Disaster Triage and Allocation of Scarce Resources

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Objectives

- Describe the types and characteristics of surges.
- Summarize key events in the history of triage.
- Identify what critical care resources may have to be allocated or triaged during a disaster.
- Explain the differences between resource allocation, rationing, and triage.
- Describe the types of triage.
- Discuss the impact of triage.
- Identify important considerations in developing and implementing a triage protocol.
- Discuss the ethical issues related to triage and allocation of scarce resources.

Case Study

A pandemic of H5N1 influenza began in Southeast Asia and has now spread around the world. The first case was detected in your city approximately 3 weeks ago, and now hundreds of cases are presenting to hospitals every day. You have implemented your pandemic plan, including maximizing your surge capacity. This morning the last available ventilator was allocated to a patient in acute respiratory failure. As per the pandemic plan you are the triage officer this week. You have just received a page from the emergency department (ED) saying they have 4 new patients who require the intensive care unit (ICU): Patient 1, a 19-year-old with cystic fibrosis who is listed for a lung transplant but is in respiratory failure, possibly related to H5N1; Patient 2, a 60-year-old with H5N1 influenza; Patient 3, a 42-year-old with a subarachnoid hemorrhage; and Patient 4, a 54-year-old police officer who was shot in the chest while guarding a pharmacy that held a stockpile of oseltamivir. The 4 are currently being manually ventilated, and the ED doctor, who has heard there are no more ventilators, wants to know whether she should intubate any of them. She also wants to know if any more ventilators are coming, who will get them if they become available, and what should she do with patients who cannot get a ventilator.

- How should decisions be made regarding the allocation of scarce resources such as ventilators?

- What ethical issues must be considered, and how should such ethical problems be framed?

- Who should make triage decisions during a disaster?

- Are the triage decisions made in the field, in the ED, and in the ICU the same or different? In what ways?

I. INTRODUCTION

When disaster strikes, effective management of resources can significantly influence the overall outcome of the response. If the number of victims and the complexity of their injuries are low and resources are abundant, resource allocation will have little impact on the disaster outcome. However, if there is a high number of victims with complex injuries and available resources are limited, how those resources are used will determine the outcome for some individuals. Historically, decisions regarding disaster resource allocation and triage have largely been in the domain of emergency medicine; however, Roccaforte and Cushman observe, “The pinnacle of the medical response to any disaster takes place in definitive care areas [DCA] (operating rooms, intensive care units). Thus, a critical component of disaster planning must be the preservation of DCA capability and effectiveness” (1). Given this, it is essential that critical care physicians understand and are skilled in resource management during surges in demand for critical care.

II. NATURE OF SURGES

A *critical care surge* refers to any increase in the number of critically ill or injured patients beyond the baseline rate a hospital or critical care unit usually experiences. Minor surges are a normal part of a hospital’s day-to-day pattern of activity. For example, it is not unusual to see the number of visits to the ED increase during long summer weekends. Such surges are typically small, in the range of 15% to 20% above usual capacity, and they are often predictable. Moderate surges, such as those due to seasonal influenza or summer heat waves, are known to occur regularly, but their exact timing is less predictable. Large surges, which are typically caused by disasters, tend to occur infrequently and with little or no advance warning. Such events may demand up to double the resources required for day-to-day activities. Finally, it may be helpful to distinguish between large surges and megasurges, such as those seen during influenza pandemics and following large-scale natural disasters (eg, tsunamis) and terrorist attacks. Megasurges may demand more than 200% of usual resources, which would overwhelm most healthcare systems. This chapter will primarily address large surges and megasurges.

The number of patients in a surge is only 1 factor that influences the impact of a surge. The types of illnesses and injuries patients present with as well as the timing of patients' arrivals are also key factors. *Surge capacity* refers to the ability to respond to an increased number of patients, whereas *surge capability* is defined as the ability to address unusual or specialized medical needs of an increased number of patients (2). Thus, while a relatively small surge of patients with typical illnesses or injuries will not overwhelm a system, the same number of patients all requiring specialized services (eg, burn management) may overwhelm that same system. Further, as Aylwin illustrates well in his analysis of the response to the July 2005 bombings in London (3), although the absolute number of patients matters, even more important is the time over which those patients present to the hospital. A hospital is less likely to be overwhelmed if a moderate number of patients present at an even rate over 8 or 12 hours than if the same number of patients present over 2 to 3 hours.

