Clinical Triage Protocol for Major Surge in COVID Pandemic

March 28, 2020

A. Overview

The need to undertake triage in a developed health care system in and of itself is uncharted territory without an evidence base upon which to specifically guide management. In extraordinary circumstances best efforts are required drawing upon evidence from clinical practice and ethical principles.
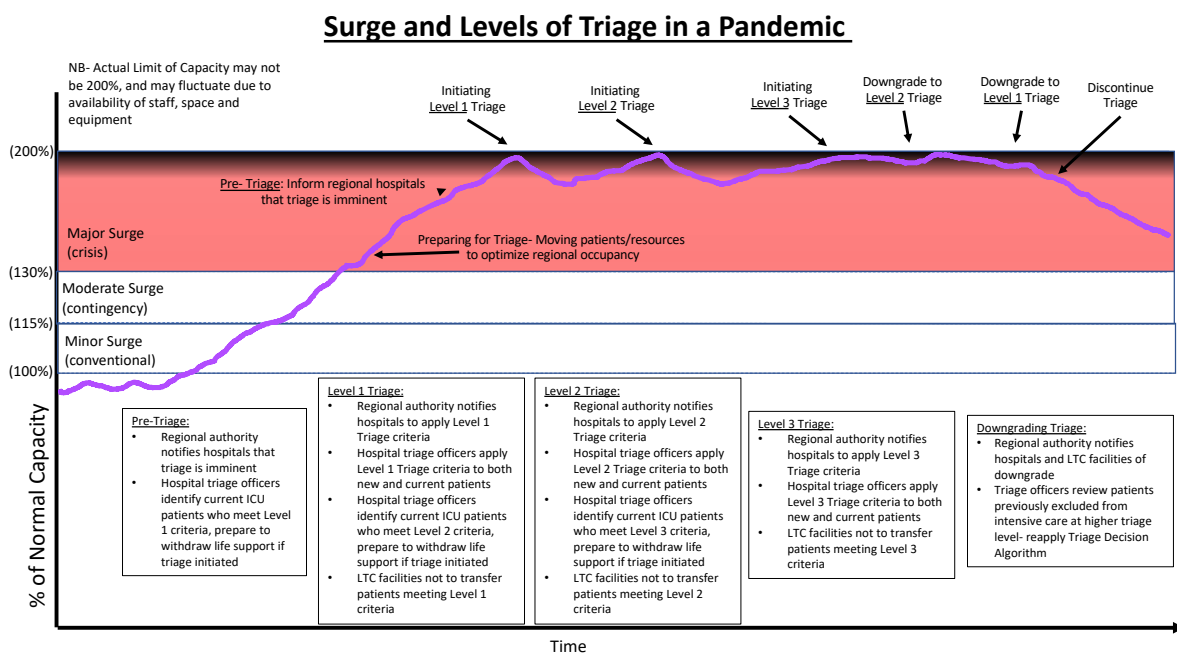
Triage is an option of last resort, to be used once all existing local resources have been used, and all reasonable attempts have been made to move patients to or resources from areas with greater availability. The overall purpose of a triage system is to minimize mortality and morbidity for a population overall, as opposed to individual mortality and morbidity risk.

Clinical triage for major surge should be guided by ethical principles. Relevant ethical principles are: utility, proportionality, and fairness.

The decision to initiate clinical triage for major surge should be predictable and apply to an entire region rather than just individual hospitals. This decision falls under the authority of the Provincial and Regional Critical Care Command Centres with full situational awareness of the existing resources and the demands on those resources. The ongoing need for triage (and at which level) should be frequently reviewed.

There are three levels of triage, and as system pressures increase, triage criteria will become proportionately more strict (see Figure). The degree of triage will be prompted by the degree of demand, in order to limit the possibility that anyone will be denied critical care resources unnecessarily.

Patients who are denied critical care resources due to triage should not necessarily have other medical treatments discontinued. They should receive the highest priority for palliative resources, including comfort medications and a consultation by a palliative care provider if necessary and available. All patients must be cared for.

Surge and Levels of Triage in a Pandemic

NB- Actual Limit of Capacity may not be 200%, and may fluctuate due to availability of staff, space and equipment

Initiating Level 1 Triage
Initiating Level 2 Triage
Initiating Level 3 Triage
Downgrade to Level 2 Triage
Downgrade to Level 1 Triage
Discontinue Triage

Pre- Triage: Inform regional hospitals that triage is imminent

Major Surge (crisis)

Preparing for Triage- Moving patients/resources to optimize regional occupancy

Moderate Surge (contingency)

Minor Surge (conventional)

(200%)
(130%)
(115%)
(100%)

% of Normal Capacity

Time

Pre-Triage:
- Regional authority notifies hospitals that triage is imminent
- Hospital triage officers identify current ICU patients who meet Level 1 criteria, prepare to withdraw life support if triage initiated

Level 1 Triage:
- Regional authority notifies hospitals to apply Level 1 Triage criteria
- Hospital triage officers apply Level 1 Triage criteria to both new and current patients
- Hospital triage officers identify current ICU patients who meet Level 2 criteria, prepare to withdraw life support if triage initiated
- LTC facilities not to transfer patients meeting Level 1 criteria

Level 2 Triage:
- Regional authority notifies hospitals to apply Level 2 Triage criteria
- Hospital triage officers apply Level 2 Triage criteria to both new and current patients
- Hospital triage officers identify current ICU patients who meet Level 3 criteria, prepare to withdraw life support if triage initiated
- LTC facilities not to transfer patients meeting Level 2 criteria

