Committee was charged with developing recommendations on the following:

- Prioritization of a limited supply of antiviral medication
- Prioritization of a limited supply of vaccine
- Modified standards of clinical care

The Committee recognizes that it is likely that Houston/Harris County healthcare providers will be among the first to diagnose and treat pandemic influenza within the community. Further, many individuals will look to their providers for information and guidance about the pandemic situation and recommendations enacted by local health officials.

Therefore, it is crucial that providers remain informed about local plans and recommendations for responding to pandemic influenza, particularly plans for enacting community control measures such as vaccines, antivirals, isolation and quarantine. Armed with this information, providers can engage patients in following recommendations that can protect their families' health and well-being during a pandemic.

Committee Activities to Date

The Committee convened in September 2006, reviewing its charge, considering relevant background materials and discussing topics for future sessions. During the fall of 2006, the Committee held two information-gathering sessions. At the first, the Committee reviewed the epidemiology of past influenza pandemics, and at the second, the Committee considered an ethics framework for public health and pandemic preparedness.

Through summer 2007, the Committee developed an ethical framework to support deliberations, established guiding principles, considered Federal and State guidance on pandemic influenza preparedness and reviewed current scientific evidence regarding pandemic control measures. With this knowledge the Committee developed recommendations for the prioritization and distribution of antivirals and vaccine. The Committee shared these draft recommendations with stakeholders in October 2007, providing an overview for clinicians attending the *Preparing for Pandemic Influenza: A Healthcare Forum* event and making them available on the HCPHES website (www.hcphes.org).

Through spring 2008 the Committee developed recommendations for the triage of critical care resources, particularly related to the use of mechanical ventilators.

Ethical Framework and Guiding Principles

The Committee adapted the following *ethical framework* to support Committee deliberations. This framework was adapted from an ethics framework developed for pandemic influenza preparedness purposes by Nancy E. Kass, ScD, in 2005.¹

- 1) What are the goals of the policies/interventions?
- 2) What are the proposed policies/interventions? How effective will they be in achieving stated goals?
- 3) What are the known or potential burdens of the policies/interventions?
- 4) Have we identified the least restrictive approaches to meeting the stated goals? What strategies should/have we used to minimize burdens?
- 5) Are the policies/interventions implemented fairly? Is there justice in the distribution to the policies/interventions' burdens and benefits?
- 6) Have we used fair procedures for developing these policies/interventions?

The Committee developed three *guiding principles*, or overarching goals for community outcomes should a pandemic occur. These principles, which steer Committee priority-setting and decision-making, are as follows:

- Preserving critical infrastructure and societal functioning;
- Reducing morbidity and mortality; and
- Controlling the spread of disease.

¹ Kass, NE. An ethics framework for public health and avian influenza preparedness. *Yale J Biol Med* 2005, 78:239-254.

Recommendations for Prioritizing Antivirals and Vaccine for Pandemic Influenza in Houston/Harris County

*Rationale for Identifying Priority Groups for Antivirals and Vaccines for Pandemic Influenza**

Issues surrounding influenza prophylaxis and treatment are complex. For example, planning assumptions based on Federal guidance estimate that:

- The time from identification of a candidate vaccine strain to the production of the first vaccine ready for administration to people could be three to six months.
- Once vaccine is available, it may take several months to produce an adequate supply of vaccine for the entire U.S. population.
- Two doses of vaccine administered one month apart may be required to develop immunity to a novel virus.
- There is a limited supply of antiviral medications; viral resistance against some antivirals may limit their use.
- A six to eight week course of antiviral medication is recommended for prophylaxis through the first wave of the pandemic if no vaccine is available; a five day course is recommended for treatment.²

Therefore the Committee believes that it is likely that in the event of a pandemic there may be limited quantities of antivirals and vaccines available in Houston/Harris County, and that throughout the course of the pandemic quantities may continued to be scarce. In order to control the spread of the disease, reduce morbidity and mortality and preserve societal functioning, the Committee recommends that Houston/Harris County identify priority groups for the use of antivirals and vaccines during a pandemic.