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Surge capacity is the ability to respond to an increased number of patients. Surge capability is the ability to address the unusual or specialized medical needs of an increased number of patients.

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It is important to take all factors into consideration when planning how resources will be allocated during a surge. Those factors include the potential size of the surge, specialized resources that are likely to be required, and the anticipated rate of patient flow. If specific resources are likely to be depleted, it is crucial to begin implementing allocation processes early in the disaster to optimize resource availability.

III. RESOURCE MANAGEMENT

A. Resource Allocation

Resource management strategies should reflect the relationship between the demand for resources and their supply. *Allocation* is a general term that refers to the assigning of resources for specific purposes. Allocation strategies vary greatly depending on whether resources are plentiful or scarce. During minor and moderate surges, when resources are typically adequate, strategies such as discharging patients early, cancelling elective operations and outpatient clinics help redirect resources to the surge event, thus mitigating resource shortfalls.

B. Resource Rationing

The term *rationing* refers to the resource allocation strategies employed when supply will not meet demand (4). During sudden or large surges, emergency mass casualty critical care (5, 6) is a form of rationing that can improve resource utilization. In medicine, triage has evolved as a tool to address significant resource shortfalls (4, 7, 8).

IV. Principles of Triage

Triage has 2 components: 1) sorting patients and prioritizing their care based on the severity of their illnesses and 2) rationing resources to optimize their availability and direct them to the patients who are most likely to benefit from them (1). The primary goal of triage, as originally used in mass casualty incidents, was to do the greatest good for the greatest number. However, as illustrated in **Figure 13-1**, triage has evolved over time.

Today, triage is used to identify priorities for patient care in emergency departments and most surge situations in which resources are rarely limited (1, 8). Triage is seldom used to ration care. Iserson and Moskop describe 5 commonly encountered types of triage: ED triage, inpatient triage, incident triage, military triage, and disaster triage, as summarized in **Table 13-1** (4). In this chapter, we will focus on disaster triage, which is used in mass casualty incidents.

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> *Triage consists of 2 primary components:*
> *1) Sorting and prioritizing patients*
> *2) Managing scarce resources to optimize their use*
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During a mass casualty incident, triage may occur at multiple points as patients progress from prehospital management to definitive care in operating rooms or ICUs. At the various points triage is usually classified as primary, secondary, or tertiary (see **Figure 13-2**). Environment and safety, resource constraints, treatment options, and specificity of decisions vary considerably at each level.

A. Primary Triage

Primary triage occurs in the field. It is often performed by paramedics and based on very simple criteria that can be rapidly assessed. If, for example, a patient requires intubation due to acute respiratory distress, in all likelihood providers will perform that procedure if the scene is safe, they have the time, there is no risk to the providers (ie, highly transmissible infection), and they have accurate tools to determine if the patient will survive higher levels of care in the ED or ICU. Intubation and other procedures may also require related treatment, such as manual ventilation during transport.

B. Secondary Triage

Secondary triage is typically performed by emergency physicians or surgeons immediately upon a patient's arrival at the hospital. They prioritize patients by assigning them to treatment areas for initial interventions. Efficient flow of critically injured or ill patients through this part of the system to definitive care is critical. Here treatment decisions may be more accurate than in the field, but they will remain limited until further information about the event or predicted outcomes can be ascertained. The goal is to provide critical initial ABC (airway, breathing, circulation) interventions rather than full resuscitation. After initial interventions, tertiary triage will assign patients to definitive care in surgery or intensive care, and only judiciously to radiology (3), for ongoing management.