Level 3 Triage:
- Regional authority notifies hospitals to apply Level 3 Triage criteria
- Hospital triage officers apply Level 3 Triage criteria to both new and current patients
- LTC facilities not to transfer patients meeting Level 3 criteria

Downgrading Triage:
- Regional authority notifies hospitals and LTC facilities of downgrade
- Triage officers review patients previously excluded from intensive care at higher triage level- reapply Triage Decision Algorithm

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B. Guiding Principles

The overall purpose of a triage system is to minimize mortality and morbidity for a population overall, as opposed to individual mortality and morbidity risk. There are published frameworks that outline the ethical principles that guide triage systems. Recent publications of surveys and stakeholder engagement indicate a preference for a consequentialist approach based on maximizing the number of lives saved[4], followed by the application of a first-come, first-served or random allocation system for prioritization of people with similar likelihood of benefit[5]. The ethical principles involved in a triage process overall have been published previously. For this protocol, the following ethical principles are foremost:

1. ***Utility-*** Aiming to derive the maximum benefit by allocating resources preferentially to those who derive the greatest incremental benefit. People who are very likely to die from their critical illness, and people who are very likely to die in the near future even if they recovered from their critical illness would have a lower priority.

2. ***Proportionality-*** The number of individuals who are negatively affected by the triage system should not exceed what would be required to accommodate the surge in demand, understanding that capacity and demand can be fluid. In other words, the response should not adversely affect more people than would have been affected if we had used a "first come, first served" approach. Triage systems necessarily have a disproportionate effect on people from vulnerable groups- proportionality is the best way to minimize this effect.

3. ***Fairness-*** Clinically-relevant criteria should be used first and foremost to allocate resources. In the event that clinically-relevant considerations cannot be used to prioritize one patient over another, patients should not be removed from intensive care in favour of another patient with a similar chance of benefit. Priority should not be given to anyone on the basis of socioeconomic privilege, or political rank.

C. Clinical Triage Criteria

In order to be admitted to an ICU bed, a patient must meet one of the inclusion criteria, and must not meet any of the exclusion criteria.

Inclusion Criteria[1]:

Variable	Inclusion Criteria for Critical Care Admission
Requirement for invasive ventilatory support	Refractory hypoxemia ($Spo_2 < 90\%$ on nonrebreather mask $Fio_2 > 0.85$) Respiratory acidosis with $pH < 7.2$ Clinical evidence of respiratory failure Inability to protect or maintain airway
Hypotension	$SBP < 90$ mm Hg for adults (see BP parameters for all age-groups in Table 3) or relative hypotension with clinical evidence of shock for all ages (altered level of consciousness, decreased urine output, other end-organ failure) refractory to volume resuscitation requiring vasopressor/inotrope support that cannot be managed on the ward

SBP = systolic BP; Spo_2 = oxygen saturation as measured by pulse oximetry.

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Exclusion Criteria:

These have traditionally fallen under 2 categories- (1) criteria that indicate a low probability of surviving an acute illness, and (2) criteria that indicate a low probability of surviving more than a few months regardless of the acute episode of critical illness[1]. These categories are not mutually exclusive, as life-limiting illnesses affect prognosis from acute illness, and acute illness affects the trajectory of chronic illness. These criteria reflect the principles of *utility* and *fairness* (see below) because they would exclude people who are very likely to die from their critical illness, and people who are very likely to die in the near future even if they recovered from their critical illness. Note these criteria are not comprehensive- they are meant to reflect known evidence or experience-based prognostic indicators. **Clinical judgment should supplement these criteria**, as some conditions not listed may also denote a poor prognosis, and such patients should be triaged appropriately. The tools listed in this table can be found in Appendix A.

Level 1 Triage Scenario (Aiming to exclude people with >~80% predicted mortality)	Level 2 Triage Scenario (Aiming to exclude people with >~50% predicted mortality)	Level 3 Triage Scenario (Aiming to exclude people with ~>30% predicted mortality)
A. Severe Trauma with predicted mortality >80% based on TRISS score	A. Severe Trauma with predicted mortality >50% based on TRISS score	A. Trauma with predicted mortality >30% based on TRISS score
B. Severe burns with any 2 of: • Age >60 • >40% total body surface area affected • Inhalation injury	B. Severe burns with any 2 of: • Age >60 • >40% total body surface area affected • Inhalation injury	B. Severe burns with any 2 of: • Age >60 • >40% total body surface area affected • Inhalation injury
C. Cardiac arrest • Unwitnessed cardiac arrest • Witnessed cardiac arrest with non-shockable rhythm • Recurrent cardiac arrest	C. Cardiac arrest • Unwitnessed cardiac arrest • Witnessed cardiac arrest with non-shockable rhythm • Recurrent cardiac arrest	C. Cardiac arrest
D. Severe baseline cognitive impairment (unable to perform activities of daily living independently due to cognitive impairment) due to a progressive illness	D. Severe baseline cognitive impairment (unable to perform activities of daily living independently due to cognitive impairment) due to a progressive illness	D. Severe and moderate baseline cognitive impairment (significant impairment in high-order ADLs (e.g. finances. Medications, transportation)) due to a progressive illness
E. Advanced irreversible neurodegenerative disease (e.g. Parkinson Disease, Amyotrophic Lateral Sclerosis)	E. Advanced irreversible neurodegenerative disease (e.g. Parkinson Disease, Amyotrophic Lateral Sclerosis)	E. Advanced and moderate irreversible neurodegenerative neuromuscular disease (e.g. Parkinson Disease, Amyotrophic Lateral Sclerosis)
F. Metastatic malignant disease with any of the following: • ECOG class >=2 • Disease progressing or stable on treatment • Active treatment plan with >80% mortality risk at 1 year • Unproven (experimental) treatment plan • Treatment plan that would only be started if the patient recovers from critical illness	F. Metastatic malignant disease with any of the following: • ECOG class >=2 • Disease progressing or stable on treatment • **Active treatment plan with >50% mortality risk at 1 year** • Unproven (experimental) treatment plan • Treatment plan that would only be started if the patient recovers from critical illness	F. Metastatic malignant disease
G. Advanced and irreversible immunocompromise	G. Advanced and irreversible immunocompromise	G. Advanced and irreversible immunocompromise

