17. Acute Care Services

The virus had made six hundred sailors and marines sick enough to require hospitalization, and more men were reporting ill every few minutes. The navy hospital ran out of beds. The navy began sending ill sailors to the Pennsylvania Hospital … Fourteen hundred sailors were now hospitalized with the disease. The Red Cross was converting the United Service Center … in to a five-hundred bed hospital for the sole use of the navy."

The Great Influenza, John Barry

In the event of a pandemic, people who develop influenza symptoms will be encouraged to call Telehealth and/or go to community-based centres (see Chapter 11) where they will be assessed and directed to the appropriate level of care. This should help reduce some demand on acute care hospitals – although some people will still present at emergency departments for care. In some cases the appropriate level of care would need to be provided in acute settings. Chapter 17A includes sample assessment and admission forms to assist hospitals in assessing patients referred to them by Telehealth or community-based influenza assessment, treatment and referrals centres.

While community assessment centres may reduce some pressure, acute care settings will still be overwhelmed with the demand for care. This section of OHPIP looks specifically at the management and allocation of acute hospital services during an influenza pandemic.

17.1 The Demand for Acute Care

Based on FluSurge, the forecasting model developed by the Centers for Disease Control in the United States, a 35% influenza attack rate will result in an estimated 61,253 total hospitalizations and 12,095 deaths over eight weeks (see Table 17.1).

During annual influenza season, the people at higher risk for complications from influenza and most likely to require hospitalization include:

- people of all ages with heart conditions and chronic lung conditions such as cystic fibrosis, asthma or emphysema
- residents of long-term care homes or other chronic care facilities due to environmental exposure, regardless of age or chronic conditions
- people with compromised immune systems from diabetes, other metabolic diseases, cancer, renal disease, anemia, HIV, sickle cell anemia
- children previously treated with acetylsalicylic acid for conditions like juvenile rheumatoid arthritis and at risk of Reyes Syndrome
- children younger than two years due to a general lack of immunity
- pregnant women in the second and third trimester who will be at increased risk of cardio-respiratory diseases and stillbirths
- healthy people aged sixty-five years and older who will be at moderately increased risk of respiratory complications.

Depending on the characteristics of the pandemic strain and the susceptibility of the population, an unknown proportion of the remaining Ontario population will develop health complications during the pandemic.

17.2 Hospital Capacity

The Flu Surge forecast assumes that each hospitalized influenza patient will require an average of either 5 (non-ICU) or 10 (ICU) days of hospital care with:

- 100% using an acute bed for 5 days
- 15% using ICU beds for 10 days
- 7.5% using ventilator support for 10 days.

Many hospitals in Ontario are currently operating at full capacity with very little surge capacity. Hospital bed numbers fluctuate during the year, according to the numbers of planned surgeries and treatments, as well as unplanned traumatic accidents, heart attacks, strokes, and high-risk births. Based on the MOHLTC Finance Information System report from March 31, 2004, Ontario hospital capacity includes:

- 17,116 total acute beds
- 1,510 ICU beds; and
- 1,096 ventilator-supported beds (MOHLTC's Critical Care Project survey in the fall of 2004, of Ontario hospitals).

Table 17.1: Impact of 35% Influenza Attack Rate on Hospital Capacity

35% Attack Rate - 8 Weeks		**Week 1**	**Week 2**	**Week 3**	**Week 4**	**Week 5**	**Week 6**	**Week 7**	**Week 8**	**Week 9**	**Week 10**
Hospital Admission	Weekly admissions	3,675	6,125	9,188	11,638	11,638	9,188	6,125	3,675		
	Peak admissions/day				1,814	***1,814***					
Hospital Capacity	# of patients in hospital	2,702	4,503	6,754	8,555	8,858	7,786	5,971	3,917		
	% capacity needed	16%	26%	39%	50%	***52%***	45%	35%	23%		
ICU Capacity	# of patients in ICU	551	1,169	1,795	2,371	2,566	2,497	1,984	1,370		
	% ICU capacity needed	37%	77%	119%	157%	***170%***	165%	131%	91%		
Ventilator Capacity	# patients on ventilators	276	585	898	1,186	1,283	1,248	992	685		
	% usage of ventilators	25%	53%	82%	108%	***117%***	114%	91%	62%		
Deaths	# of influenza deaths			726	1,209	1,814	2,298	2,298	1,814	1,209	726
	# of deaths in hospital			508	847	1,270	1,609	1,609	1,270	847	508

Notes:
1. All results showed in this table are based on most likely scenario.
2. Number of influenza patients in hospital, in ICU, and number of influenza patients on ventilator are based on maximum daily number in a relevant week.
3. Hospital capacity used, ICU capacity used, and % usage of ventilator are calculated as a percentage of total capacity available (see manual for details).
4. The maximum number of influenza patients in the hospital each week is lower than the number of weekly admissions because we assume a 5-day stay in general wards (see manual for details).

