Triage and Scoring Systems in Critical Care for Pandemic Flu

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“...even if existing critical care bed capacity can be maximally escalated, during the peak of a pandemic there may be ten times as many patients requiring mechanical ventilatory support as the number of beds available.”

Pandemic Flu: Managing Demand and Capacity in Health Care Organisations. Department of Health, April 2009
“It is also likely that the current high standards of care provided will not be sustainable...”

Introduction

- Review of recent literature
  - 2006: Canadian attempt at triage system for pandemic flu
  - 2008: ICS contingency planning guidance
  - 2009: Department of Health “managing demand and capacity” guidance
  - 2009: Recent assessment of proposed triage tool

- Discussion
  - Did you know about this?
  - What do you think of it?
Development of a triage protocol for critical care during an influenza pandemic


See related article page 1393

ABSTRACT

Background: The recent outbreaks of avian influenza (H5N1) have placed a renewed emphasis on preparing for an influenza pandemic in humans. Of particular concern in this planning is the allocation of resources, such as ventilators and antiviral medications, which will likely become scarce during a pandemic.

Methods: We applied a collaborative process using best evidence, expert panels, stakeholder consultations and ethical principles to develop a triage protocol for prioritizing access to critical care resources, including mechanical ventilation, during a pandemic.

Results: The triage protocol uses the Sequential Organ Failure Assessment score and has 4 main components: inclusion criteria, exclusion criteria, minimum qualifications for survival and a prioritization tool.

Interpretation: This protocol is intended to provide guidance for making triage decisions during the initial days to weeks of an influenza pandemic if the critical care system becomes overwhelmed. Although we designed this protocol for use during an influenza pandemic, the triage protocol would apply to patients both with and without influenza, since all patients must share a single pool of critical care resources.

Demand for intensive care unit (ICU) resources, solely for patients with influenza, would peak at 173% of current ICU bed capacity and 118% of the ventilator capacity. These figures do not take into account the current usage rate of critical care for patients without influenza, which is nearly at 100%. Nor does this model factor in the availability of human resources. Surge response strategies (e.g., scaling back elective procedures, opening additional critical care areas and implementing the use of “mass critical care”) will partially mitigate the sudden demand for medical care during an influenza pandemic; however, these strategies will be inadequate to fully address the demands on the health care system.

When resource scarcities occur, the tenets of biomedical ethics and international law dictate that triage protocols be used to guide resource allocation. 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. We have developed this triage protocol in an effort to ensure the equitable and efficient use of critical care resources if scarcities occur during an influenza pandemic.

Methods

In December 2004, at the request of the steering committee of the Ontario Health Plan for an Influenza Pandemic (OHPIP), a group of clinicians with expertise in critical care, in-
Canadian attempt at a triage protocol

- In response to H5N1 “bird flu” epidemic
- Commissioned by Canadian Government
- “Collaborative process”
  - Best evidence, experts and stakeholders
  - Critical care and acute specialties
  - Military and disaster medicine
- Found no existing systems, so designed their own

4 components of triage protocol...

- Inclusion criteria
  - to identify those requiring critical care

- Exclusion criteria
  - if poor prognosis despite critical care
  - if comorbidities give poor long-term prognosis
  - if excessively resource-hungry

...4 components of triage protocol

- Minimum qualifications for survival
  - ceiling on amount of resources invested in any one patient
  - if exclusion criteria met after admission

- Prioritisation tool
  - 4 triage categories based on SOFA score, inclusion and exclusion criteria

Inclusion criteria

The patient must have 1 of the following:

A. Requirement for invasive ventilatory support
   - Refractory hypoxemia (SpO₂ < 90% on non-rebreather mask or FIO₂ > 0.85)
   - Respiratory acidosis (pH < 7.2)
   - Clinical evidence of impending respiratory failure
   - Inability to protect or maintain airway

B. Hypotension (systolic blood pressure < 90 mm Hg or relative hypotension) with clinical evidence of shock
   (altered level of consciousness, decreased urine output or other evidence of end-organ failure)
   refractory to volume resuscitation requiring vasopressor or inotrope support that cannot be managed in ward setting
Exclusion criteria

The patient is excluded from admission or transfer to critical care if any of the following is present:

A. Severe trauma
B. Severe burns of patient with any 2 of the following:
   • Age > 60 yr
   • > 40% of total body surface area affected
   • Inhalation injury
C. Cardiac arrest
   • Unwitnessed cardiac arrest
   • Witnessed cardiac arrest, not responsive to electrical therapy (defibrillation or pacing)
   • Recurrent cardiac arrest
D. Severe baseline cognitive impairment
E. Advanced untreatable neuromuscular disease
F. Metastatic malignant disease
G. Advanced and irreversible immunocompromise
H. Severe and irreversible neurologic event or condition
1. End-stage organ failure meeting the following criteria:
   