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Level 1 Triage Scenario (Aiming to exclude people with >~80% predicted mortality)	Level 2 Triage Scenario (Aiming to exclude people with >~50% predicted mortality)	Level 3 Triage Scenario (Aiming to exclude people with ~>30% predicted mortality)
H. Severe and irreversible neurologic event with >80% risk of death or poor outcome based on: • For Intracerebral Hemorrhage a modified ICH score of 4-7 • For Subarachnoid Hemorrhage, a WFNS grade 5 (GCS 3-6) • For Traumatic Brain Injury, the IMPACT score • Acute ischemic stroke alone would not be excluded at this level	H. Severe and irreversible neurologic event with >50% risk of death or poor outcome based on: • For Intracerebral Hemorrhage a modified ICH score of **3-7** • For Subarachnoid Hemorrhage, a WFNS grade 3-5 (GCS 3-12 OR GCS 13-14 AND focal neurological deficits) • For Traumatic Brain Injury, the IMPACT score • For acute ischemic stroke, an NIHSS of **22-42.**	H. Irreversible neurologic event/condition with >30% risk of death or poor outcome based on: • For Intracerebral Hemorrhage a modified ICH score of **2-7** • For Subarachnoid Hemorrhage, a WFNS grade 2-5 (GCS <15) • For Traumatic Brain Injury, the IMPACT score • For acute ischemic stroke, an NIHSS of **14-42.**

I. End-stage organ failure meeting the following criteria:
Heart
• Chronic End-stage Heart Failure with NYHA Class 4 symptoms, ineligible for advanced therapies (mechanical support, transplant)
Lung
• COPD with FEV_1 <30% predicted, baseline PaO_2 < 55 mmHg
• Cystic Fibrosis with postbronchodilator FEV_1 <30% or baseline PaO_2 <55 mmHg
• Pulmonary fibrosis with VC or TLC <60% predicted, baseline PaO2 <55 mmHg, or secondary pulmonary hypertension
• For pulmonary hypertension, anyone with ESC/ERS high risk criteria (see below)
Liver
• Chronic Liver Disease with failure of 2 or more organ systems (ACLF Grades 2-3)
• MELD score >=25
 	
Note that patients who meet these criteria may be eligible for ICU admission if they are currently on an organ donation waiting list and would be given highest priority if admitted to ICU (e.g. status 4/4F for liver transplantation). This does not include people who have been referred to a transplant service but not yet listed for a transplantation. <u>This also would not apply if organ donation processes are halted due to triage conditions precluding organ procurement.</u>
	I. End-stage organ failure meeting the following criteria:
	Heart
	• Chronic End-stage Heart Failure with NYHA Class 3 or 4 symptoms, ineligible for advanced therapies (mechanical support, transplant)
	PLUS any of:
	  o High/increasing BNP
	  o Cardiorenal syndrome
	  o Recent discharge (<30d) or multiple admissions for CHF in past 6 months
	Lung
	• COPD with FEV_1 <50% predicted, baseline PaO_2 < 55 mmHg
	• Cystic Fibrosis with postbronchodilator FEV_1 <30% or baseline PaO_2 <55 mmHg
	• Pulmonary fibrosis with VC or TLC <60% predicted, baseline PaO2 <55 mmHg, or secondary pulmonary hypertension
	• For pulmonary hypertension, anyone with ESC/ERS high risk criteria (see below)
	Liver
	• Chronic Liver Disease with failure of 1 or more organ systems (ACLF Grades 1-3)
	• MELD score >=15
	
	Note that patients who meet these criteria may be eligible for ICU admission if they are currently on an organ donation waiting list and would be given highest priority if admitted to ICU (e.g. status 4/4F for liver transplantation). This does not include people who have been referred to a
		I. End-stage organ failure (any diagnosis) or previous organ transplant with evidence of chronic rejection or chronic organ dysfunction in the transplanted organ.