Figure 13-1. Milestones in the History of Medical Triage [a]

1792	Baron Dominique Jean Larrey, surgeon-in-chief to Napoleon's Imperial Guard, articulates the first triage rule: "Those who are dangerously wounded should receive the first attention, without regard to rank or distinction. They who are injured in a less degree may wait until their brethren in arms, who are badly mutilated, have been operated on and dressed, otherwise the latter would not survive many hours; rarely, until the succeeding day."
1846	John Wilson, a British naval surgeon, notes that lifesaving surgery could only be performed on those most in need and likely to survive if treatment is withheld from those who are unlikely to survive their injuries and deferred for those with minor injuries.
1862-1864	Jonathan Letterman, medical director of the Army of the Potomac, introduces triage along with frontline medical care during the US Civil War, which was reported to significantly decrease mortality among Union troops.
1914-1918	WWII sees larger numbers of casualties than any previous conflict due to the introduction of modern weapons of war. The philosophy of triage evolves further to doing the "greatest good for the greatest number," a measure beyond simply withholding treatment from those unlikely to survive even with treatment.
1900s	Through WWII and the wars in Korea, Vietnam, and Iraq, military triage shifted primarily to prioritization for air-medical evacuation to forward medical stations.
Mid-1900s	Civilian EDs begin to use triage to prioritize patients for assessment and treatment.
1983	Frykberg introduces the concept of "critical mortality" following US Marine barracks in Beirut. That same year the START triage system is developed and widely adopted for use in primary triage for civilian disasters.
2000s	Triage is widely used in various fields of medicine within the western world to prioritize access to limited resources ranging from ED treatment to MRIs, cardiac surgery, and cancer treatments. However, rationing is rarely a feature of the decisions being made.
2006	Threat of terrorist attacks, SARS, and threat of an influenza pandemic begin to shift the focus from primary and secondary triage to tertiary triage decisions involving critical care with publication of the first proposed critical care triage protocols (14, 27).

Abbreviations: ED, emergency department; START, Simple Triage and Rapid Treatment; MRI, magnetic resonance imaging; SARS, severe acute respiratory syndrome.

[a] Data from Iserson KV, Moskop JC. Triage in medicine, part I: concept, history, and types. *Ann Emerg Med*. 2007; 49(3):275-281. Kennedy K, Aghababian RV, Gans L, et al. Triage: techniques and applications in decision making. *Ann Emerg Med*. 1996;28(2):136-144. Robertson-Steel I. Evolution of triage systems. *Emerg Med J*. 2006;23(2):154-155.

Table 13-1. Common Types of Triage [a]

ED triage: Used daily to prioritize patient assessment and treatment in the emergency department during routine functioning. Priority is given to those most in need. Resources are not rationed.

Inpatient triage: Applied day-to-day in a variety of medical settings, such as the ICU, medical imaging, surgery, and outpatient areas, to allocate scarce resources. Priority is given to those most in need based upon medical criteria. Resources are rarely rationed.

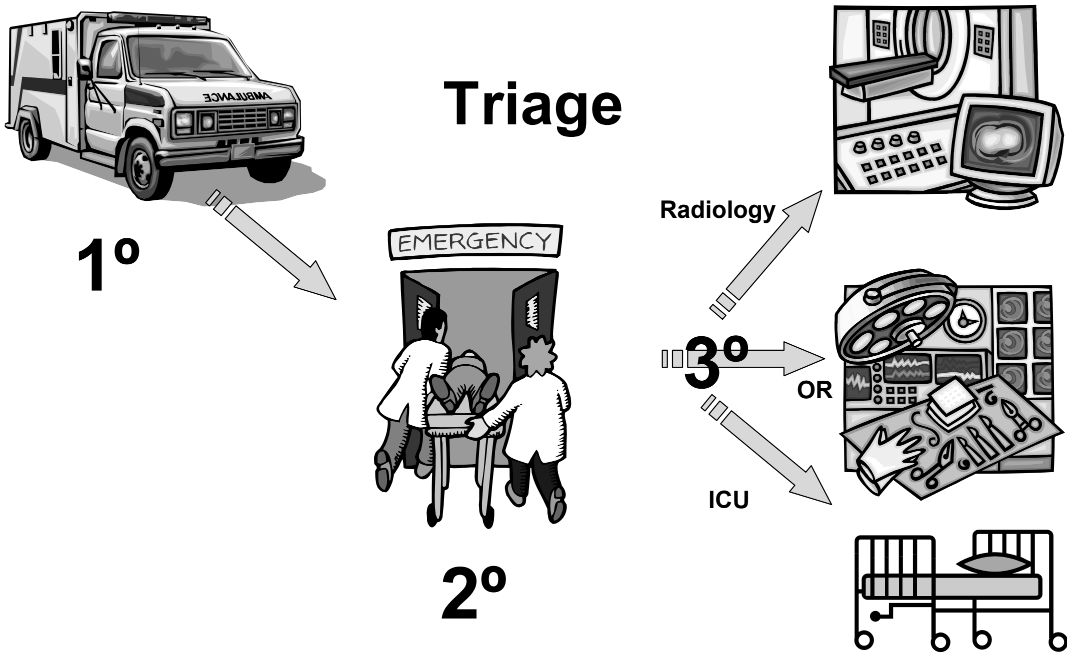
Incident triage: Used in multiple casualty incidents such as bus accidents, fires, or airline accidents to prioritize the evacuation and treatment of patients. These events place significant stress on local resources but do not overwhelm them. Resources are rarely rationed, and most patients receive maximal treatment.