   **Heart**
   - NYHA class III or IV heart failure
   
   **Lungs**
   - COPD with FEV\(_1\) < 25% predicted, baseline \(\text{PaO}_2\) < 55 mm Hg, or secondary pulmonary hypertension
   - Cystic fibrosis with postbronchodilator FEV\(_1\) < 30% or baseline \(\text{PaO}_2\) < 55 mm Hg
   - Pulmonary fibrosis with VC or TLC < 60% predicted, baseline \(\text{PaO}_2\) < 55 mm Hg, or secondary pulmonary hypertension
   - Primary pulmonary hypertension with NYHA class III or IV heart failure, right atrial pressure > 10 mm Hg, or mean pulmonary arterial pressure > 50 mm Hg
   
   **Liver**
   - Child-Pugh score ≥ 7
   
   J. Age > 85 yr
   
   K. Elective palliative surgery
<table>
<thead>
<tr>
<th>Triage code</th>
<th>Criteria</th>
<th>Action or priority</th>
</tr>
</thead>
</table>
| **Blue**    | Exclusion criteria met or SOFA score $> 11^*$ | - Manage medically  
- Provide palliative care as needed  
- Discharge from critical care |
| **Red**     | SOFA score $\leq 7$ or single-organ failure | Highest priority |
| **Yellow**  | SOFA score 8–11 | Intermediate priority |
| **Green**   | No significant organ failure | - Defer or discharge  
- Reassess as needed |
<table>
<thead>
<tr>
<th>Organ system</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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<tbody>
<tr>
<td>Respiratory</td>
<td>&gt;400</td>
<td>≤400</td>
<td>≤300</td>
<td>≤200</td>
<td>≤100</td>
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<tr>
<td>PaO2/FiO2</td>
<td></td>
<td></td>
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<tr>
<td>Renal</td>
<td>&lt;106</td>
<td>106–168</td>
<td>169–300</td>
<td>301–433</td>
<td>&gt;433</td>
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<tr>
<td>Creatinine (μmol/l)</td>
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<td></td>
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<tr>
<td>Renal</td>
<td></td>
<td></td>
<td></td>
<td>≤0.1</td>
<td>&gt;0.1</td>
</tr>
<tr>
<td>Urine output &lt;500ml/day</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Renal</td>
<td></td>
<td></td>
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<tr>
<td>Bilirubin (μmol/l)</td>
<td>&lt;20</td>
<td>20–32</td>
<td>33–100</td>
<td>101–203</td>
<td>&gt;203</td>
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<tr>
<td>Hepatic</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Cardiovascular</td>
<td>No hypotension</td>
<td>Mean arterial BP &lt;70mmHg</td>
<td>Dopamine ≤5 or Epinephrine ≤0.1 or Norepinephrine ≤0.1</td>
<td>Dopamine &gt;5 or Epinephrine &gt;0.1 or Norepinephrine &gt;0.1</td>
<td></td>
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<tr>
<td>Haematological</td>
<td>&gt;150</td>
<td>≤150</td>
<td>≤100</td>
<td>≤50</td>
<td>≤20</td>
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<tr>
<td>Platelet count</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Platelet count</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>(thousands/mm³)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Neurological</td>
<td>15</td>
<td>13–14</td>
<td>10–12</td>
<td>6–9</td>
<td>&lt;6</td>
</tr>
<tr>
<td>Glasgow Coma Scale score</td>
<td></td>
<td></td>
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</tbody>
</table>
Comments

- Complex and time-consuming to design
- Some concepts much closer to disaster or military medicine
- Will only work with clear communication
- Will need training for triage officers
- Untested in pandemic
- Acknowledge need to revise whilst in use
Critical care contingency planning: phased responses and triaging framework

B Taylor, V Kernp, D Goldhill, C Waldmann
On behalf of the Intensive Care Society and the Division of Emergency Preparedness

As most of our readers will be aware from previous publications and from the special articles contained in this edition, a lot of work has gone into highlighting the implications of an influenza pandemic for critical care services and trying to work out how to make the best use of the resources that may be available. The latest Department of Health Document ‘Pandemic influenza: surge capacity and prioritisation in health services – provisional UK guidance’ (available on the DH website) has made an encouraging start in providing official recognition of the problems likely to be encountered as a result of limited bed capacity and also supports the concept that triaging decisions cannot be left to secondary care (and particularly critical care specialists) alone. Regrettably, however, even if its recommendations for patient selection are fully followed and the number of inappropriate referrals to critical care is reduced significantly, there is still a strong probability that during the peak of a pandemic the number of patients who are likely to benefit from critical care will still significantly exceed bed capacity – even if this is maximally expanded.

In the original working of the Critical Care Contingency Planning Group a draft document on Phased Responses and Triaging was produced as a starter to addressing these difficulties. Further work on this was then put on hold pending the production of official ethical guidance and other documentation to address these problems. However, now that these have been finalised and we still face potential dilemmas about how ICUs will be able to cope, feedback from critical care network discussions has persuaded us that it may be useful to circulate a revised version of this document, updated to include more recent recommendations, in the hope that this may be of help in assisting local planning.