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Level 1 Triage Scenario (Aiming to exclude people with >~80% predicted mortality)	Level 2 Triage Scenario (Aiming to exclude people with >~50% predicted mortality)	Level 3 Triage Scenario (Aiming to exclude people with ~>30% predicted mortality)
	transplant service but not yet listed for a transplantation. This also would not apply if organ donation processes are halted due to triage conditions precluding organ procurement.	
J. Anyone with a Clinical Frailty Score of >=7 due to a progressive illness or condition	**J. Anyone with a Clinical Frailty Score of >=5** due to a progressive illness or condition	**J. Anyone with a Clinical Frailty Score of >=3** due to a progressive illness or condition
K. Elective palliative surgery	K. Elective palliative surgery	K. Elective or emergency palliative surgery
L. Anyone receiving mechanical ventilation for >=14 days with a ProVent score of 4-5.	**L. Anyone receiving mechanical ventilation for >=14 days with a ProVent score of 2-5.**	**L. Anyone receiving mechanical ventilation for >=14 days who is not improving**
M. A clinical judgment that this patient has a >80% chance of mortality due to their critical illness, or in the near future regardless of their critical illness	M. A clinical judgment that this patient has a >50% chance of mortality due to their critical illness, or in the near future regardless of their critical illness	M. A clinical judgment that this patient has a >30% chance of mortality due to their critical illness, or in the near future regardless of their critical illness

Supplemental Criteria at Level 3:
Once a Level 3 triage is initiated, only people with the lowest risk of death or poor outcome in the near future would receive intensive care. At this point, should the demand continue to exceed the capacity of the intensive care services there would be little evidence to guide our triage on the basis of *utility*.

- The use of an acute illness score (e.g. SOFA) would be difficult to justify, given that even people with the highest scores have a roughly 50% chance of surviving an acute viral respiratory illness, and if you only look at those who do not meet any of the exclusion criteria at levels 1-3, the survival rate would likely be even higher.

- We do not know whether the prognosis of COVID-19 illness is similar to other vital illnesses. Early data suggests that the admission SOFA scores for nonsurvivors was low, and thus unhelpful for distinguishing them from survivors[2,3]

- Mortality risk from acute illness does not easily translate into utility. It is not clear whether the greatest benefit would be seen in those with mild, moderate, or severe illness.

Focusing on the principles underlying this triage protocol, the demand for intensive care from new patients who don't meet exclusion criteria does not justify withdrawing life-sustaining measures from someone else with a similar prospect of benefitting from them. Decisions to withdraw life-sustaining measures from someone already admitted to intensive care should be primarily driven by clinical considerations. In practice, this would involve a frequent reassessment of admitted patients for any indication that they are no longer responding to treatment, or their clinical trajectory suggests that their chances of recovery have substantially worsened from when they were admitted. To be clear, this is a decision that should be based on clinical considerations, integrating all relevant information, and not solely on any demographic or socioeconomic factor. As with all triage decisions, they should be referred for a second opinion to confirm the assessment that the person's chance of recovery have substantially worsened from when they were admitted.

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D. Clinical Triage Protocol:

Overall Approach
The initiation of a tertiary critical care triage process should be a well-coordinated and predictable decision made at a regional level. Ideally, transportation resources should be used to move patients to or resources from areas/hospitals with lower occupancy as the surge in demand increases, in order to ensure that all resources are maximally used prior to the initiation of a triage protocol. This will reduce the chances that some people will be denied critical care resources that they would have received had they been in another hospital. Of course, transportation resources will become stretched in a pandemic and this will not always be possible. Ideally, triage protocols should be applied consistently across a large region, and reviewed frequently to determine whether the surge in demand is still large enough to justify triaging. Each hospital should be aware of the precise number of critically ill and mechanically-ventilated patients they can accommodate with their resources (including consumables), staff and space. The timing and degree of the surge in demand is likely to be variable in different areas, so as one site approaches their maximum capacity, regional authorities should make significant efforts to transfer patients to or equipment from hospitals with lower occupancy. When all hospitals in a region are near their capacity, or when transportation resources are no longer able to reallocate patients to hospitals with lower occupancy, Provincial and Regional Critical Care Command Centres should clearly inform these hospitals that a triage scenario is impending. Surges in demand may be intermittent requiring a regular review (e.g. every 12 hours) of occupancy to determine whether the triage protocol is still required, or whether hospitals can decrease the level of triage.

Scale-up of Clinical Triage in Major Surge
In Major Surge, all patients who are currently receiving critical care resources should be reviewed, and those who would be excluded under a level 1 triage scenario identified in advance and they (or their substitute decision-makers) informed of the situation if possible. Each hospital should communicate the number of patients who would no longer receive critical care in a level 1 scenario to their regional authority, to assist with planning. When the level 1 triage scenario is initiated, these patients should be removed from critical care resources and transferred to non-critical care beds, with appropriate palliative measures initiated. All patients who develop critical illness after a level 1 triage scenario should be evaluated against the level 1 criteria before receiving critical care resources.

Once a level 1 triage scenario is initiated, this should prompt each hospital to review and identify all patients in their critical care beds who would be excluded from critical care resources under a level 2 triage scenario, informing the patients (or their substitute decision-makers) and the regional authority. The regional authority should continue to coordinate transportation of patients to optimize the utilization of all critical care resources before initiating a level 2 triage. If a level 2 triage scenario is initiated, hospitals should remove these patients from critical care resources and transfer them to non-critical care beds and initiate palliative care measures. All patients who develop critical illness after a level 2 triage scenario should be evaluated against the level 2 criteria before receiving critical care resources.

The hospitals should then prepare for a level 3 triage scenario, similar to the previous steps.
The initiation of a tertiary triage process should also prompt the initiation of primary and secondary triage processes. Patients with exclusion criteria who have impending respiratory failure should not be transferred to acute care facilities if we know in advance that they would not receive critical care

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resources. All efforts should be made to treat them supportively, including palliative treatments, in their current location or a nonacute setting.