Based on these Ontario bed numbers, at the peak of the pandemic, influenza patients will use an estimated 52% of all acute care beds, 170% of ICU beds and 117% of ventilator supported beds. Table 17.1 summarizes the demand for hospital services for influenza patients; it does not include the services required to treat patients with other health problems (e.g., trauma, heart attacks, strokes, high-risk births).

The FluSurge estimates for hospitalizations during an influenza pandemic are at least six times greater than typical hospitalizations for influenza and pneumonia during interpandemic periods (based on CIHI hospitalizations for influenza and pneumonia, from April 1996 to March 2004).

FluSurge used both influenza and pneumonia hospitalizations to estimate the impact of a pandemic because influenza has nonspecific symptoms and pneumonia is the most common health complication caused by influenza.

Note: The FluSurge model is based on hospital data from the United States, which may not reflect the Canadian experience (i.e., hospital influenza admissions, ICU admissions, ventilator use and deaths may be lower in Canada). The model also does not take into account health care worker absenteeism (hospital staff will likely contract influenza at the same rate as the general population in their communities). MOHLTC will work with PHAC to develop a Canadian approach to pandemic modeling, and to test different pandemic scenarios (e.g., increased volume of Telehealth calls or increased use of protective equipment during the pandemic) and their impact on the health system.

Optimizing Hospital Capacity

As alarming as the FluSurge numbers are, they do not take into account other factors that will affect hospital capacity including:

- the current demand for hospital services which is high without a pandemic: the daily utilization rate of ICU beds is over 90%
- illness among health care workers.

Table 17.2 outlines approaches to optimizing hospital capacity and capability that, pending further advice from clinical experts and MOHLTC counsel, will be used in Ontario.

Developing Surge Capacity

Based on the FluSurge estimate for a 35% attack rate, ICUs will be immediately affected, followed by rapidly increasing pressures on acute beds. By the end of the first week of the pandemic, influenza patients will require 37% of ICU bed and 16% of acute care bed capacity. To be able to meet pandemic demands, hospitals must develop a phased approach to surge capacity, including the deferral of non-influenza care and the dynamic use of influenza triage and admission/discharge criteria constantly adjusted to hospital capacity. Recent reviews of emergency response arrangements in the United States suggest that 20% surge capacity is the maximum upper limit to any hospital "surge in place" response during major emergencies. This will vary according to local hospital resources. Table 17.3 outlines strategies that hospitals and their community partners can use to respond to the need for surge capacity.

With a 35% attack rate, the phased development of surge capacity will not free up sufficient resources to meet needs during the peak periods of pandemic demand. After hospital surge capacity and other health system resources have been exhausted, mass emergency care will be declared in order to ensure the fair and equitable allocation of scarce resources, and maximize the benefit to the population at large. This approach will be consistent with the federal and provincial goals of pandemic influenza planning (i.e., to minimize serious illness and overall deaths). Since there are substantial political, legal, regulatory and logistical implications to declaring the shift to mass emergency, further advice will be sought from clinical experts and ministry counsel about the criteria for mass emergency care and guidelines for implementing that care once hospital surge capacity is exhausted.

