Ethical Ventilator Triage in a Disaster

Bob Milisch MEd, RRT

Acknowledgement

Ethical Decision-Making in a Disaster

(A Draft Document)

State Expert Panel on the Ethics of Disaster Preparedness

Wisconsin Division of Public Health
Hospital Emergency Preparedness Program

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The State Expert Panel on the Ethics of Disaster Preparedness

Cheryl Anderson MSN, MA-Bioethics, Clinical Ethicist, Wheaton Franciscan Healthcare, Milwaukee, WI
Bill Bazan, Vice President – Metro Milwaukee, Wisconsin Hospital Association, Milwaukee, WI
Elizabeth Corneliuson MS, RN, Region 7 Hospital Emergency Preparedness Coordinator, Froedtert & Community Health, Menomonee Falls, WI
Arthur R. Derse, MD, JD, Director for Medical and Legal Affairs, and Associate Director, Center for the Study of Bioethics, Medical College of Wisconsin, Milwaukee, WI
Father Larry Dunklee, M.Div., M.A., Director of the Center for Spiritual Care, Sacred Heart Hospital, Eau Claire, WI
Bud Hammes, Ph.D, Director of Medical Humanities, Gundersen Lutheran Medical Foundation, La Crosse, WI
Anne Hartwig, JD, Ph.D., Becker Law Office, S.C. and Advisory Committee for Meriter Hospital, Madison, WI
Lisa Hass-Peters, RN, BA, TNS, TNCC, Emergency Preparedness/Injury Prevention Educator/EMS Liaison, Froedtert Hospital, Emergency Department, Milwaukee, WI
Thomas Jankowski, RN, Chair, Ethics Committee; Supervisor, Cardiac Special Procedures, OP Cardiac Procedure Unit, Appleton Medical Center, Appleton, WI
Dick Lange, HEM, Facilities Manager; President - Chapter IV Wisconsin Healthcare Engineering Association, St. Joseph's Hospital, Marshfield, WI
Jody Langfeldt, Public Health Officer, Dodge County Health Department, Juneau, WI
Susan McCarthy, Director, Clinical Ethics, Ministry Health Care, Milwaukee, WI
Marge McFarlane, CHSP, MS (ENPH), Safety Coordinator, Sacred Heart Hospital, Eau Claire, WI

Marilyn Michels RN MSN CIC CRRN, Infection Control Director, Gundersen Lutheran Medical Center, La Crosse, WI
Bernard Micke MD, Family Practice, UW Health, Madison, WI
Karl B. Palmer, RN, Associate Director of Nursing-Clinic, Emergency Preparedness Coordinator, Red Cedar Medical Center-Mayo Health System, Menomonie, WI
Marianne Peck, State Trauma Coordinator, Wisconsin Division of Public Health, Madison, WI
Lisa Pentony, Pandemic Influenza Coordinator, Wisconsin Division of Public Health, Madison, WI
Sharon Rand, COO/CFO, Community Health Systems, Inc., Beloit, WI
Mary Anne Reed, RN, Emergency Department, Staff Nurse, HazMat Coordinator, Meriter Hospital, Madison, WI
Robert Salinger MD, Adult Psychiatry, UW Medical School, Madison, WI
Kathryn Schroeter, PhD, RN, CNOR, Surgical Services Education Coordinator Faculty - Bioethics, Medical College of WI, Froedtert Hospital & Medical College of Wisconsin, Milwaukee, WI
Reverend K.C. Schuler, MDiv, BCC, Supervising Chaplain, Theda Clark and Appleton Medical Centers, Neenah and Appleton, WI
Barbara Theis, Health Officer, Juneau County Health Department, Mauston, WI
Denny Thomas, Risk Manager, Ministry Health Care, Saint Joseph's Hospital, Marshfield, WI
Dennis Tomczyk, Director, Hospital Emergency Preparedness, Wisconsin Division of Public Health, Madison, WI
John Whitcomb MD, Bioterrorism Coordinator, Aurora Physicians, Aurora Sinai Medical Center, Milwaukee WI

The Need for Triage Protocols

In a disaster, it is very likely that there will be a significant imbalance between available resources and the needs of many patients. There not only will be longer waits for treatment, but, more likely, there will be patients who do not receive the treatment necessary and even patients for whom there will be no treatment available due to lack of human and/or material resources.

With limited resources, there will not be enough to go around for everyone in need. Thus, these resources must be allocated to achieve the greater good for the community.

Healthcare professionals nationally and in the State of Wisconsin are working to develop "Guidelines for the Triage of Patients" so that treatment decisions are made that best serve the greater good of the community and that meets the values that are proposed in this document.

It is evident that these guidelines will only be applied when absolutely necessary. Thus, healthcare organizations have an ethical responsibility not only to have these guidelines in place, but also to ensure that these guidelines will be applied only after every other remedy has been implemented.