Triage Process in Hospital

The process of triage involves at least 3 separate individuals or groups:
- The Most Responsible Physician (MRP)
- The consulting physician from the Critical Care (CC) team or Rapid Response Team (RRT)
- The triage physician, who could be a designated triage physician or the consulting physician from the CC team or RRT
- The hospital triage committee, which should at least include a physician, an ethicist, and a representative from the hospital administration responsible for allocating beds

Regardless of whether or not the triage protocol has been implemented, when a patient is admitted to hospital or assessed in the Emergency Department, if the most responsible physician (MRP) identifies any chronic or incurable illness or condition that implies a shortened life expectancy, they will explore the patient's goals and aim to develop a plan of care that reflects those goals and respects the limitations of medical care. If the patient indicates a preference to receive life-sustaining measures in the event of a deterioration, but the MRP feels that this is not appropriate given the patient's medical condition, they should attempt to resolve this discordance as they normally would. If a person expresses a desire not to receive life-sustaining treatment in the event of a deterioration, this should be recorded in the chart and the patient should not be referred for intensive care.

Triage Algorithm

On admission/in ER: Identify patients who do not want life-sustaining treatment- document
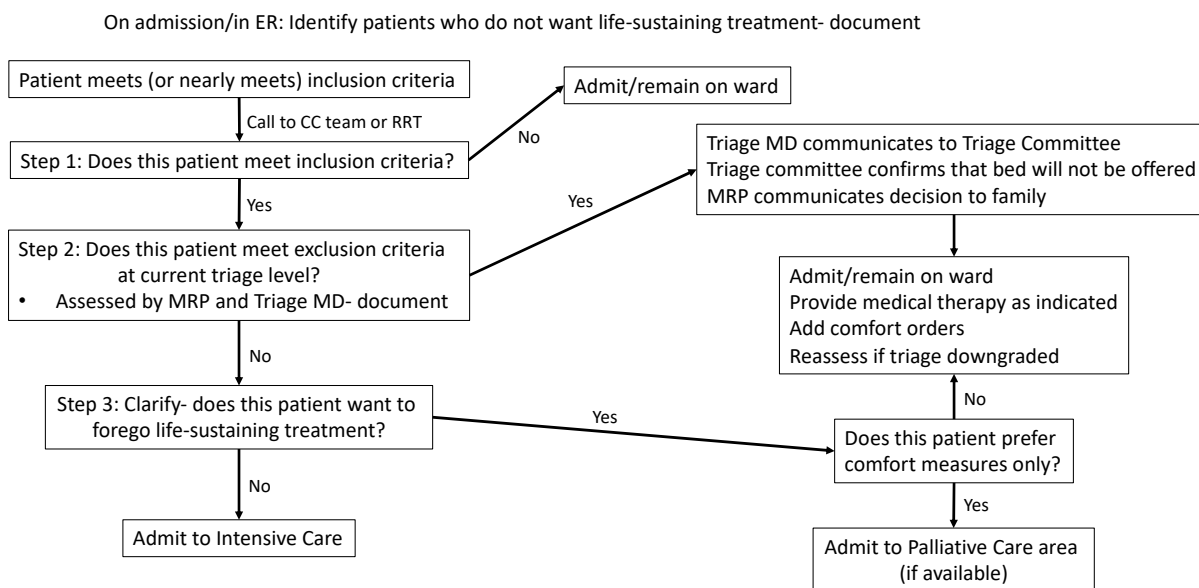
Once the triage protocol has been implemented, if an in-patient meets (or is close to meeting) the inclusion criteria, provided that there is no order withholding life sustaining measures, the MRP should consult with the CC team or RRT, as they normally would in such a situation. At the time of the assessment of by the CC team or RRT, the MRP and a triage physician (who could be either the CC physician, RRT physician, or a designated triage physician with acute care expertise) should assess the

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patient to determine whether they meet the inclusion criteria, and whether they meet any of the exclusion criteria. If both the MRP and the triage physician agree that the patient meets the exclusion criteria in place at the time of the assessment, then they will document this in the medical record. Disagreements should be resolved by consensus among those at the bedside if possible.

Following this assessment, the triage physician will communicate the assessments to the hospital triage committee, who will review the decision. The triage committee may also help to resolve any disagreement about whether the patient meets exclusion criteria. If appropriate, the triage committee will confirm that under the triage protocol, they will not offer admission to intensive care. The MRP will communicate this decision to the patient or substitute decision maker and their next-of-kin (See Appendix B for suggested language to disclose a triage decision). The MRP should continue to offer all other indicated medical treatments, and write comfort orders to ensure that the patient does not suffer (see Appendix C for suggested comfort medication orders). For clarity, the MRP and triage physicians take responsibility for determining that the patient meets the exclusion criteria. The healthcare system, through the implementation of the triage protocol, takes responsibility for determining that they cannot offer admission to intensive care.

E. Paediatric Considerations

Given the very low mortality of most conditions with which children are admitted to intensive care (<5%), patients <18 years who meet the mortality criteria associated with the adult triage levels will be very rare, such that the adoption of the same triage system in pediatrics is unlikely to mobilize further resources[14,15]. An entirely different medical criteria table or algorithm that is pediatric specific would be necessary in considering pediatric specific triage policy, since pediatric life-limiting conditions are diverse and do not lend themselves to scoring nor have such scales been developed or validated in any practically applicable way. Some centres have modeled situations where a certain mortality rate or predicted ventilator-days could exclude some children from initiating invasive ventilator support at a time of significantly increased short-term ventilator needs [16], but there is a paucity of pediatric-specific data to guide such triage. The same task force that assessed adult triage criteria did not adopt an equivalent for pediatrics [17]. Medical specificities aside, the guiding ethical principles remain the same for pediatric triage and should still be applied to pediatric triaging. It is important to recognize that the initiation of adult triage levels does not itself imply initiation of pediatric triage (or vice versa). However, dependent on the level of impact within the pediatric system, pediatric hospitals may need to consider lower level triage initiation at a point when adult systems have reached level 3 triage, in order to respect the principles of utility and fairness population-wide.

