# HOSPITAL RESOURCE AND CLINICAL MANAGEMENT GUIDELINES FOR HOSPITAL HEALTHCARE PROVIDERS WHEN ROUTINE CRITICAL CARE RESOURCES ARE NOT AVAILABLE

## Perspective

1. These guidelines are triggered when hospital efforts to preserve and augment bed capacity (e.g., adding on-site surge beds, canceling elective surgeries, opening alternate care sites, augmenting staffing) are maximized and critical care supplies and equipment are exhausted.

2. These Guidelines are limited by the capability of the critical care supplies and equipment to accommodate the physiologic requirements of patients' of various ages.

3. The Guidelines are designed to accommodate the variability of patient volume, patient acuity and resource availability. Thus over time, a more stringent tiered approach to clinical management will evolve.

4. These Guidelines are intended for use by hospital-based healthcare providers and do not address all of the accompanying hospital administrator responsibilities.

5. This project does not address strategies for providing and maintaining patient care surge capacity, staffing or legal protection for healthcare providers using these Guidelines. (The Wisconsin Hospital Emergency Preparedness Program provides additional information on these topics.)

## Basic Premises Adopted from Previous Published Works

1. The evolution of a new pandemic strain of influenza will inevitably result in a major increase in demand for critical care services. It is likely that these services will rapidly reach capacity and even their contingency arrangements for extended facilities will be overwhelmed.

2. Triage remains widely accepted as the preferred model for the ethical distribution of scarce medical resources in everyday clinical settings. The foremost clinical criterion underpinning ethical triage decisions is expected outcome in survival and function. For triage decisions to be considered fair, just, and ethical, the medical resource must be allocated with prudence and consistency. Patients with injuries that are so severe that treating them would be medically futile are not considered appropriate candidates for receiving scarce resuscitative resources. The goal is to optimize the effectiveness of the triage protocol so that every patient who receives resources will survive.

   Standardized triage provides a way to draw organization out of chaos, brings first care to those who will benefit the most, guides resource allocation and provides an objective framework for stressful and ethical decisions.

3. Although more complex than single-principle allocation systems, a multi-principle allocation system better reflects the diverse moral considerations relevant to these difficult decisions.

This multi-principle allocation system includes:

- ***Doing the greatest good for the greatest number***
  Decision making during extreme conditions assumes a shift to a utilitarian framework in which the clinical goal is the greatest good for the greatest number of individuals. In this framework, not everyone may receive the services that may be available at other times or places, and care decisions are not about the "most that can be done" or the "best that can be done under perfect conditions."

- ***Maximizing life-years saved***
  Assuming equal chances of short-term survival, giving priority to a 60-year old woman who is otherwise healthy over a 60-year-old woman with a limited life expectancy from severe comorbid conditions will result in more "life-years" gained. The justification for incorporating this utilitarian claim is simply that, all other things being equal, it is better to save more years of life than fewer.

- ***The Life-Cycle Principle***
  This principle has been called the "fair innings" argument and "intergenerational equity". In practical terms, the life-cycle principle gives relative priority to younger individuals over older individuals. The ethical justification of the life-cycle principle is that it is a valuable goal to give individuals equal opportunity to pass through the stages of life - childhood, young adulthood, middle age and old age. The justification for this principle does not rely on considerations of one's intrinsic worth or social utility. Rather, younger individuals receive priority because they have had the least opportunity to live through life's stages.

## Hospital Resource and Clinical Management Guideline Assumptions

1. The Guidelines are based on the best available evidence and illness definitions from the World Health Organization (WHO), the Centers for Disease Control and Prevention (CDC) and State and local public health authorities, and are integrated with the Wisconsin Hospital Emergency Preparedness Program (WHEPP).

2. Initial patient diagnostic testing and treatment will comply with CDC and regional public health recommendations. Hospital clinical management guidelines must be compliant with Centers for Medicare and Medicaid Services (CMS) Emergency Medical Treatment and Labor Act (EMTALA) requirement options and waivers.

3. The National Incident Management System (NIMS) and incident management principles will be used for hospital management decisions.

4. EMS transports to hospitals are anticipated to increase during a health emergency. Yet similar to other disaster situations, most patients will self present to the hospital and not be transported by EMS.

5. Critical care ventilatory (e.g., ventilators, supplemental oxygen) and circulatory (e.g., IV fluids, vasopressors, blood) support equipment and supplies will likely be the most limited resources. Other resources may also become limited (e.g., dialysate, antibiotics, antivirals).