The State Expert Panel is recommending that these guidelines for the allocation (triage) of scarce resources meet the following criteria:

they be applied consistently across the state

they be consistent with the ethical principles and values addressed in this document

they be based on evidence-based practices to the extent that these practices are available

they reflect the current best practices for the triage of critical care patients

they be tiered so that, as the number of patients increase and resources are further depleted, these criteria can become more stringent

they allocate resources so as to save as many lives as possible

they have the consensus of healthcare providers, especially those involved in the response to the disaster, through open review and discussion and an opportunity for comment

They have the consensus of the general public through open review and discussion and an opportunity for comment

Dr. Pou and the Hurricane – Implications for Patient Care during Disasters

New England Journal of Medicine
January 3, 2008
Describes conditions following Hurricane Katrina
Describes events surrounding the questionable deaths of nine patients
A grand jury considered, and subsequently dropped, murder charges
Civil suits pending

Dr. Pou and the Hurricane – Implications for Patient Care during Disasters

“One lesson of Pou’s experience is the need for community discussions about what care should be provided during a disaster that strains medical resources… As a community we have to say, what are we going to don’t have the resources”
Marianne Matzo, a professor of nursing at the University of Oklahoma.

The Impact of a Pandemic

The next pandemic may have a devastating impact on the health and well being of the people in our local community, the state, the nation and the world. Table 1 illustrates the morbidity and mortality estimates of an influenza pandemic, based on a 30 – 35 percent attack rate and the severity of illness seen during the 1968 pandemic during a 6 - 12 week period.

TABLE 1	**United States**	**Wisconsin**
Persons Clinically Ill	89 million1	.9 million
Patients Requiring Outpatient Care	42 million	1 million
Potential Hospitalizations	700,000	22,000
Potential Deaths	200,000	8,000

"Template Hospital Policy for Responding to Pandemic Influenza," Wisconsin Division of Public Health, Hospital Emergency Preparedness Program, 2006.

Key Definition

Disaster Ethics: A set of principles and values that serve to direct the duties, obligations and parameters of the delivery of healthcare in a disaster situation. Disaster Ethics is the study of what **ought to be done** in a disaster situation.

Triage Protocols

The hospital should adopt a system for the triage of large numbers of patients and even for smaller numbers of patients when there are limited resources. The hospital should have a process in place to educate physicians and other healthcare professionals on these protocols prior to any disaster. It is recommended that there be a triage officer or Critical Care Specialist, who will make these triage decisions versus the attending physician. Centralizing this decision-making will allow this person to have a big picture perspective, make decisions based on preceding decisions and thus become more scientific and objective in the decision made.

Clinical Review Committee

The hospital should establish now a multi-disciplinary committee to review admissions, procedures and allocation of resources so that the Committee can learn how to make such decisions without the stress and urgency that will occur in a disaster. This committee should meet regularly to discuss triage protocols so that it is prepared to implement these guidelines when necessary. This will necessarily involve the education of physicians and healthcare professionals in the application of these protocols through table-top exercises and other such simulations.

Implementation of Protocols for the Allocation of Scarce Resources

Once a hospital believes that it is approaching the point where needs are beginning to surpass available resources, the hospital should confer with other hospitals and also with public health authorities about the fact that it is near to reaching its treatment capacity. It is also expected that by this time the State Emergency Operations Center (EOC) will be fully activated and will help to coordinate medical resources. Obviously, if the community is facing an incident such as pandemic influenza, hospitals will have sufficient time to determine, in collaboration with public health authorities, when hospitals may reach this threshold either in the local community or in the region.
Hospitals in the state of Wisconsin have access to "WITrac" (Wisconsin Tracking, Resources, Alerts, Communications) that enables any hospital to send an alert or message and request that other hospitals post their ICU and/or ventilator capacity on line in real-time to determine what resources are available locally, regionally or state wide.

Ventilator Triage – Minnesota Model

To date, the "Minnesota Model" was reviewed by three groups of Wisconsin Critical Care Specialists, and minor modifications have been made. It is expected that, as more clinicians are involved in the discussion of these protocols, there will be further enhancements, leading to the eventual adoption of such a protocol by hospitals across the state.
This "triage tool" asks the physician
"Compared to other patient(s), requiring and awaiting mechanical ventilation, does this particular patient have significant differences in prognosis or resource utilization in one or more of the categories below that would justify prioritizing this patient for ventilator support?

Lesser Priority → **Greater Priority**

Category and Variables	RED	YELLOW	GREEN
1. Prognosis - SOFA Data: SOFA and ΔSOFA when available	High potential for death according to predictive model (>11)	Intermediate potential for death according to predictive model (7-11)	Low potential for death according to predictive model (<7)
2. Prognosis - Oxygenation Index* Data: OI and ΔOI - 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	3a Long duration –	3a. Moderate duration –	3a. Short duration –

Need: Data includes days ventilated – if applicable - and expected duration of ventilation	estimate > 7 days on ventilator (ARDS in septic patient with obstructive lung disease) 3b. Prolonged mechanical ventilation with poor or no progress toward weaning	estimate 3-7 days on ventilator (pneumonia in young healthy patient) 3b. Making slow progress toward weaning	flash pulmonary edema, chest trauma, other conditions (estimate < 3 days on ventilator) 3b. Making good progress toward weaning
4. Duration of Benefit: Data includes prognosis/ duration modifying underlying diseases and patient age**	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