Pediatric centres should regionally activate a Pediatric Level 1 triage when shared pediatric resources (accounting for transportation capacity) are exhausted, with mortality predictions subject to expert opinion which should be agreed upon and documented by at least two members of the treating team where possible (Pediatric disease-specific triage algorithm/table to be developed). Prior to movement to a Level 2 or 3 Triage, especially in light of such steps being unlikely to mobilize resources, discussions should be held regarding movement of ventilators back to the pediatric centres from adult sites. Lastly, additional considerations for pediatrics include the moral distress inherent in removing a *child* from life support, or denying its application.

Additional information on the background of the document (Appendix D).

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Appendix A. Triage Criteria Tools

TRISS Score Calculator
https://www.mdapp.co/trauma-injury-severity-score-triss-calculator-277/

Clinical Frailty Scale (Rockwood et al)

Clinical Frailty Scale*

1 Very Fit – People who are robust, active, energetic and motivated. These people commonly exercise regularly. They are among the fittest for their age.

2 Well – People who have **no active disease symptoms** but are less fit than category 1. Often, they exercise or are very **active occasionally**, e.g. seasonally.

3 Managing Well – People whose **medical problems are well controlled**, but are **not regularly active** beyond routine walking.

4 Vulnerable – While **not dependent** on others for daily help, often **symptoms limit activities**. A common complaint is being "slowed up", and/or being tired during the day.

5 Mildly Frail – These people often have **more evident slowing**, and need help in **high order IADLs** (finances, transportation, heavy housework, medications). Typically, mild frailty progressively impairs shopping and walking outside alone, meal preparation and housework.

6 Moderately Frail – People need help with **all outside activities** and with **keeping house**. Inside, they often have problems with stairs and need **help with bathing** and might need minimal assistance (cuing, standby) with dressing.

7 Severely Frail – Completely dependent for **personal care**, from whatever cause (physical or cognitive). Even so, they seem stable and not at high risk of dying (within ~ 6 months).

8 Very Severely Frail – Completely dependent, approaching the end of life. Typically, they could not recover even from a minor illness.

9. Terminally Ill - Approaching the end of life. This category applies to people with a **life expectancy <6 months**, who are **not otherwise evidently frail**.

Scoring frailty in people with dementia

The degree of frailty corresponds to the degree of dementia. Common **symptoms in mild dementia** include forgetting the details of a recent event, though still remembering the event itself, repeating the same question/story and social withdrawal.

In **moderate dementia**, recent memory is very impaired, even though they seemingly can remember their past life events well. They can do personal care with prompting.

In **severe dementia**, they cannot do personal care without help.

* 1. Canadian Study on Health & Aging, Revised 2008.
2. K. Rockwood et al. A global clinical measure of fitness and frailty in elderly people. CMAJ 2005;173:489-495.

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Provent Score- calculated at 14 days:
One point for each of Age >50, platelet count <150, requiring hemodialysis, and requiring vasopressors. An additional point is given for age >=65, for a maximum score of 5. Scores of 4-5 at 14 days suggest a mortality rate of ~90% at 1 year. Scores of 2-3 at 14 days suggest a mortality rate of 56-80% at 1 year[31].

Modified ICH Score[23]:
One point each for age >80, infratentorial origin, volume >30mL, intraventricular extension, use of oral anticoagulants, and Glasgow Coma Score of 5-12. Two points for a GCS of 3-4. Scores of 4-7 suggest a 30-day mortality rate of >80%. Scores of 3-7 suggest a mortality rate of >60%.

The World Federation of Neurological Surgeons grading system:
A combination of Glasgow Coma Score (GCS) and the presence or absence of focal neurological deficits[32]. A WFNS grade 5 (GCS 3-6) is associated with a >90% probability of a poor outcome. Grades 3-4 (GCS 7-12 or GCS 13-14 AND focal neurological deficits) are associated with a >50% probability of a poor outcome. Grade 2 (GCS 14 with no neurological deficits) is associated with a ~30% probability of a poor outcome.

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National Institue of Health Stroke Scale (NIHSS): score 0-7 is associated with a 30-day mortality of 4.2%; 8-13 with a 30d mortality of 13.9%; 14-21 with a 30d mortality of 31.6%; and 22-42 with a 30d mortality of 53.5%[24]:.