Consumable resources (e.g., medications, dialysate, blood) and non-consumable resources (e.g., ventilators, monitors) may become limited at differing rates. These Guidelines may be applied to these and other types of limited resources.

6. The Guidelines are driven by the limited resources. The Guidelines will be activated when the hospital no longer has the critical care resources to meet the patient's ventilatory and circulatory support needs. Until the point in time when the required resources become unavailable, critical care should be provided as detailed in hospital surge and conservation plans.

7. Critical care patients require many resources that are shared with non-critical care patients ranging from oxygen and intravenous fluids to suction catheters and bed linens. Resource conservation strategies should attempt to avoid overuse of these common resources in non-critically ill patients.

8. Patients' physiologic parameters will be used to determine critical care resource allocation.

9. Patients needing specialized pediatric equipment in limited supply will be ranked in a separate group. Patients who cannot be accommodated by a particular piece of equipment because of size or age should be assigned to the supportive care group.

10. The Guidelines will be applied without discrimination or regard to gender, sexual orientation, race, religion, ethnicity, disability, income, economic value, social standing or insurance status.

11. These guidelines are intended for use in acute care facilities. Patients who reside in non-hospital based chronic care facilities, or in the community, who currently receive ventilatory and circulatory support may not be subject to these Guidelines. The adoption of these Guidelines for hospital-based or owned chronic care facilities may be applicable and should be considered.

12. The Guidelines will apply to patients with and without influenza, since all patients must share a single pool of critical care resources.

13. These Guidelines should be applied to all patients to establish a rank order list for resource allocation.

14. Scoring is independent of resource need, yet rank order is based on the specific resource required. For example, a patient that requires a ventilator will be ranked with all patients who require a ventilator. Likewise, patients needing blood will be ranked with all patients needing blood.

15. Retrospective review of hospital resource and clinical management decisions will be done on a daily basis. This will provide an opportunity to ensure that the Guidelines have been appropriately applied and allow for revision of the Guidelines as additional information becomes available about the clinical course of the illness. This approach is preferred over an individual patient appeal process.

16. Hospital procedures must ensure that transparent discussions occur between healthcare providers and their patients and families about the decisions made in compliance with these Guidelines.

## Hospital Resource Management Guidelines Operational Framework

1. Hospitals will implement equipment and supply conservation strategies. It is a basic principle of disaster preparedness that conservation begins immediately at the beginning of an incident. As soon as the hospital recognizes that it may be faced with a sustained disaster that may deplete both human and material resources, the hospital should implement its conservation strategies. (Wisconsin Guidelines for the Allocation of Scarce Resources during Pandemic Influenza, Draft September 2009)

2. Resource allocation decisions will be made within an established Incident Command System (ICS) structure. The bedside clinical care provider should be isolated from resource allocation decisions.

3. Patients' informed request to not receive critical care resources will be honored. These resources will be reallocated to the next eligible patient. Patients cannot self-direct resources they decline.

4. In order for patients to receive critical care resources they must meet eligibility criteria listed in Table 1 - Individual Patient Decision Process, Section 4 (page 9). Grounds for the decision to limit or remove critical care resources will be provided to the family and the clinical care provider.

5. In anticipation of trigger conditions being met within 48 hours, patients requiring limited resources should be evaluated for eligibility for these resources and be subjected to the Multi-principled Critical Care Resource Allocation System (MCCRAS) decision algorithm. The first 48 hour operational period generates a buffer for resource allocation and MCCRAS eligibility and reassessment timing.

6. When these Guidelines are activated, all patients needing consumable resources (e.g., intravenous fluids, medications) will be scored and resources will be allocated based on rank order. Some of these patients may not meet initial eligibility criteria and thus not receive resources.

7. When these Guidelines are activated, all available needed non-consumable (e.g., ventilators, monitors) resources will be assigned to patients. Although some of these patients may not meet initial eligibility criteria, they should be provided the resource with the understanding that the resources will be withdrawn if an eligible patient requires the same resource.

8. Allocation of the needed resource is dependent upon the availability of the specific resource. For example, if the patient requires ventilatory support and antibiotics, based on their rank order and availability of the needed resources they may receive a ventilator without antibiotics, antibiotics without a ventilator, both a ventilator and antibiotics or neither.

   However, if the specific limited resources are interdependent for survival, the lowest rank will be used to determine the patient's rank order for all resources. For example, if the patient requires ventilatory support and a blood transfusion and is ranked 3 for a ventilator and 12 for a blood transfusion, their lower rank of 12 should be used for determining allocation of both resources.