SOFA Scoring

Appendix 1: Scoring criteria for the Sequential Organ-Failure Assessment (SOFA) score*

	Score				
Variable	0	1	2	3	4
PaO_2/FIO_2, mm Hg	> 400	≤ 400	≤ 300	≤ 200	≤ 100
Platelet count, $\times 10^6$/L	> 150	≤ 150	≤ 100	≤ 50	≤ 20
Bilirubin level, mg/dL (μmol/L)	< 1.2 (< 20)	1.2–1.9 (20–32)	2.0–5.9 (33–100)	6.0–11.9 (101–203)	> 12 (> 203)
Hypotension†	None	MABP < 70	Dop ≤ 5	Dop > 5 Epi ≤ 0.1 Norepi ≤ 0.1	Dop > 15 Epi > 0.1 Norepi > 0.1
Glasgow Coma score	15	13–14	10–12	6–9	< 6
Creatinine level, 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)

Note: PaO_2 = partial pressure of arterial oxygen; FIO_2 = fraction of inspired oxygen; MABP = mean arterial blood pressure, in mm Hg;
*Adapted, with permission, from Ferreira FL, Bota DP, Bross A, et al. Serial evaluation of the SOFA score to predict outcome in critically ill patients. *JAMA* 2001;286: 1754-8.
†Dop (dopamine), epi (epinephrine) and norepi (norepinephrine) doses in μg/kg per min.

*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)

OI = MAWP x FiO2 / PaO2

** 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):

Congestive heart failure with ejection fraction < 25% (or persistent ischemia unresponsive to therapy or ischemia with pulmonary edema)

Severe chronic lung disease including pulmonary fibrosis, cystic fibrosis, obstructive or restrictive diseases requiring continuous home oxygen use prior to onset of acute illness

Central nervous system, solid organ, or hematopoietic malignancy with poor prognosis for recovery.

Cirrhosis with ascites, history of variceal bleeding, fixed coagulopathy or encephalopathy;

Acute hepatic failure with hyperammonemia

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.).

Ventilator Triage Decision Tool for Pediatric Patients
DRAFT

Pediatric Model for Ventilator Triage

Ventilator Triage Decision Tool for Pediatric Patients

In this model each patient would be assessed on a daily basis and triage decisions made based on the needs of all patients requiring mechanical ventilation.
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?

Category and Variables	RED	YELLOW	GREEN
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 ΔOI - 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

Pediatric Logistic Organ Dysfunction Score

Organ System and variable	Score = 0	1	10	20
Neurological: Glasgow Coma Score	12-15	7-11	4-6	3
	and		Or	
Pupillary reaction	Both reactive	NA	Both fixed	NA
Cardiovascular:				
Heart rate (beats/min)				
< 12 years of age	≤195	NA	>195	NA
➢ 12 years of age	≤150	NA	>150	NA
Systolic blood pressure (mmHg)				
< 1 month	>65	NA	35-65	< 35
1 month-1 year	>75	NA	35-75	< 35
1-12 years	> 85	NA	45-85	< 45
≥ 12 years	> 95	NA	55-95	< 55
Renal				
Creatinine (mg/dl)				
< 7 days	< 1.6	NA	≥ 1.6	NA
7 days-1 year	< 0.6	NA	≥ 0.6	NA
1-12 years	< 1.1	NA	≥ 1.1	NA
≥ 12 years	< 1.6	NA	≥ 1.6	NA
Respiratory				
PaO2/FiO2 ratio	> 9.3	NA	≤ 9.3	NA
	and			
PaCO2 (mmHg)	< 88	NA	≥ 88	NA
	and			
Mechanical Ventilation	No	Yes	NA	NA
Hematologic				
White Blood Cell Count ($x10^9$/L)	≥ 4.5	1.5-4.4	< 1.5	NA
	and	**or**		
Platelet count ($x10^9$/L)	≥ 35	< 35	NA	NA
Hepatic				
AST (IU/L)	< 950	≥ 950	NA	NA
	and	Or		
PTT or	≤ 60 sec.	> 60 sec.		
INR	< 1.4	≥ 1.4		

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

Cardiomyopathy with ejection fraction < 25% and pulmonary edema unresponsive to therapy

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

Central nervous system, solid organ, or hematopoietic malignancy with poor prognosis for recovery.

Liver disease with ascites, history of variceal bleeding, fixed coagulopathy or encephalopathy;

Acute hepatic failure with hyperammonemia

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.).

Congenital heart disease with poor chance of long term survival.

Conclusion

In a disaster, very difficult decisions may have to be made
The development of protocols will assure that fair, and reasonable decisions will be made
Protocols may provide a means of preventing “after the fact” repercussions of a disaster
Health care professionals and the public must be aware of disaster triage protocols
Triage protocols will be posted on this site as they are finalized

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