Priority Populations for Antivirals

Table A outlines recommended priority groups for the receipt of antiviral medication treatment during a pandemic influenza event in Houston/Harris County. The prioritization of antiviral treatment during a pandemic event is based on the assumption that there will be a *severe shortage* in the supply of antiviral medications. Note that these recommendations refer to antiviral *treatment* only – the Committee recommends that antiviral *prophylaxis* be utilized only for localized outbreak control purposes among small clusters of potentially-exposed individuals when health officials have a reasonable chance of stopping an epidemic from occurring.

The Committee's recommendations are similar to those outlined by the State of Texas in the Department of State Health Services' draft *Antiviral Allocation, Distribution and Storage Plan* dated March 2007 (see <http://www.dshs.state.tx.us/comprep/pandemic/default.shtm>). There are two key differences:

- The Committee's recommendations place hospitalized patients with influenza as the highest priority for antiviral treatment, while the draft State plan places these patients in a priority

* The recommendations in this document were developed for pandemic influenza events as well as large-scale outbreaks of other highly infectious respiratory diseases.

² U.S. Department of Health and Human Services. HHS Pandemic Influenza Plan, Part 1, Appendix D, November 2005.

group after ill, non-hospitalized persons who serve in health, emergency and critical services roles. The Committee's rationale for placing hospitalized patients with influenza as the highest priority for antiviral treatment include a belief that the primary goal of antiviral therapy is to provide treatment for those who are very ill and are likely to benefit from this treatment. The Committee feels that this belief likely reflects the values of the Houston/Harris County community. The Committee notes that if a person serving in a health, emergency or critical services role were to become ill enough for hospitalization, they would then become classified in the highest priority grouping and thus eligible for antiviral therapy.

The Committee also believes that prioritizing patients hospitalized with influenza over persons serving in health, emergency or critical services roles promotes equity in antiviral treatment access across the community. That is, highest priority for antiviral access is not granted to professional groups among which certain races, ethnicities, genders, ages or socioeconomic strata have historically predominated.

Finally, the Committee believes that the mission of the healthcare sector is to care for the ill; therefore prioritizing persons hospitalized with influenza above persons serving in healthcare roles is consistent with this mission.

- The Committee recommends that antiviral post-exposure prophylaxis (PEP) be utilized for localized outbreak control purposes only, while the State plan recommends that healthcare workers employed by a facility where influenza patients are being treated be provided PEP.

The Committee reviewed this recommendation and concluded that 1) it would be difficult to define an exposure event in a healthcare setting, and 2) that it would be difficult to explicitly define the term "healthcare worker" for the purposes of determining who would receive PEP. The Committee believes that this term could be legitimately defined in very broad terms to include all persons employed by a treatment facility – and thus potentially exposed to influenza virus – from direct care providers (i.e. physicians, registered nurses, licensed vocational nurses) to allied health providers (i.e. respiratory therapists, medical assistants) to support personnel (i.e. custodial workers). The volume of persons potentially requiring the approximately two-week course of PEP (vs. a 5-day treatment course) would quickly deplete already limited antiviral supplies, thus magnifying the scarcity of treatment available to ill persons.

The Committee believes that the first line of defense against exposures in the healthcare setting should focus upon the use of effective and consistent infection control practices and personal protective equipment. Nevertheless, because tasks involved in the provision of direct care do place providers at increased risk, the Committee has placed healthcare workers in direct care roles second-highest on the priority list.

Finally, the Committee believes that a recommendation developed by healthcare providers (e.g. members of the Committee) to reserve PEP for healthcare providers could be interpreted as self-serving.

Table A: Recommended Priority Groups for Antiviral Medication Treatment for Persons Ill with Pandemic Influenza, Houston/Harris County