9. The MCCRAS reassessment is performed every 48 hours and determines a patient's eligibility, MCCRAS and rank order. 48 hours is considered a prudent therapeutic trial for allocated resources. If during the 48 hour therapeutic trial the patient's condition deteriorates such that further use of the allocated resource is futile, the patient should be rescored at that time.

   Other patient care assessments performed between MCCRAS reassessment windows should be used to determine ineligibility. It is appropriate to reallocate resources whenever a patient is determined to be ineligible. Ineligible patients will be re-evaluated for critical care treatment only when adequate resources become available.

10. Institutional specific critical care resource review will be required every 48 hours both in hospital and alternative care sites to determine the need for continuation of therapy, discharge or supportive care. This review is done en masse and newly admitted/identified patients need to be integrated into the 48 hour resource review schedule. Some variability of the time interval for the first 48 hour MCCRAS reassessment may be required. No patient should receive his or her first reassessment sooner than 36 hours from the initial MCCRAS assessment.

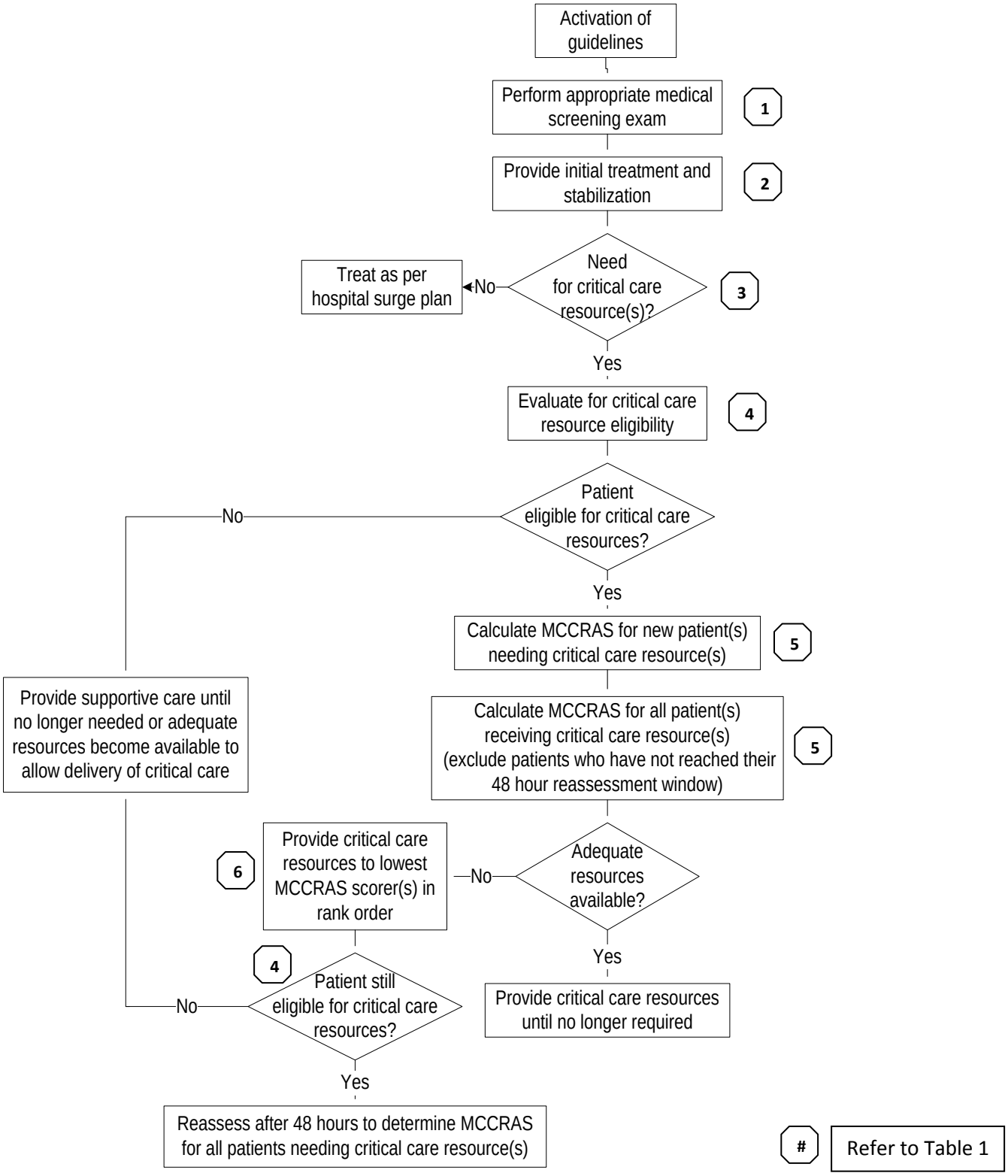
11. Patients who are already admitted and require a critical care resource, or who are receiving critical care and require an additional critical care resource prior to their 48 hour MCCRAS reassessment window, will have their MCCRAS recalculated at that time. They will receive the identified critical care resource if rank qualified and the resource is available.