Military triage: Used on the battlefield, modern military triage protocols most reflect the original concept of triage and include many of the same principles. Resources are rationed when their supply is threatened.

Disaster triage: Used in mass casualty incidents that overwhelm local and regional healthcare systems. Disaster triage protocols both prioritize salvageable patients for treatment and ration resources to ensure the greatest good for the greatest number.

[a] Data from Iserson KV, Moskop JC. Triage in medicine, part I: concept, history, and types. *Ann Emerg Med*. 2007;49(3):275-281.

Figure 13-2. Classifications of Triage



Abbreviations: 1°, primary triage; 2°, secondary triage; 3°, tertiary triage; OR, operating room; ICU, intensive care unit.

C. Tertiary Triage

Tertiary triage should be conducted by surgeons or intensivists in keeping with the best practices for triage officers discussed later in this chapter. At each stage of the triage process accuracy can be increased by measuring physiologic parameters and introducing structured physical examination (8). This third stage of triage is of primary relevance to critical care physicians because the situation and the patients' characteristics call for definitive critical care management. In disasters where most injuries are not life threatening or where few critically injured patients survive long enough to present to the hospital there will be less need to conduct tertiary triage.

Using triage to ration resources should be done only when the system is overwhelmed and the resources are or will be insufficient to meet the demand. Critical care resources that may be depleted in a disaster include ventilators, medications, monitors, and trained personnel. Although the specific resources required vary with the nature of the disaster, some resources, such as ventilators, are key to the provision of critical care and lack a reasonable substitute. Further, it is important to remember that only a single pool of critical care resources exists to serve the needs of those directly affected by the disaster and all other patients with critical illnesses or injuries unrelated to the major incident.

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> *Effective triage not only requires a balance between the demands on the system and the supply of resources but also must balance overtriage and undertriage.*
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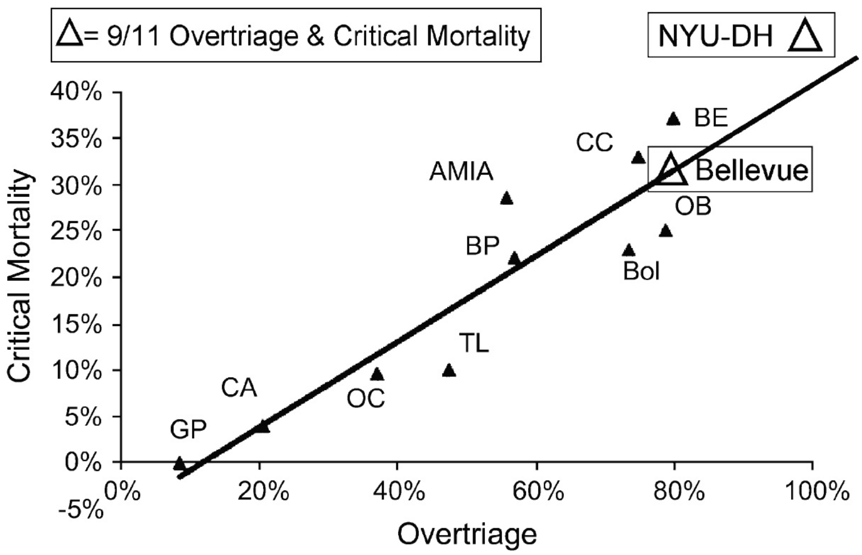
D. Overtriage and Undertriage

Effective triage requires balance not only between the demands on the system and the supply of resources but also between overtriage and undertriage. Overtriage and undertriage are related to the accuracy with which patients are triaged. Undertriage occurs when the severity of a patient's illness or injury is not appropriately recognized, which results in delayed treatment that places the patient at risk of dying. Particularly in day-to-day situations, undertriage is minimized through the use of protocols that tend to overtriage patients to higher levels of care than they require (1, 7).