Priority	Group
A1	Hospitalized patients with influenza
A2	Healthcare workers with direct patient contact, care or response functions: <ul style="list-style-type: none"> • Physicians, nurses and other healthcare providers in ambulatory and/or acute patient care settings • Emergency medical services personnel • Public health
A3	Critical community emergency providers, including: <ul style="list-style-type: none"> • Law enforcement, firefighters and mortuary services workers • Public health workers with planned pandemic response roles • Key government officials and essential personnel responsible for the continuity of emergency operations
A4	Essential infrastructure service workers, such as: <ul style="list-style-type: none"> • Public utility workers responsible for maintenance of critical functions, such as clean water, energy, solid waste and sewage system functioning • Workers responsible for transporting and distributing water, fuel and food • Telecommunications/IT for essential network operations and maintenance • Public information/emergency communications, including those utilizing multiple languages
B1	Highest-risk outpatients; outpatients more susceptible to severe illness or death from influenza: <ul style="list-style-type: none"> • Pregnant women • Immunosuppressed persons • Persons with lung or heart disease • Persons >64 years of age with one or more Advisory Committee on Immunization Practices (ACIP) - defined chronic disease³ • Persons aged 6 months to 64 years with two or more ACIP-defined chronic diseases • Persons hospitalized in the prior year with pneumonia, influenza or other high-risk condition
B2	Increased-risk outpatients; outpatients potentially more susceptible to severe illness or death from influenza: <ul style="list-style-type: none"> • Persons ≥65 years of age with no ACIP-defined chronic disease or other high-risk condition • Persons aged 6 months to 64 years with one or more ACIP-defined chronic disease
C	Other outpatients/general population

³ CDC. Prevention and Control of Influenza: Recommendations of the Advisory Committee on Immunization Practices. MMWR 2007;53(RR06);1-54.

Priority Populations for Vaccination

Table B outlines recommended priority groups for the receipt of pandemic vaccine during a pandemic influenza event in Houston/Harris County. The prioritization of vaccination during a pandemic event is based on the assumption that the supply of vaccine will be limited.

In October 2007 the Federal government released draft guidance on prioritizing pandemic vaccine (see <http://www.pandemicflu.gov/vaccine/prioritization.html>). This guidance outlines five tiers, with Tier 1 reflecting the priority group for vaccine when the pandemic is most severe and quantities of vaccine are most limited. Tier 1 receives the most focus within the Federal guidance, and is further prioritized by seven sub-populations. The sub-populations within Tier 1 are similar to the Committee's recommendations found in Priority Groups A and B in Table B. Key differences are as follows:

- The Committee included certain essential service personnel within the top priority group to receive vaccine, while the Federal recommendations do not include this sub-population in its Tier 1 group – this population is found in Tier 2. The Committee rationale for placing these persons within the top priority group includes a belief that the roles provided by these persons – such as ensuring clean water, energy, solid waste and sewage system functioning, as well as transporting food and fuel and providing critical communications, information technology and public information functions – are necessary to preserve critical infrastructure and ensure basic societal functioning.
- Within its Tier 1 priority groups, the Federal Guidance includes pregnant women and infants aged 6-11 months, stating that these sub-populations are at high mortality risk. The Committee designated a Priority B group that includes high risk populations, but these high risk populations are expanded and further divided into two groups – first, a group that is considered high risk for transmitting the virus within the community; and second, a group that is considered to be at high risk for morbidity and mortality from influenza.

Within this first subgroup the Committee included all children ages 6 months to 17 years, a group that is included in Tier 3 of the Federal guidelines (with the exception of infants aged 6-11 months). The Committee believes that much like seasonal influenza, children will likely be primary transmitters of a pandemic influenza virus within their communities; therefore it is important that they be protected in order to control the spread of the disease and protect the community at large.

Within the second subgroup the Committee included pregnant women and other high-risk adults, including immunosuppressed persons and those with certain underlying conditions. Other than pregnant women, the Federal guidance includes high-risk adults in its Tier 4 ranking.

Table B: Recommended Priority Groups for Vaccination for Pandemic Influenza, Houston/Harris County