12. If two patients needing critical care resources have the same MCCRAS, the patient with the lowest score in the "life years lived" category will be given priority to receive the critical care resource. If both patients have the same score in that category, a random selection system will be used to allocate the critical care resource.

13. Patients will receive critical care resources until they either have improved such that they no longer require these resources, they become ineligible or their 48 hour MCCRAS reassessment rank is higher than other individuals who require those resources.

14. Patients whose MCCRAS remains the same over 2 rounds of MCCRAS reassessment (96 hours) will no longer be eligible for the identified critical care resource until adequate resources become available.

## Hospital Resource Management Decision Algorithm



| Table 1 – Clinical Management Decision Process for the Individual Patient | | |
|---|---|---|
| **ACTION** | | **ADDITIONAL INFORMATION** |
| 1 | Perform appropriate medical screening exam | |
| 2 | Provide initial treatment and stabilization | |
| 3 | Determine need for critical care resources<br><br>(ventilatory and/or circulatory support) | **Criteria for Ventilatory Support**<br><br>• Respiratory Failure - Refractory hypoxemia ($SpO_2$ less than 90% on non-rebreather mask or $FIO_2$ greater than 0.85), respiratory acidosis (pH less than 7.2), clinical evidence of impending respiratory failure, inability to protect or maintain airway.<br><br>• Hypoxia - ABG $PO_2$ less than or equal to 55 mm Hg or $SpO_2$is less than or equal to 88%, awake and at rest on room air.<br><br>**Criteria for Circulatory Support**<br><br>• Shock - Systolic blood pressure less than 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.<br><br>• Volume Depletion - Evidenced by orthostatic hypotension, commonly defined as a reduction in systolic blood pressure of 20 mmHg or greater, or a reduction in diastolic blood pressure of 10 mmHg or greater, within 3 min of undergoing orthostatic stress not resolved with 40 ml/kg of an isotonic intravenous solution and unable to take adequate fluids by mouth. |

| Table 1 – Clinical Management Decision Process for the Individual Patient | | |
|---|---|---|
| **ACTION** | | **ADDITIONAL INFORMATION** |
| 4 | Evaluate for critical care resource eligibility | **Defer patient from receiving critical care resources if he/she has any of the following:**<br><br>a. Baseline severe and irreversible chronic neurological condition with and without persistent coma or vegetative state (physician judgment)<br><br>b. Acute severe neurologic event with minimal chance of functional neurologic recovery, such as traumatic brain injury, severe hemorrhagic stroke, hypoxic ischemic brain injury, and intracranial hemorrhage (physician judgment)<br><br>c. Severe acute trauma with a Revised Trauma Score of less than 2 (anticipated mortality of greater than 50%)<br><br>d. Burns with a predicted hospital mortality of greater than 50% based on the FLAMES score or comparable scoring system |
| 5 | Determine Sequential Organ Failure Assessment (SOFA) Score<br><br>Calculate Multi-principled Critical Care Resource Allocation Score (MCCRAS) | Independent of the initial value, an increase in the SOFA score during the first 48 hours of ICU admission predicts a mortality rate of at least 50%.<br><br>When determining rank order, scores should be ordered lowest to highest with resource allocation beginning with the lowest score. |
| 6 | Provide MCCRAS to the hospital emergency operations center for determination of allocation of critical care resources | All patients to be assessed for eligibility and rescored after 48 hours |