Table 17.2: Approaches to Optimizing Hospital Capacity in Ontario

Capacity	**Activity**
Physical Capacity	Defer any services for non life-threatening conditions where no severe adverse health consequences are anticipated from the delay.
	Discharge Alternate Level of Care (ALC) patients to Long-Term Care homes when beds are immediately available.
	Discharge acute inpatients to home care when care can be provided safely in that environment.
	Discharge acute patients to family and self care when care can be provided safely in that environment.
	Create "flex beds" from reserved beds or recently closed beds.
	Use ventilator capacity anywhere in the hospital where sufficient oxygen capacity exists (e.g. ER, post-anesthetic care units), cohort infectious patient and noninfectious patients.
	Deploy freed-up beds for influenza patients.
Hospital Staffing	Re-deploy clinical staff from deferred services.
	Defer staff holidays and leaves of absence until pandemic ends.
	For staff willing to work extra hours, establish 12-hour shifts up to the maximum recommended number of days per staff.
	Train non-clinical staff to provide support services such as meals, personal care, and patient movement for treatment, site cleaning and support for health care workers and their families so the workers can do their job (e.g., child care, pet care).
	Recruit clinical agency staff in coordination with other hospitals in the immediate geographic area.
	Encourage members of the public to take home health care courses before the pandemic so they know how to prevent infection and provide supportive care for family members who are ill; train family members of hospital patients to provide home health care.
	Cross-train clinical staff for influenza care and other essential services during a pandemic and other large-scale emergencies.
Clinical Practices	Adopt clinical care practices to optimize hospital capacity, pending further development of clinical guidelines.

Table 17.3: Strategies to Enhance Surge Capacity

Surge Levels During an Influenza Pandemic	Surge Strategies		Response Level	IMS Command Function
Pre-Surge	Basic	• Staffed and operational beds open • Some approved beds closed due to resource constraints	Intra facility	Hospital
Minor Surge **5% to 10%**	Enhanced	• Open approved ICU and ventilator-supported beds as staff redeployment/recruitment permits • Defer elective surgery up to 72 hours as per routine surge protocols • Cohort/Isolate influenza patients in ER, acute units, and ICU/ventilator units	Intra facility	Hospital
Moderate Surge **11% - 15%**	Augmented	• Establish early discharges; home care transfers; ALC transfers to LTC Homes • Open more ICU/ventilator beds where oxygen available (e.g., operating rooms or post anesthetic care units) • Defer some treatment for non-life threatening condition if no severe adverse health consequences anticipated from the delay	Intra facility	Hospital
Major Surge **16% - 20%**	Optimum	• Defer all treatment for non-life threatening conditions where no severe adverse health consequences are anticipated from a delay	Inter facility	Region Province
Large Scale Emergency **> 20%**	Over capacity	• No more beds available • Maintain services for life-threatening conditions • Triage for all treatment • Mass Emergency Care	Inter facility	Province

Deferral of Non-Influenza Services

When a pandemic is declared, hospitals will begin a phased deferral or scale-back of certain non-influenza services (e.g., elective surgeries, outpatient procedures) in order to ensure that essential services are there for both influenza and non-influenza care. By using a phased approach, hospitals will avoid unnecessary deferral of services before the full size of the pandemic is known, but will be able to act quickly to defer services as the pandemic grows.

When making decisions to defer services, all sectors will:

- establish a senior multidisciplinary team to make the decisions and seek support from ethical and legal experts
- apply the ethical framework for decision making (Chapter 2)
- use consistent criteria that are flexible enough to allow local responses based on local demands and resources
- ensure their decisions are transparent.

Note: All hospital service deferral decisions will be based on a careful and compassionate clinical assessment of each patient's health condition, prognosis, and risk of infection during acute hospital care.

Table 17.4 lists the criteria and indicator conditions that hospitals will use to identify services that can be deferred and those that are essential and must be maintained.

17.3 Strategies to Build Critical Care Surge Capacity

While the activities in Table 17.2 may divert some people from hospital, they do not address the need to manage critical care resources. During a pandemic, hospitals will use a series of strategies, such as code orange protocols and mass critical care, to build surge capacity (figure 17.1).

Table 17.4: Criteria and Indicator Conditions for Deferring Hospital Services

Site of Care	Level 1 Defer services for non-life threatening conditions immediately if no severe, adverse health consequences anticipated by the delay.	Level 2 Maintain services for non-life threatening conditions as long as resources are available, if severe adverse health consequences are anticipated from delay.	Level 3 Maintain services for life-threatening conditions throughout the influenza pandemic.
Hospital Inpatient Surgery or Procedure	• Elective abdominal aortic surgery • Cholecystectomy • Hip/knee replacement • Prostate transurethral resection	• Carotid endarterectomy • Colectomy • Thoracotomy • Total prostatectomy • Lumpectomy/mastectomy	• Initiation of mechanical ventilation
Hospital Outpatient Surgery or Procedure	• Vasectomy • Myringotomy • Carpal tunnel release • Cataract surgery	• Breast biopspy • Chemotherapy • Percutaneous coronary intervention (PCI) • Cardiac catheterization	
Hospital Emergency Department Care	• Superficial injuries • Back or neck pain • Extremity strain	• Severe cuts • Upper/lower respiratory infection • Otitis media	• Initiation of mechanical ventilation