Priority		Group
A. Infrastructure	A1. Healthcare	Healthcare workers with direct patient contact, care or response functions: <ul style="list-style-type: none"> • Physicians, nurses and other healthcare providers in ambulatory or acute care settings • Emergency medical services • Public health
	A2. Emergency	Critical community emergency providers, including: <ul style="list-style-type: none"> • Law enforcement, firefighters and mortuary services workers • Public health workers with planned pandemic response roles • Key government officials and essential personnel responsible for the continuity of emergency operations
	A3. Services	Essential infrastructure service workers, such as: <ul style="list-style-type: none"> • Public utility workers responsible for maintenance of critical functions, such as clean water, energy, solid waste and sewage system functioning • Workers responsible for transporting and distributing water, fuel and food • Telecommunications/IT for essential network operations and maintenance • Public information/emergency communications, including those utilizing multiple languages
B. High Risk	B1. Risk for Transmission	Persons with a high risk of transmitting influenza: <ul style="list-style-type: none"> • Children aged 6 months to 17 years • Household contacts of: <ul style="list-style-type: none"> ○ Pregnant women ○ Infants <6 months of age ○ Immunosuppressed persons • Healthcare workers employed in nursing homes
	B2. Risk for Morbidity and Mortality	Persons more susceptible to severe illness or death from influenza: <ul style="list-style-type: none"> • Pregnant women • Immunosuppressed persons • Persons with lung or heart disease • Persons >64 years of age with one or more Advisory Committee on Immunization Practices (ACIP)-defined chronic disease⁴ • Persons aged 18-64 years with two or more ACIP-defined chronic diseases • Persons hospitalized in the prior year with pneumonia, influenza or other high-risk condition
C. Moderate Risk		Persons potentially more susceptible to severe illness or death from influenza: <ul style="list-style-type: none"> • Persons ≥65 years of age with no ACIP-defined chronic disease or other high-risk condition • Persons 18-64 years with one or more ACIP-defined chronic disease
D. Lower Risk		General population; persons not covered in the categories above

⁴ CDC. Prevention and Control of Influenza: Recommendations of the Advisory Committee on Immunization Practices. MMWR 2007;53(RR06);1-54.

Recommended Model for Ventilator Triage in Houston/Harris County during an Influenza Pandemic

Rationale for Modifying Standards for Ventilator Triage during a Pandemic

It is likely that during a pandemic event, critical care capacity within Houston/Harris County hospitals will be overwhelmed. For example, many patients with avian influenza have required mechanical ventilation within 48 hours of hospitalization. Acute renal failure has occurred in an estimated 10-29% of cases, with the failure of multiple organs occurring in almost all deaths.⁵ Planning assumptions based on Federal guidance⁶ estimate that during a moderate pandemic influenza event in Houston/Harris County:

- 0.3% to 3% of the Houston/Harris County population⁷ would require hospitalization
 - 11,808 – 118,076 persons hospitalized
- 0.04% to 0.5% of the Houston/Harris County population would require intensive care
 - 1,574 – 19,679 persons requiring critical care
- 0.02% to 0.25% of the Houston/Harris County population would require ventilation
 - 787 – 9,840 persons requiring ventilation

The number of ill persons seeking care in the any of the nation’s critical or intensive care units will likely exceed the availability of critical care resources such as ventilators needed to treat and care for these persons.⁸ It is important to remember that persons seeking critical care due to influenza will be *in addition to* persons seeking critical care for other conditions such as trauma, heart attack and stroke.

According to Christian et al, a clinician workgroup from Ontario, Canada, “when resource scarcities occur, the tenets of biomedical ethics and international law dictate that triage protocols be used to guide resource allocation.” Further, “international law requires a triage plan that will equitably provide every person the ‘opportunity’ to survive. However, such a law does not guarantee either treatment or survival.”⁹

Current protocols for triaging persons presenting for critical care are not designed to address situations where resource needs far outweigh supply not only within a single emergency department but on a community-wide and, potentially, nationwide basis. Therefore it is crucial to consider alternate protocols that may be used during a pandemic event in order to best allocate scarce critical care resources to reduce morbidity and mortality, control the spread of disease and preserve critical infrastructure and societal functioning.

⁵ Chotpitayasunondh T, et al. Human disease from influenza A (H5N1), Thailand, 2004,” *Emerging Infectious Diseases* 2005; 11:201-209 and Hien TT, et al. Avian Influenza A (H5N1) in 10 patients in Vietnam. *N Engl J Med* 2004;350::1179-1188 as cited in The Writing Committee of the World Health Organization Consultation on Human Influenza A/H5, Avian Influenza A (H5N1) infection in humans. *N Engl J Med*, 2005;353:1374-1385.

⁶ U.S. Department of Health and Human Services. HHS Pandemic Influenza Plan, Part 1, November 2005.

⁷ Houston/Harris County population total based upon 2007 U.S. Census estimate of 3,935,855 persons.

⁸ Osterholm MT. Preparing for the next pandemic. *N Engl J Med* 2005; 352:1839-42.