Such protocols are not foolproof, however, because overtriage has been shown to decrease overall survival rates among critically ill or injured victims (1, 9, 10) (see **Figure 13-3**). Overtriage may increase mortality by depleting resources, fatiguing staff, and impairing efficient flow of critically ill or injured patients through the system to definitive care. The accuracy of triage depends on both the reliability of the protocol in predicting patient outcomes and how the protocol is applied by the triage officers. Triage is a dynamic process that makes it more likely to correct inevitable instances of undertriage and overtriage.

Figure 13-3. Relation Between Overtriage and Critical Mortality [a]



Building on the work of Frykberg, Roccaforte and Cushman compare the relation between overtriage and critical mortality in bombings across the world. Overtriage rate associated with the September 11, 2001, World Trade Center attacks increased the critical mortality, maintaining the trend reported by Frykberg.
Abbreviations: AMIA, Buenos Aires; BE, Beirut; Bol, Bologna; BP, Birmingham pubs; CA, Craigavon; CC, Cu Chi; GP, Guildford pubs; OB, Old Bailey; OC, Oklahoma City; NYU-DH, New York University Downtown Hospital; TL, Tower of London.
[a] Reproduced with permission from Frykberg ER. Medical management of disasters and mass casualties from terrorist bombings: how can we cope? *J Trauma.* 2002;53(2):201-212.

E. Triage Protocols

In general, triage protocols classify patients into 1 of 3 categories signified by standardized color codes: 1) those who will survive whether they receive care or not (green and yellow), 2) those who will benefit significantly from interventions (red), and 3) those who are likely to die despite maximal medical effort (blue or black) (8, 11). Triage protocols used in a disaster have 2 aspects that, using an Internet analogy, may be referred to as the front end and the back end. The front end is the user-friendly aspect of the protocol that the triage officer displays in dealing with casualties. The back end of the protocol is the algorithm used to determine the category in which a patient is placed and the cut-off point for treatment based on resource availability.

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> *In triage the 3 commonly used categories are: 1) patients who are likely to survive whether they receive care or not (green [minimal] and yellow [delayed]), 2) patients who will benefit significantly from interventions (red [immediate]), and 3) patients who are likely to die despite maximal medical effort (blue or black).*
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Many standardized protocols have been developed for use in specific triage situations. The notable exception is triage protocols that apply to mass casualty critical care or disasters (11). Until recently, the few existing disaster triage protocols, like the START (Simple Triage and Rapid Treatment) protocol, were designed almost exclusively for primary triage (4, 11, 12). Protocols for primary and secondary triage vary more based on the type of disaster than do protocols for tertiary triage. For example, specific primary and secondary triage protocols have been developed for chemical, radiation, and crush injuries resulting from earthquakes (4, 11, 13). Primary and secondary triage protocols lend themselves to specialization because they are used at the scene of a major incident or at hospitals when casualties first arrive. In contrast, tertiary triage must apply to all patients who need critical care; it is not limited to casualties of the disaster (7, 14). Although tertiary triage protocols may not be specialized by type of disaster, they must be significantly more complex to predict outcomes among a more diverse pool of patients.

1. The Ontario Protocol

The first protocol for triage of critical care resources, known as the Ontario protocol, was published in 2006 (14). Although initially developed for use in an influenza pandemic, this protocol can potentially be used for any event in which critical care resources may be overwhelmed. Among those who have adopted or are in the process of modifying the Ontario protocol for local use are New York State; British Columbia; the European Society of Intensive Care Medicine; and a task force for mass critical care that includes representatives from the American College of Chest Physicians, the Society of Critical Care Medicine, the American Association of Critical-Care Nurses, the American Association of Respiratory Care, and the American Society of Health-System Pharmacists.