The IMPACT Score[25] predicts outcome at 6-months based on multiple demographic, clinical and radiographical factors using the calculator found at http://www.tbi-impact.org/?p=impact/calc

The ACLF grading system is based on the number of organ systems failing at the time of admission in a patient with chronic liver disease. Patients with more than 2 organ systems failing on presentation (ACLF Grades 2 and 3) have an >=80% risk of mortality at 6 months[33]. Those with ACLF Grade 1 have an approximately 50% mortality at 6 months[33]; ACLF grade 1 is defined as having chronic liver failure plus ONE of the following:
- Creatinine >177 umol/L (2.0 mg/dL)
- Creatinine >132 umol/L (1.5 mg/dL) AND Hepatic encephalopathy grade 3-4
- Creatinine >132 umol/L (1.5 mg/dL) OR Hepatic encephalopathy grade 1-2 AND ONE OF:
  - Bilirbin >200umol/L (12mg/dL)
  - INR >2.5
  - pressor support required
  - PaO2/FiO2 <200

For pulmonary hypertension, **the ECS/ERS High Risk Criteria** are[22]:
- WHO Class 4 symptoms
- 6MWT <165m
- NT pro-BNP >1400 ng/L
- RA area >26 cm^2
- RAP >14 mmHg
- CI <2.0 L/min/m^2
- SvO$_2$ <60%

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Appendix B. Suggested language for physicians providing support to a patient or family member who is denied intensive care due to resource scarcity

Template 1.
Normally, when somebody develops critical illness, the medical team would offer them intensive care (a combination of medications and machines to support their vital organs), provided that the medical team felt that they had a reasonable chance of survival. However, because of the COVID outbreak, we are currently unable to offer intensive care to everyone who is critically ill. As a result, our hospital is working under triage guidelines, which means that we are only offering intensive care to those who are most likely to be able to survive and recover from their critical illness. You probably have heard about this in the news – all hospitals in the region are working under these guidelines.

I regret to inform you that we are unable to offer you intensive care treatments at this time, as a result of the triage guidelines. Because of your medical condition, the likelihood that you would survive even with intensive care is considered to be too low for us to offer intensive care. The team has made this decision based on the following information:_____.

I have also asked for a second opinion from a colleague, Dr. _____, who has concurred with my assessment. You may speak with him/her if you wish.

I am deeply sorry about this situation. This is not the way we ordinarily make these decisions, and I can only imagine how you must feel right now. I want you to know that even though we cannot offer intensive care, we will do everything else that could conceivably give you a chance of recovering, including: _____.

And I promise you that, no matter what, we will also use medication to treat any discomfort, such as pain or shortness of breath. We know that when we treat discomfort appropriately, this is not harmful and may actually help improve your condition.

Template 2.
As you know, you/your loved one has been receiving treatment in our Intensive Care Unit. Normally, when somebody is admitted to our Intensive Care Unit, the medical team continues to offer them intensive care until they recover, or it becomes apparent that there is no reasonable chance that they could recover even with continued intensive care. However, because of the COVID outbreak, we are currently unable to offer intensive care to everyone who is critically ill. As a result, our hospital is working under triage guidelines, which means that we are only offering to provide or continue intensive care for those who are most likely to be able to survive and recover from their critical illness. You probably have heard about this in the news – all hospitals in the region are working under these guidelines.

I regret to inform you that we are unable to continue giving you/your loved one intensive care treatments at this time, as a result of the triage guidelines. Because of your medical condition, the

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likelihood that you would survive and recover even with continued intensive care is too low for us to offer intensive care. I have made this decision based on the following information:

[Either document the specific exclusion criterion met by the patient, or a brief explanation for concluding that this person's chances of survival fall below the threshold indicated in the triage document]

I have also asked for a second opinion from a colleague, Dr. _____, who has concurred with my assessment. You may speak with him/her if you wish.

I am deeply sorry about this situation. This is not the way we ordinarily make these decisions, and I can only imagine how you must feel right now. I want you to know that even though we cannot continue intensive care, we will continue other therapies, including:

And I promise you that, no matter what, we will also use medication to treat any discomfort, such as pain or shortness of breath. We know that when we treat discomfort appropriately, this is not harmful and may actually help improve your condition. We have guidelines for how to keep people comfortable when we discontinue life-sustaining measures, and we will use those guidelines.

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Appendix C. Suggested order set for symptom management for COVID-19 patients (adapted with permission from Champlain Palliative Symptom Management Medication Order Form - Long Term Care)

Symptom	Medications	Recommended starting dose
Pain/Dyspnea	Hydromorphone 2mg/ml	0.5-1.0 mg SC q30min PRN*
Nausea/Delirium	Haloperidol 5mg/ml	1 mg subcut q2hourly PRN **
Sedation	Midazolam 5 mg/ml	1-2 mg subcut q15 minutes PRN ***
Secretions	Scopolamine 0.4 mg/ml	0.4 mg subcut q4hourly PRN
Fever	Acetaminophen 650 mg suppositories	Administer q6hourly PR PRN
Urinary retention	Foley catheter 16 Fr	Insert catheter PRN
Dry mouth	Mouth swabs	Mouth care QID and PRN

Please call MD if patient receives more than 2 PRN of hydromorphone in 4 hours.

* may start at 0.25mg in a patient who is opioid naive, frail, or elderly
** relative contraindication in Parkinson's disease
*** can use higher doses for refractory dyspnea

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Appendix D. Backgrounder

A. Context

The current pandemic of COVID-19 is likely to lead to a substantial increase in the demands on acute and critical care services in Ontario. Given that these services operate near or even above capacity at baseline, even the lowest estimates of incidence would exceed our capacity at an early stage. A minor or moderate surge could potentially be accommodated by adapting existing resources (e.g. transport and OR ventilators, operative settings and non-ICU staff with appropriate training). However, there is a compelling need to prepare a triage system to allocate critical care resources in the event of a severe surge in demand, to be used only as a last resort when critically ill people are unable to access any critical care resources. This triage system would be applied to current and new patients with critical illness, whether or not they are presenting with COVID acute respiratory illness or another illness. In order to enact this triage plan, we require a triage decision support protocol, infrastructure, processes, legal/regulatory protections and training[1], all of which are currently lacking in Ontario. We also need to ensure that patients who are denied critical care resources are still cared for appropriately, ensuring that they are given an opportunity to survive, while also receiving appropriate symptom management. The consequences of failing to prepare for this eventuality are potentially serious, as has been seen in Italy, a country with similar ICU resource levels to Canada.