⁹ Christian MD, Hawryluck L, Wax RS, et al. Development of a triage protocol for critical care during an influenza pandemic. *CMAJ* 2006; 175(11):1377-81.

Recommended Model for Ventilation Triage during a Pandemic

The Committee researched and considered existing models for critical care/ventilation triage during a pandemic or large-scale emergency event, including a triage protocol developed by *Christian et al*; a tool developed by *Talmor et al*; and draft recommendations developed by the *New York State Workgroup on Ventilator Allocation in an Influenza Pandemic* (“workgroup”), which was convened by the New York State Department of Health and the New York State Task Force on Life and the Law.

The Committee concluded that the latter New York State workgroup recommendations, which consider and include key elements of the first model, were ethical, feasible, practical and had the best potential for effectiveness, and therefore should be considered as potential guidelines for Houston/Harris County critical care providers. This model, released as a draft planning document in March 2007, can be accessed at http://www.health.state.ny.us/diseases/communicable/influenza/pandemic/ventilators/docs/ventilator_guidance.pdf, and is summarized below:

- *Ethical Framework*: The recommendations contained in the planning document are built upon an ethical framework composed of five principles. These principles include the duty to care, the duty to steward resources, the duty to plan, distributive justice and transparency.
- *Medical Factors in Triage System Design*: The workgroup states that a perfect critical care triage method would accurately differentiate “those patients who will survive without critical care, those who will survive only with critical care, and those who will die despite treatment.” However, after reviewing existing triage models, particularly those with scoring systems to assess survival capacity, the workgroup finds that “no known clinical scoring system offers a quick, resource-sparing and accurate prediction of mortality in an influenza pandemic.” Therefore the workgroup acknowledges that their recommendations, which incorporate features from existing triage systems, are imperfect, and urges clinicians to perfect a clinical scoring system specific to a pandemic event.
- *Recommended Process for Allocating Ventilators in an Influenza Pandemic*: The system outlined in the planning document consists of eight components:
 - 1) *Pre-triage requirements* – The workgroup recommends two steps prior to enacting triage protocols. First, in the early days of a pandemic, hospitals should limit non-critical ventilator use; cancel/postpone elective procedures; enact review systems for procedures that are not emergencies but can decrease morbidity or mortality; and limit outpatient procedures that have an alternate option of admission to a hospital and ventilator support if there are complications.

Second, before rationing ventilators, hospitals should create surge capacity to the best of their ability by ensuring that protective measures/equipment are available for staff; permitting alternate staffing levels (if alternate staffing levels are permitted during an emergency); considering how the skills of available staff could be extended; and

assessing and sharing information with partners about ventilator and ventilator stockpile capacity at the hospital, community, state and federal levels.

- 2) *Patient categories for triage* – The workgroup concluded that ventilator access should depend only on clinical factors for the individual patient. Therefore, they rejected rationing ventilators based on criteria such as diagnosis (or diagnoses), age, social worth and/or status as a healthcare worker or first responder.
- 3) *Implications of triage for facilities* – In order to ensure an equitable rationing system, the workgroup concluded that the recommendations must have statewide applicability during a pandemic. The workgroup also acknowledged that distinctions between acute and long-term care facilities must be made, “permitting chronic care facilities to maintain their specific mission” once triage begins. However, the workgroup noted that if a long-term care patient required transfer to an acute care facility, that patient should be assessed by the same criteria as other incoming patients, and may well fail to meet the criteria for ventilator use in the new acute care setting. Along these lines, the workgroup concluded that persons in the community who use ventilators at home should continue to utilize their ventilators during a pandemic.

The workgroup also addresses the feasibility of designating special “centers for excellence” for influenza care during a pandemic event, but concluded that other than the potential for centers of excellence for the pediatric population, the financial obstacles for the hospitals designated as such centers would be too great to make the effort worthwhile.

- 4) *Clinical evaluation* – The workgroup adapts a clinical evaluation system that is based on the *Christian et al* protocol and the *Sequential Organ Failure Assessment (SOFA)* tool (see Appendix A). The planning document states that patients entering critical care who meet the inclusion criterion of pulmonary failure will next be assessed for the exclusion criteria, and then be placed in categories of priority/action. It is important to note that patients that are using ventilators at the initiation of the triage process will also be assessed to determine if they should continue ventilator use. The goal of the system is to ensure that “when a ventilator becomes available and many potential patients are waiting, clinicians may choose the patient with pulmonary failure who has the best chance of survival with ventilatory support, based on objective clinical criteria.”