**Sequential Organ Failure Assessment (SOFA) Score**

| VARIABLE | POTENTIAL SCORE | | | | | ROW SCORE |
|---|---|---|---|---|---|---|
| | 0 | 1 | 2 | 3 | 4 | |
| **Glasgow Coma Score** Use actual or if sedated, assumed score | 15 | 13-14 | 10-12 | 6-9 | 5 or less | _____ |
| **Hypotension** Adrenergic agents administered for at least 1 hour (µg/kg/min) | None | Mean Arterial BP less than 70 mm Hg | Dop 5 or less | Dop 6-15 or Epi/Norepi 0.1 or less | Dop greater than 15 or Epi/Norepi greater than 0.1 | _____ |
| **$PaO_2/FiO_2$ mmHg** | greater than 400 | 301-400 | 201-300 | 101-200 with respiratory support | 100 or less with respiratory support | _____ |
| **Platelets** x $10^3/\mu L$ | greater than 150 | 101-150 | 51-100 | 21-50 | 20 or less | _____ |
| **Bilirubin** (mg/dL) | less than 1.2 | 1.2-1.9 | 2.0-5.9 | 6.0-11.9 | 12 or greater | _____ |
| **Creatinine** (mg/dL) | less than 1.2 | 1.2-1.9 | 2.0-3.4 | 3.5-4.9 | 5 or greater | _____ |
| | | | | | **TOTAL SCORE** Minimum total score = 0 Maximum total score = 24 | _____ |

Note: Dopamine [Dop], epinephrine [Epi], norepinephrine [Norepi] doses in µg/kg/min.

Adapted from: Christian, et al., 2006, Ferreira et al., 2001 and Vincent, et al., 1996.

**Multi-principled Critical Care Resource Allocation Score (MCCRAS)**

| PRINCIPLE | RATIONALE | POTENTIAL SCORE | | | | | | ROW SCORE |
|---|---|---|---|---|---|---|---|---|
| | | 0 | 1 | 2 | 3 | 4 | 5 | |
| Save the most lives | Best prognosis for short term survival<br>***SOFA score*** | SOFA 5 or less | SOFA 6-9 | SOFA 10-13 | SOFA 14-17 | SOFA 18-21 | SOFA 22-24 | _____ |
| Opportunity to live through phases of life | Priority to those who have not lived through life's stages<br>***Age in years*** | *Age 0-12 | Age 13-20 | Age 21-40 | Age 41-60 | Age 61-80 | Age 81 or greater | _____ |
| Maximizing most life-years | Best prognosis for long-term survival<br>***Comorbidities*** | No comorbid conditions | Likely limited impact on long-term survival | Likely moderate impact on long-term survival | Likely significant impact on long-term survival | Likely profound impact on long-term survival | Likely death within 1 year | _____ |
| | | | | | | | **TOTAL SCORE**<br>Minimum total score = 0<br>Maximum total score = 15 | _____ |

Adapted from White, et al., 2009

*Age range for Potential Score 0 includes all patients age 12 or less who may be accommodated by the available equipment and supplies.

Patients needing specialized pediatric equipment in limited supply will be ranked in a separate group with consideration for age scoring in reverse order. For example, all other things being equal, a 10 year old will receive resources before a 2 year old.

Patients who cannot be accommodated by a particular piece of equipment because of size or age should be assigned to the supportive care group.

**Comorbidities that may impact long term survival include:**

1. Known severe dementia medically treated and requiring assistance with activities of daily living
2. Advanced untreatable neuromuscular disease (such as ALS, end-stage MS, or SMA) requiring assistance with activities of daily living or requiring chronic ventilatory support
3. Incurable metastatic malignant disease
4. Individuals whose weight exceeds 3 times their ideal body weight (BMI greater than 60 $kg/m^2$)
5. Second and third trimester pregnancy
6. New York Heart Association (NYHA) Functional Classification System for Congestive Heart Failure Class III or IV (moderate or severe)
7. End stage liver disease with a Child-Pugh score greater than 7
8. End stage pulmonary disease meeting the following criteria:
   a. Chronic Obstructive Pulmonary Disease (COPD) with Forced Expiratory Volume in one second (FEV1) less than 25% predicted baseline, $Pa0_2$ less than 55 mm Hg, or severe secondary pulmonary hypertension
   b. Cystic fibrosis with post-bronchodilator FEV1 less than 30% or baseline $Pa0_2$ less than 55 mm Hg
   c. Pulmonary fibrosis with VC or TLC less than 60% predicted, baseline $Pa0_2$ less than 55 mm Hg, or severe secondary pulmonary hypertension
   d. Primary pulmonary hypertension with NYHA class III or IV heart failure (g), right atrial pressure greater than 10 mm Hg, or mean pulmonary arterial pressure greater than 50 mm Hg
9. End stage renal disease with a glomerular filtration rate of less than 60 $mL/min/1.73m^2$ [CKD3 (Moderate)] for 3 months
10. DNR orders with consideration of underlying disease process.