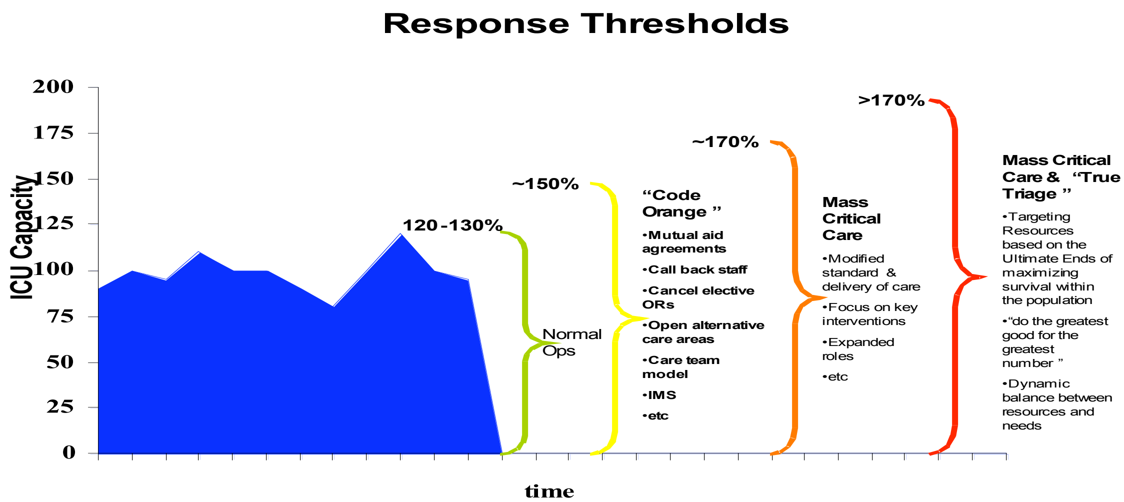
Notes to Table 17.4:
These criteria are based on the three health care urgency categories developed by the Institute for Clinical Evaluative Sciences (ICES) to assess the impact of SARS on health services utilization. If the spread of influenza is gradual, scale-back may be time-sensitive, with some services deferred earlier than others according to the assessed impact from a delay. These recommendations mirror the Alberta Clinical Subcommittee report (2003, page 21), which state that the exact details of rationing health care resources cannot be anticipated in advance by an algorithm or list of tradeoffs. The report recommends a step-wise process, starting with decisions about elective surgery by the Chiefs of Surgery, Neurosurgery and Medicine, followed with shared decision-making among attending physicians, health care workers, senior physicians, the head of nursing, an ethicist and the Chief Executive Officer, for all other treatment.

Code Orange

The first response to a demand that exceeds routine critical care capacity is to implement an external disaster or "code orange" protocol. Most code orange protocols include a series of strategies (figure 17.1) that work together to provide short-term surge capacity and operate on an incident management system [IMS](3). Because responding to a pandemic that will last several weeks or months requires long-term sustainability rather than short-term surge capacity, not all "code orange" strategies will apply. For example:

- Hospitals often hold back a shift from going home; thereby doubling staff complement, but this will not be feasible during a pandemic which will last several weeks.
- Traditional mutual aid agreements (i.e., one organization lends staff or resources to another) will be of limited use as all hospitals will be facing the same challenges.
- Cancelling **all** elective and non-emergent services and surgeries will not be appropriate because, as we learned from SARS(4), failure to maintain other essential services during a prolonged emergency affects the broader health care system.