Following is an outline of the protocol, with colors corresponding to each triage category:

- **Blue:** High probability of mortality; should be discharged from critical care and should receive medical management and palliative care as appropriate
 - Initial: Exclusion criteria or SOFA > 11
 - 48 hours: Exclusion criteria or SOFA > 11 or SOFA 8-11 unchanged
 - 120 hours: Exclusion criteria or SOFA > 11 or SOFA < 8 unchanged
- **Red:** Highest priority for critical care [ventilator use]
 - Initial: SOFA ≤ 7 or single organ failure
 - 48 hours: SOFA < 11 and decreasing
 - 120 hours: SOFA < 11 and decreasing progressively
- **Yellow:** Intermediate priority for critical care
 - Initial: SOFA 8-11

- 48 hours: SOFA < 8 unchanged
- 120 hours: SOFA < 8 with minimal decrease (< 3 point decrease in 72 hours)
- *Green*: Low probability of mortality; defer admission/discharge from critical care
 - Initial: no significant organ failure
 - 48 hours: no longer ventilator dependent
 - 120 hours: no longer ventilator dependent

Following is the exclusion criteria for ventilator access, which the workgroup adapted from guidelines developed by *Christian et al*:

- Cardiac arrest: unwitnessed arrest, recurrent arrest, arrest unresponsive to standard measures; trauma-related arrest
- Metastatic malignancy with poor prognosis
- Severe burn: body surface area > 40%, severe inhalation injury
- End-stage organ failure:
 - Cardiac: NY Heart Association class III or IV
 - Pulmonary: severe chronic lung disease with Forced Expiratory Volume in 1 second (FEV₁) < 25%
 - Hepatic: Model of End-Stage Liver Disease (MELD) score > 20
 - Renal: Dialysis dependent
 - Neurologic: severe, irreversible neurologic event; condition with high expected mortality

See Appendix A for the color-coded triage tool adapted by the workgroup. The planning document notes that continued ventilator use should be reassessed for each patient at 48 and 120 hour intervals – Appendix A shows the adapted triage tools for each of these intervals. Patients who continue to meet the criteria for ventilator use should continue until the next reassessment, while those who do not should lose access to ventilation.

- 5) *Triage decision-makers* – The workgroup recommends the identification of a triage review officer to make triage decisions based on the protocol. This role is intended to remove the primary clinicians treating a patient from responsibility for the decision to removing a ventilator from a patient, as well as ensure that the staff “with the best information on the current balance of need versus resources would make triage decisions, and would be most likely to make the decisions consistently within a group of patients.” The workgroup recommends that the triage review officer be the supervising clinician in charge of intensive care patients.
- 6) *Palliative care* – The workgroup recommends that persons who do not meet the criteria for ventilation should be offered palliative care; thus hospitals should be prepared for increased demand for palliative care expertise and resources.
- 7) *Appeals process* – The workgroup concluded that some form of review process is necessary to ensure that the application of the triage protocol is consistent and just; however they did not agree on whether such a review process should be conducted in real-time or retrospectively. A real-time appeals process would offer the most benefit for individuals, but because of the time and resources needed, may not be feasible during a pandemic situation. An alternative daily retrospective review process could “assure that

standards are followed consistently and correctly, and would present an opportunity for correcting the guidelines or their implementation as needed.” However, a retrospective review process would not likely provide benefit to all individual patients.

- 8) *Communication about triage* – The workgroup emphasizes that communication about the modified standards of clinical care must occur at many levels, including to the public, to patients and their families and to staff involved with providing and supporting critical care during a pandemic.
- *Legal Issues:* The workgroup identifies several legal issues which may warrant further consideration and/or legislation. These issues relate to “Do Not Resuscitate” (DNR) orders for patients who have been removed from ventilation; guidelines regarding the performance of brain death evaluations; liability concerns; and volunteer health care provider indemnification. While the workgroup acknowledged that during a disaster such as a pandemic event state officials may be able to suspend certain laws and regulations based on emergency powers, they recommend further examination of the need for revisions to current legislation specific to these issues.