| Glasgow Coma Score | | | |
|---|---|---|---|
| **Criteria** | | **Points** | **Subscore** |
| **Best Eye Response** (4 possible points) | No eye opening | **1** | _____ |
| | Open to pain | **2** | |
| | Open to verbal command | **3** | |
| | Open spontaneously | **4** | |
| **Best Verbal Response** (5 possible points) | No verbal response | **1** | _____ |
| | Incomprehensible sounds | **2** | |
| | Inappropriate words | **3** | |
| | Disoriented | **4** | |
| | Oriented | **5** | |
| **Best Motor Response** (6 possible points) | No motor response | **1** | _____ |
| | Extension to pain | **2** | |
| | Flexion to pain | **3** | |
| | Withdraws from pain | **4** | |
| | Localizes pain | **5** | |
| | Obeys commands | **6** | |
| **Total Score** (add 3 subscores; range 3 to 15): | | | _____ |

| Revised Trauma Score | | | | |
|---|---|---|---|---|
| **Criteria** | **Score** | **Coded value** | **Weighting** | **Adjusted Score** |
| **Glasgow Coma Score** | 3 | 0 | **x 0.9368** | _____ |
| | 4 to 5 | 1 | | |
| | 6 to 8 | 2 | | |
| | 9 to 12 | 3 | | |
| | 13 to 16 | 4 | | |
| **Systolic Blood Pressure (SBP)** | 0 | 0 | **x 0.7326** | _____ |
| | 1 to 49 | 1 | | |
| | 50 to 75 | 2 | | |
| | 76 to 89 | 3 | | |
| | greater than 89 | 4 | | |
| **Respiratory Rate (RR) in breaths per minute (BPM)** | 0 | 0 | **x 0.2908** | _____ |
| | 1 to 5 | 1 | | |
| | 6 to 9 | 2 | | |
| | greater than 29 | 3 | | |
| | 10 to 29 | 4 | | |
| **Revised Trauma Score calculation:** (add 3 adjusted scores) | | | | _____ |

| New York Heart Association (NYHA) Functional Classification System For Congestive Heart Failure | |
|---|---|
| **Class** | **Patient Symptoms** |
| I (Mild) | Patients with cardiac disease but without resulting limitation of physical activity. Ordinary physical activity does not cause undue fatigue, palpitation, dyspnea or anginal pain. |
| II (Mild) | Patients with cardiac disease resulting in slight limitation of physical activity. They are comfortable at rest. Ordinary physical activity results in fatigue, palpitation, dyspnea or anginal pain |
| III (Moderate) | Patients with cardiac disease resulting in marked limitation of physical activity. They are comfortable at rest. Less than ordinary activity causes fatigue, palpitation, dyspnea or anginal pain. |
| IV (Severe) | Patients with cardiac disease resulting in inability to carry on any physical activity without discomfort. Symptoms of heart failure or the anginal syndrome may be present even at rest. If any physical activity is undertaken, discomfort increases. |

| Child-Pugh Score | | | | |
|---|---|---|---|---|
| **Measure** | **1 point** | **2 points** | **3 points** | **Points Assigned** |
| Bilirubin (total) µmol/L (mg/dL) | less than 34 (less than 2) | 34-50 (2-3) | greater than 50 (greater than 3) | _____ |
| Serum albumin (g/L) | greater than 35 | 28-35 | less than 28 | _____ |
| INR | less than 1.7 | 1.71-2.20 | greater than 2.20 | _____ |
| Ascites | None | Mild | Severe | _____ |
| Hepatic encephalopathy | None | Grade I-II (or suppressed with medication) | Grade III-IV (or refractory) | _____ |
| | | | **Total Score:** | _____ |

| Interpretation | | |
|---|---|---|
| **Points** | **Class** | **One year survival** |
| 5-6 | A | 100% |
| 7-9 | B | 81% |
| 10-15 | C | 45% |

*Note:* Different textbooks and publications use different measures. Some older reference works substitute PT prolongation for INR. In primary sclerosing cholangitis (PSC) and primary biliary cirrhosis (PBC), the bilirubin references are changed to reflect the fact that these diseases feature high conjugated bilirubin levels. The upper limit for 1 point is 68 µmol/L (4 mg/dl) and the upper limit for 2 points is 170 µmol/L (10 mg/dL).

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