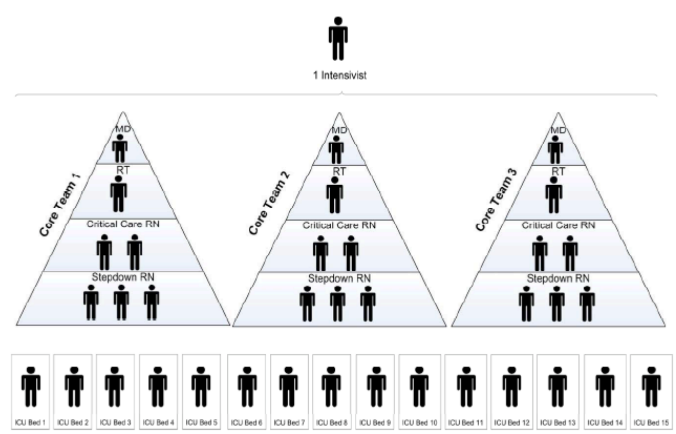
Figure 17.1 Strategies to Build Critical Care Surge Capacity



Scaling Back Elective Services
Scaling back elective services and surgeries can free up hospital areas, such as surgical intensive care units, endoscopic units, step-down units and post anaesthetic care units [PACU], that are well equipped to provide critical care for influenza and non-influenza patients. How much critical care capacity can be increased will depend largely on the availability of ventilators, and personnel skilled in managing critically ill patients.

Scaling back elective and non-urgent services can also provide additional personnel who may have skills transferable to critical care – particularly when a team care model is used (figure 17.2). In this model, health care providers who lack experience in a specific area can be supervised by those with the relevant experience. Instead of individual health care providers caring for one or two patients, a team that has a complete skill set and relevant experience collectively cares for a group of patients. For example, a team of 2 ICU nurses supervising 3 step-down nurses working with a respiratory therapist and a physician could care for 8 to 10 patients instead of the usual complement of 4 ICU nurses caring for 5 ventilated patients (i.e., 1:1 or 1:2 ratio). The care team model has proven effective in past emergencies(5;6).

Figure 17.2 Team Model for Critical Care



Any scale back of elective and non-urgent procedures will require coordination among hospitals and between hospitals and community services so the system can continue to provide a full spectrum of services and continue to meet the population's urgent health needs.

Mass Critical Care

If after all these efforts, demands still exceed capacity, hospitals will adjust the type of care being provided to focus on key critical care interventions (i.e., mass critical care), including:

- basic modes of ventilation
- hemodynamic support
- antibiotics
- disease specific countermeasures (i.e., thrombolysis)
- prophylaxis (e.g., DVT).

Mass critical care(7;8) targets resources – including supplies and manpower -- to optimize their effectiveness and efficiency.

17.4 Critical Care Triage

The strategies discussed above will not be enough to respond to the number of people who will seek care during an influenza pandemic.

CPIP notes that: "Prioritization of health resources at times of critical shortages will also need to be considered. Local community-based centers and hospitals need to take a multi-disciplinary approach and include ethical and legal considerations when developing any prioritization processes. If supplies, equipment, and access to intensive care must be rationed, a fair and equitable prioritization process will need to be established."[i]

Difficult decisions will have to be made about how best to use scarce critical care resources to maximize the benefit for the community as a whole. This process, called "triage", is only used after all the above strategies have been employed to maximize system capacity.

Principles of Critical Care Triage

Three key principles underpin critical care triage:

1. A triage protocol for critical care is not aimed at deciding who will or will not receive care. <u>All patients will be cared for.</u> Every human life is valued and every human being deserves respect, caring and compassion. However, this does not mean that all patients will or should receive critical care. Those who do not receive critical care will not be abandoned; they <u>will</u> continue to receive alternative levels of care.

2. Triage does not challenge or contravene ethical doctrine. In fact, triage is a practical application of ethics. Effective triage will ensure that fairness and justice prevail at a time when circumstances could leave people vulnerable to inequitable treatment. A thoughtful and carefully implemented triage protocol is based on clear and transparent criteria and can protect individuals from any inequities.

3. In a resource-rich country like Canada, the type of triage described here is only ethically, legally and morally justifiable in an overwhelming crisis, such as an influenza pandemic, when all resources are in danger of being exhausted. This protocol **is NOT** a first step toward resource rationing under ordinary circumstances. It is

to be used only in extraordinary situations.