In particular, the document addresses two concepts that were initially felt to be inappropriate or unacceptable, but which now may be considered reasonable/realistic. These are the possibility of using some method of lottery selection if there are several appropriate referrals but insufficient bed numbers, and the fact that at some point there may be a requirement to accept temporary closure of intensive care to further referrals if no beds are available. It is hoped that consensus support for the principles of this document may help to produce reassurance for staff (with the support of local PCTs and Trust Management) that if potentially preventable deaths occur in such circumstances they will not be vulnerable to litigation or professional criticism when no other treatment options were available.

Keywords: pandemic influenza; triage; healthcare planning
2008 JICS Article...

- By the Critical Care Contingency Planning Group
- Produced after:
  - Draft DH paper acknowledged that critical care resources could be overwhelmed
  - Initial ICS work on phased responses
  - Official ethical guidance
  - Critical care network feedback

2008 JICS Article

- Describes phased responses
  - Phases 0-4
  - Cancelling elective surgery
  - Converting other areas to critical care
  - Cancelling annual leave
  - Relaxing nurse-patient ratios
  - Using reserve-trained staff

• Emphasises:
  • need for clear plan agreed in advance
  • “doing the most for the most”
  • acknowledgement of Christian et al’s work

• Highlights difficult areas:
  • choosing between patients with equal needs
  • managing disagreement
  • withdrawal of care due to lack of resources, not futility

• Suggests staged triage, including use of SOFA score
Pandemic flu

Managing Demand and Capacity in Health Care Organisations. (Surge)
DH: Managing Demand and Capacity

- Guidance for all health care organisations
- Critical Care component in line with ICS advice
- Guiding ethical principles:
  - Do the most for the most
  - Equal chance of benefiting = equal chance of receiving critical care
  - Rational, non-arbitrary selection supported by objective evidence
DH: Managing Demand and Capacity

On triage for critical care:

- Suggests use of Christian et al’s protocol
- Omits “Age >85” and “palliative surgery”
- Protocol to be used ever more rigorously from triage stage 1 upwards
- Recognises controversies and difficulties
- More specific about 48-hour reassessment
<table>
<thead>
<tr>
<th>Table 9: Example of 48-hour assessment in critical care</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SOFA score</strong></td>
</tr>
<tr>
<td>SOFA score &gt;11 or score stable at 8–11 with no change from initial assessment</td>
</tr>
<tr>
<td>SOFA score ≤11 and decreasing</td>
</tr>
<tr>
<td>SOFA score stable at &lt;8 with no change</td>
</tr>
<tr>
<td>No longer dependent on ventilator</td>
</tr>
</tbody>
</table>
Use of the SOFA score in pandemic influenza - a prospective study

- **Aim**
  - to assess likely impact of following DH guidance

- **Methods**
  - Wirral University Teaching Hospital ITU
  - 7 level-3, 9 level-2, 2 renal beds
  - Nov-Dec 2008 (493 potential bed-days)
  - Daily SOFA and exclusion criteria assessment of all patients on unit

# Use of the SOFA score in pandemic influenza - a prospective study

<table>
<thead>
<tr>
<th></th>
<th>Not Excluded</th>
<th>Excluded</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number (%)</td>
<td>59 (76%)</td>
<td>19 (24%)</td>
</tr>
<tr>
<td>Length of Stay (days)</td>
<td>3.4</td>
<td>5.9</td>
</tr>
<tr>
<td>Bed Days</td>
<td>198</td>
<td>113</td>
</tr>
<tr>
<td>Survival to Discharge or 1 month</td>
<td>83%</td>
<td>37%</td>
</tr>
</tbody>
</table>

Cancelling elective surgery would have freed a further 41 bed-days

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<table>
<thead>
<tr>
<th>Exclusion Criteria</th>
<th>Number Excluded</th>
</tr>
</thead>
<tbody>
<tr>
<td>Known advanced metastatic malignant disease</td>
<td>5</td>
</tr>
<tr>
<td>SOFA score &gt;11</td>
<td>5</td>
</tr>
<tr>
<td>Severe and irreversible neurological event or condition</td>
<td>3</td>
</tr>
<tr>
<td>Child-Pugh score &gt;7</td>
<td>2</td>
</tr>
<tr>
<td>NYHA III or IV</td>
<td>2</td>
</tr>
<tr>
<td>Severe trauma</td>
<td>2</td>
</tr>
</tbody>
</table>
My thoughts...

- Need a plan in advance
- DH/ICS plan seems reasonable
- Cancelling elective work doesn’t exclude enough
- SOFA score in itself doesn’t exclude enough
- Difficult decisions will still need to be made

26/11/2009
What do you think?

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