B. Purpose & Methods

Purpose of this Document

This document is intended to outline criteria to be used for the allocation of critical care resources (especially mechanical ventilators) in a scenario where the need for ventilatory support is greater than the existing resources. The use of a triage protocol should be considered a last resort, to be used only when all potential resources (e.g. operating room ventilators, transport ventilators) and staff have been deployed, all reasonable efforts have been made to move patients to available resources at other locations, and there is still demand. The triage protocol is a green document within the overall 2020 COVID pandemic response in Ontario.

Methods

Development of the protocol was led by Dr. James Downar (The Ottawa Hospital) under the auspices of the Ethics Table of the Ontario COVID Command Structure. It builds on earlier work in Ontario by Christian et al[1] (see also Appendix 1) and is informed by a consultative process with Ontario critical care and other physicians and members of the Ethics Table in March 2020. Consultation will continue over the coming days. Legal opinion is being sought to ascertain legal implications of its use in the 2020 COVID pandemic.

Evolution and Key Considerations of Triage Criteria

Existing critical care triage plans have generally described a set of inclusion criteria, a set of exclusion criteria, and a timeframe for reassessment of improvement[1,18].

i) Inclusion Criteria (Christian et al.[1]):

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Variable	Inclusion Criteria for Critical Care Admission
Requirement for invasive ventilatory support	Refractory hypoxemia ($Spo_2 < 90\%$ on nonrebreather mask $Fio_2 > 0.85$) Respiratory acidosis with $pH < 7.2$ Clinical evidence of respiratory failure Inability to protect or maintain airway
Hypotension	$SBP < 90$ mm Hg for adults (see BP parameters for all age-groups in Table 3) or relative hypotension with clinical evidence of shock for all ages (altered level of consciousness, decreased urine output, other end-organ failure) refractory to volume resuscitation requiring vasopressor/inotrope support that cannot be managed on the ward

SBP = systolic BP; Spo_2 = oxygen saturation as measured by pulse oximetry.

ii) Exclusion Criteria:

These have traditionally fallen under 2 categories- (1) criteria that indicate a low probability of surviving an acute illness, and (2) criteria that indicate a low probability of surviving more than a few months regardless of the acute illness[1]. These categories are not mutually exclusive. A detailed list of these criteria appear in Ontario's pandemic plan, published in 2006[18]:

Exclusion critiera

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

I. End-stage organ failure meeting the following criteria:
  Heart
  - NYHA class III or IV heart failure
  Lungs
  - COPD with FEV_1 < 25% predicted, baseline PaO_2 < 55 mm Hg, or secondary pulmonary hypertension
  - Cystic fibrosis with postbronchodilator FEV_1 < 30% or baseline PaO_2 < 55 mm Hg
  - Pulmonary fibrosis with VC or TLC < 60% predicted, baseline 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

In addition, this pandemic plan identified those with Sequential Organ Failure Assessment (SOFA) scores of 7-11 for the highest priority, with those <7 as lower priority, and those with scores of 0 or >11 being excluded from critical care resources. The aim was to prioritize those with intermediate levels of acute illness to receive intensive care.

Considerations to establish current criteria
- With greater experience, most experts no longer recommend the use of SOFA scores to prioritize patients, because the correlation with outcomes is not as strong as was previously believed. Many young patients are admitted with severe illness but ultimately survive, and the severity of acute illness does not imply greater or lower utility of treatment.
- Some selected individuals with metastatic cancer have a reasonable expectation of surviving an ICU admission and living for years[19,20].

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- We are able to better prognosticate for patients with some types of chronic organ disease who develop critical illness, such as people with chronic liver disease using the Acute on Chronic Liver Failure (ACLF) grading system[21]
- Organ donation has become more common, and may offer substantial life prolongation for people with organ failure. Selected patients who are admitted to the ICU and assigned the highest priority for organ transplantation have a reasonably high expectation of receiving an organ and surviving to discharge. This would mean that anyone who is immediately postoperative from an organ transplant should not be denied ICU admission. However, patients who are being referred for ICU admission while awaiting an organ should only be admitted if organ transplantation is still proceeding (and this may not be the case if people who would be eligible for organ donation after neurological or circulatory death are not being admitted to the ICU) and they are assigned the highest priority for an organ transplant
- We have better prognostication tools for neurological injury, including:
    - For subarachnoid hemorrhage, the WFNS system[22].
    - For intracerebral hemorrhage, the ICH score[23].
    - For acute ischemic stroke, the NIH Stroke Scale[24].
    - For moderate or severe traumatic brain injury, the IMPACT score[25].
- Specific age limits may also seem arbitrary, and perhaps less rationally connected to mortality than frailty[26-28]. The Clinical Frailty Score is currently in widespread use throughout the healthcare system.
- There is also a greater appreciation of the concept of chronic critical illness, and the ability to identify ICU patients who have survived their acute illness but who are still requiring mechanical ventilation after 2 weeks and very unlikely to survive to a year using the ProVent score[29-31].

With this in mind, we propose a staged triage protocol that allows for the use of continuous data at different thresholds depending on the degree of surge.

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