Triage Overview

During a disaster, including a pandemic, international law(9-11) requires jurisdictions to use methods to allocate resources that are equitable and maximize the benefit to the population at large(6). These methods are referred to as 'triage', but should not be confused with the prioritization "triage" systems(12) used routinely in emergency departments(13). To differentiate between the two, the term 'TRUE Triage' or 'Targeting Resources to achieve Ultimate Ends' has been suggested.

The original concept of 'triage' was developed during wartime(11) when scarce resources were used to provide the maximum benefit to the population at large, even if it meant that individuals who might have been saved under other circumstances could not be treated optimally(13;14). Triage must be based upon established medical criteria, not factors such as socioeconomic status or political affiliation, and represents a dynamic balance between resource availability versus demand(13).

When triage protocols are being developed, organizations must adhere to human rights, humanitarian laws(10) and to ethical practices, such as transparency and accountability(8) (see Framework for Ethical Decision Making, Chapter 2). As guardians of important resources, health care providers have to balance the needs of individuals with their responsibility to others in the community. The primary goal of triage is to "do the greatest good, for the greatest number"(13).

No triage systems have been developed for use in critical care or medical illnesses; however there are models that provide valuable lessons:

- Illness severity scoring systems(16-18) currently used in critical care research have reasonable abilities to predict ICU outcome, but they are cumbersome to use and impractical during a disaster when human resources are scarce. They have also not been validated for guiding or restricting treatment.
- Military triage systems(19-21) are good only as a model for critical care triage since they were devised specifically for trauma and not medical conditions or biological events.
- The 'SEIRV' triage system, developed for use in bioterrorism attacks, is used to categorize patients as susceptible, exposed, infectious, removed and vaccinated (SEIRV) (22). It provides many lessons that can be applied to the overall response to bioevents, but does not address resource allocation and has limited applicability when a virus is widespread in the community. The SEIRV system uses inclusion, exclusion and minimum qualifications for survival [MQS] to guide triage decisions, which should be used in all critical care triage systems.
- The Sequential Organ Failure Assessment score [SOFA](24) may be useful as a component of a triage tool. It has not been used to ration critical care resources but it was designed with this in mind(24). It is not disease specific; it uses general physiologic parameters that can be applied to a wide variety of conditions. The SOFA scale has been validated on a wide range of patients with various reasons for being in critical care and can be applied to all critical care patients as opposed to disease specific scoring systems. Preliminary drafts of this

proposed tool were developed and included in OHPIP 2005.

Accurate triage is critical to maximize survival. "Over-triage" -- triaging patients inappropriately to critical care(13) – leads to inappropriate resource expenditures. Frykberg showed that over-triage of patients involved in terrorist bombings is directly related to overall increased mortality rates. Health care providers need real-time data about patient outcomes during a disaster in order to modify triage criteria and prevent under or over triage. Another mechanism to fine tune triage criteria is computer modeling based on databases of patients with similar illnesses (i.e., influenza) from non-bioevent occurrences.(23).

17.5 Draft Triage Protocol and Rationale

A draft triage protocol is included in Chapter 17A: Acute Care Services Tools.

It is not possible to develop a perfect triage protocol in advance of the pandemic when many factors (e.g., the pandemic strain, groups most likely to have poor outcomes) are unknown. Triage is a dynamic process that depends on both the demands and availability of resources, so the protocol will evolve over time. The primary goal of the draft protocol is to provide a starting point: guidance for making triage decisions during the early days and weeks of a pandemic.

Although the triage protocol is designed for use during a pandemic, it applies to all patients being considered for admission to critical care: the pool of critical care resources must be shared by both those with and without influenza. Patients should be triaged when the physician or health care providing attending them believes that they meet the inclusion criteria for ICU. Patients at a centre without critical care services should be triaged remotely before being transferred in order to minimize unnecessary transfers if they do not meet the criteria for admission to the ICU, or meets the exclusion criteria.

The triage protocol has three main components.

Inclusion Criteria

Inclusion criteria identify patients who may benefit from admission to critical care. The inclusion criteria primarily focus on respiratory failure because the ability to provide ventilatory support is what will differentiate the ICU from other acute care areas such as step-down units. (With expanded care models developed as part of surge capacity, hemodynamic support and other advanced care will be provided in areas that have appropriate monitoring but do not typically provide that level of care; however, if hemodynamic support is not available elsewhere, it will qualify as inclusion criteria.)