The Committee recommends that Houston/Harris County facilities adopt the principle of this triage protocol in the event of ventilator shortage during a pandemic event, noting the following:

- 1) The triage protocol must be adopted *community-wide* at a determined *trigger point* during the course of a pandemic event affecting Houston/Harris County. That is, all area facilities that provide critical care ventilation (with the exception of long-term care facilities) must apply the triage protocol at their respective facilities simultaneously. The trigger point must be determined by a central coordinating body based on ongoing reviews of reported ventilator capacity at each facility and then communicated to all facilities by this body. Similarly, this coordinating body must continue to monitor ventilator capacity in order to determine the appropriate time to suspend use of the triage protocol and return to “business as usual.”
- 2) The triage protocol will rely on the clinical condition of the patient being considered for ventilator status at that time. A patient who is using a ventilator and meets the criteria for ventilator use will not be “bumped” for a later-arriving patient who also meets the criteria for ventilator use.
- 3) Community-wide acceptance, adoption and use of the triage protocol will require extensive education and information-sharing among health professionals and the public.

The recommendation to adopt the principles of this triage protocol is based upon current knowledge about the epidemiology of avian influenza, the availability of local resources and the existing guidance and recommendations from published and unpublished sources. This recommendation may be updated in response to changes in the status of one or more of these factors.

Appendix A: Ventilator Triage Tools

Sequential Organ Failure Assessment (SOFA) Score

Variable	0	1	2	3	4
PaO ₂ /FiO ₂ mmHg	>400	≤400	≤300	≤200	≤100
Platelets, x 10 ³ /μL (x 10 ⁶ /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

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 functions; low score indicates poorer function
- Creatinine is measured by a blood test and indicates kidney function.

Adapted by New York State Workgroup on Ventilator Allocation in an Influenza Pandemic from:

Ferreira FL, Bota DP, Bross A, Melot C, Vincet JL. Serial evaluation of the SOFA score to predict outcome in critically ill patients. JAMA 2001; 286(14): 1754-1758.

Adapted Triage Tool: Initial Assessment

Critical Care Triage Tool (Initial Assessment)		
Color Code	Criteria	Priority/Action
Blue	Exclusion Criteria* or SOFA >11	Medical Management +/- Palliate and Discharge
Red	SOFA ≤ 7 or Single Organ Failure	Highest
Yellow	SOFA 8-11	Intermediate
Green	No Significant Organ Failure	Defer or Discharge, Reassess as Needed

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

Adapted by New York State Workgroup on Ventilator Allocation in an Influenza Pandemic from:

Christian MD, Hawryluck L, Wax RS, et al. Development of a triage protocol for critical care during an influenza pandemic. CMAJ 2006; 175(11):1377-81.

Adapted Triage Tool: 48 Hour Assessment

Critical Care Triage Tool (48 Hour Assessment)		
Color Code	Criteria	Priority/Action
Blue	Exclusion Criteria or SOFA >11 or SOFA 8-11 No Change	Palliate and Discharge from Critical Care
Red	SOFA <11 and Decreasing	Highest
Yellow	SOFA <8 No Change	Intermediate
Green	No Longer Ventilator Dependent	Discharge from Critical Care

Adapted by New York State Workgroup on Ventilator Allocation in an Influenza Pandemic from:

Christian MD, Hawryluck L, Wax RS, et al. Development of a triage protocol for critical care during an influenza pandemic. CMAJ 2006; 175(11):1377-81.

Adapted Triage Tool: 120 Hour Assessment

Critical Care Triage Tool (120 Hour Assessment)		
Color Code	Criteria	Priority/Action
Blue	Exclusion Criteria* or SOFA >11* SOFA < 8 No Change	Palliate and Discharge from Critical Care
Red	SOFA <11 and Decreasing Progressively	Highest
Yellow	SOFA <8 Minimal Decrease (< 3 point decrease in past 72 hours)	Intermediate
Green	No Longer Ventilator Dependent	Discharge from Critical Care

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

Adapted by New York State Workgroup on Ventilator Allocation in an Influenza Pandemic from:

Christian MD, Hawryluck L, Wax RS, et al. Development of a triage protocol for critical care during an influenza pandemic. CMAJ 2006; 175(11):1377-81.