Exclusion Criteria

Exclusion criteria can be broken down into three categories:

1) People who currently have a very poor prognosis/chance of survival even when treated aggressively in an ICU.

These are the 'hard' boundaries that many intensivists recognize from their day-to-day care of patients. For example:

- people with severe burns with two or more high risk factors have a significant mortality risk(25)
- cardiac arrest patients who have unwitnessed or recurrent arrests and those who do not respond to prompt electrical interventions such as defibrillation or cardiac pacing, require

significant resources but rarely survive to discharge(26)

- patients with a SOFA score of > 11 have a mortality rate in excess of 90% even with full critical care during a normal period. During a pandemic, mass critical care will focus on key intervention, which will likely result in equivalent or higher mortality rates then seen in studies validating the SOFA score.

2) People who will need a level of resource that simply cannot be met during a pandemic

Some people *may* benefit from ICU care during a normal period, but only with intense use of resources and often prolonged care. During a pandemic, when the goal is to the most for the most, intense consumption of resources will be limited. For example, requiring large volume blood transfusions has, at this time, been listed as an exclusion criteria because many conditions requiring large transfusions are associated with high mortality rates and the availability of blood products may be limited if we cannot identify "clean" or uninfected potential donors.

3) People with underlying significant and advanced medical illnesses whose underlying illness has a poor prognosis with high short-term mortality even without their current concomitant critical illness.

Patients with advanced cancer or immunosuppression have very high resource requirements and are likely to suffer significant complications from influenza. Others in this cluster of exclusion criteria include patients who have end stage organ failure involving their heart, liver or lungs, based on cut offs adopted from the transplant literature(27;28)[ii] (i.e., mortality of >50% within the next one to two years as the baseline natural history of their organ failure). The risk from their illness combined with the fact that transplantation is unlikely during a pandemic means that these patients would require considerable resources and still have an overall low probability of survival.

Minimum Qualifications for Survival

The final aspect of the triage protocol deals with the "minimum qualifications for survival" [MQS]: a term borrowed from military triage protocols which represent a ceiling on the amount of resources that can be expended on any one individual. This is a concept foreign to western medical systems but required in war zones and refugee camps. For example, in a drought situation, in a refugee camp, physicians often find many dehydrated patients and a limited supply of saline solution to treat patients. A severely dehydrated patient on the verge of cardiovascular collapse, needing possibly 10 or more liters of fluid to reverse the hypovolemic shock, which often in the end is not possible to do. Continuing to treat such a patient means that 5 or 10 other patients with early hypovolemia who could have been saved with 1 to 2 liters of fluid will also succumb to dehydration because the IV fluids were all used in a failed attempt to save a single individual. The alternative is to place a ceiling on the amount of resources that will be allocated to any one individual to ensure the maximum potential benefit of the available resources can be realized and a larger number of people overall can be saved.

The draft triage protocol includes MQS that require patients to be reassessed at 48 and 120 hours as well as an ongoing ceiling if a patient ever develops a SOFA score of ≥ 11 or any other exclusion criteria. The MQS attempts to identify early patients who are not improving and are likely to have a poor outcome. In routine practice, this poor outcome often isn't identified until several days or weeks of intensive care have been invested in the patient: a situation that will not be possible during a pandemic, when resources are scarce.

Prioritization of Patients

The final component of the triage protocol is the prioritization of patients for potential admission to the ICU and ventilation. For ease of use, the common blue-red-yellow-green colour scheme was used.

- **Blue** patients are those who fall in to the expectant category and should not receive critical care. Depending on their condition and medical issues the patient may either continue to have curative medical care on a ward or palliative care.
- **Red** patients are highest priority for ICU admission and a ventilator if required. The aim is to find the balance between those who are sick enough to require the resource and will do poorly if they don't receive it, but are not so sick that they are unlikely to recover even if they do receive intensive care. Patients with a single organ failure, particularly those with respiratory failure due to influenza and who otherwise have a very low SOFA score are included in the red category -- if they have no exclusion criteria. The goal is to optimize the effectiveness of the triage protocol so that every patient who receives critical care will survive.
- **Yellow** patients are very sick and may or may not benefit from critical care. They should receive care if the resources are available but not at the expense of denying care to someone in the red category who is more likely to recover. At the re-assessment points, patients who are improving are given high priority (red) for continued care, while those who are not showing signs of improvement or worsening are prioritized as yellow.
- **Green** patients should be considered for transfer out of the ICU.

17.6 Operationalizing Critical Care Triage

Effective triage depends on an established, skilled and practiced infrastructure. The infrastructure required for critical care triage during a pandemic will be integrated with and built on the foundation for surge capacity. The infrastructure should include the following:

Triage Officers

Triage is challenging both clinically and psychologically, so those responsible for assessing patients and making triage decisions must have proper training before a pandemic as well as ongoing support throughout the pandemic. Prior experience shows that the best triage decisions are made by senior physicians with training in triage and significant clinical experience. In most circumstances a triage officer will assess patients in person; however mechanisms should also be developed to give less senior or experienced physicians access to more senior/ experienced triage officers who can provide advice (e.g., building on existing infrastructure such as 'NorthNetwork' and 'Telestroke').

Central Triage Committee

While the triage protocol has been designed for ease of use, it will have to be modified as the pandemic evolves. These modifications will be based on an analysis of a large amount of data, and should not be decided by individual triage officers. To maintain public trust in the system as well as equity, solidarity and reasonable (see Framework for Ethical Decision Making, Chapter 2), there should be a central committee familiar with the triage protocol to oversee triage during the pandemic and have command and control over the critical care resources in the field.

Intelligence

Good triage is based on good information (e.g., the demands on the system, resource availability, natural history of influenza, patient outcomes in critical care). The Central Triage Committee must have real time access to system and epidemiological data.

Communications Network

To implement the triage protocols, there must be an efficient communications network that allows two-way communications between the field and the command centre (e.g., the flow of data up to the central triage committee as well as new directives and advice down to the field).

Protocol Activation

Knowing when to activate a system is a challenge in any emergency. This task becomes even more challenging with an event like a pandemic, which is dynamic (evolving over time) rather then static (a single point in time). The same is true of knowing when to implement surge capacity strategies, mass critical care or any of the other pandemic response programs. If the triage protocol is implemented too late, many resources will utilized by a few patients early in the pandemic and the ICUs may quickly become gridlocked. However, given the implications of being declined ICU admission, implementing the protocol too early also has significant consequences for individual patients. The quality of the decision will depend on the availability of accurate information.

When to activate the triage protocol is only half the question; the other half is how to implement the protocol. One approach would be to implement the protocol gradually by:

- expanding the breadth of the exclusion criteria in a graded manner
- applying the protocol to new patients being considered for admission as opposed to those already admitted to the ICU when the pandemic begins.

If there is a rapid influx of patients who need critical care, the protocol may have to be applied retroactively to patients already admitted to the ICU. This requires further discussion.

17.7 Stockpiling of Antibiotics

Most influenza-related deaths are caused by the development of complications and secondary infections, such as pneumonia. Many of these deaths can be avoided through prompt antibiotic treatment. The Provincial Infectious Diseases Advisory Committee (PIDAC) has identified antibiotics that hospitals should consider stockpiling as part of pandemic planning (see Table 17.5). The MOHLTC is also developing a provincial stockpile of antibiotics.

17.7 Next Steps

In developing the protocol, every effort was made to ensure that it reflects the OHPIP Ethical Framework for Decision

Making. Access to critical care will be a contentious issue during a pandemic, and the triage protocol requires more consultation. The MOHLTC plans to:

- consult broadly with the health community
- educate the public about the need for triage during a pandemic
- develop the triage infrastructure.

Table 17.5: Antibiotics for Treatment of Infections Secondary to Influenza

Antibiotic	Unit	Route
Amoxicillin/ Clavulinic acid (200)	70ml Bottles	Oral-liquid
Amoxicillin/ Clavulinic acid (125)	875/125 Tablets	Oral
Azithromycin	15ml bottles	Oral-liquid
Azithromycin	500mg	IV
Azithromycin	250mg	Tablet
Levofloxacin	250mg	Tablet
Levofloxacin	500mg	Tablet
Levofloxacin	250mg/ 50ml IV bags	IV
Levofloxacin	500mg/ 100ml IV bags	IV
Vanocomycin	1g Vials	IV
Cefuroxime	1.5g Vial	IV
Cefriaxone	2g Vials	IV
Cefriaxone	1g Vials	IV

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