The Ontario protocol consists of 3 elements: inclusion criteria, exclusion criteria, and minimum qualifications for survival (MQS), which place a ceiling on resource expenditures for each patient (14). The exclusion criteria and MQS both utilize the Sequential Organ Failure Assessment (SOFA) score to identify patients likely to benefit from treatment as well as those who are too sick to recover despite care. The benefit of using SOFA scores (**Table 13-2**), and of the Ontario protocol in general, is that neither is disease-specific. In addition, a prioritization tool aids users in applying the protocol (**Table 13-3**). Although it is a solid early attempt at a tertiary triage protocol, the Ontario protocol is complex, requires laboratory investigations, and has not been thoroughly evaluated.

Table 13-2. Sequential Organ Failure Assessment (SOFA) Scores[a]

Variable	0	1	2	3	4
PaO_2/FiO_2 mm Hg	>400	=400	=300	=200	=100
Platelets x 10^3/µL (x 10^6/L)	>150 (>150)	=150 (=150)	=100 (=100)	=50 (=50)	=20 (=20)
Bilirubin mg/dL (µmol/L)	<1.2 (<20)	1.2-1.9 (20-32)	2.0-5.9 (33-100)	6.0-11.9 (101-203)	>12 (>203)
Hypotension	None	MABP <70 mm Hg	Dop = 5	Dop >5, Epi = 0.1, Norepi = 0.1	Dop >15, Epi >0.1, Norepi >0.1
Glasgow Coma Score	15	13-14	10-12	6-9	<6
Creatinine mg/dL (µmol/L)	<1.2 (<106)	1.2-1.9 (106-168)	2.0-3.4 (169-300)	3.5-4.9 (301-433)	>5 (>434)

Abbreviations: MABP, mean arterial blood pressure; Dop, dopamine; Epi, epinephrine; Norepi, Norepinephrine.
[a] Adapted with permission from Ferreira FL, Bota DP, Bross A, Melot C, Vincent JL. Serial evaluation of the SOFA score to predict outcome in critically ill patients. *JAMA*. 2001;286(14):1754-1758. Copyright © 2001 American Medical Association.

Table 13-3. Prioritization Tool for Use with the Ontario Protocol[a]

Color Code	Initial Assessment	48-Hour Assessment	120-Hour Assessment	Priority/Action
Blue	Exclusion criteria[b] or SOFA >11[b]	Exclusion criteria[b] or SOFA >11[b] or SOFA 8-11, no change	Exclusion criteria[b] or SOFA >11[b] or SOFA <8, no change	Medical management +/-palliate and discharge from critical care
Red	SOFA ≤7 or Single organ failure	SOFA score <11 and decreasing	SOFA score <11 and decreasing progressively	Highest
Yellow	SOFA 8-11	SOFA <8, no change	SOFA <8 with <3-point decrease in past 72 h	Intermediate
Green	No significant organ failure	No longer ventilator dependent	No longer ventilator dependent	Defer or discharge, reassess as needed

[a] Adapted with permission from Christian MD, Hawryluck L, Wax RS, et al. Development of a triage protocol for critical care during an influenza pandemic. *CMAJ*. 2006;175(11):1377-1381.
[b] If exclusion criteria or SOFA >11 occur at any time, change triage code to blue and palliate.

2. Other Protocols

Other protocols, such as the Pandemic Medical Early Warning Score (PMEWS) (15) and that developed by Talmor et al (16), have been proposed for use specifically in a pandemic, but each has significant limitations. For example, PMEWS was principally designed for secondary rather then tertiary triage and is intended to identify patients who are at high risk of complications rather than those who are most likely to benefit from the limited resources available. Intended for secondary triage in the ED, Talmor's protocol also aims to identify patients at risk of complications. Neither protocol provides insight into which patients are unlikely to survive with treatment. Thus, both scoring systems would result in high rates of overtriage and extensive use of resources on patients who will not survive. Finally, because both protocols apply only to patients with influenza seeking access to critical care, they are of limited utility in general critical care triage. These scoring systems may be useful, however, as a disease-specific component within a general triage algorithm.

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> *At present no ideal tertiary triage algorithm exists for use in critical care.*
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At present no ideal tertiary triage algorithm exists for use in critical care. The ideal tertiary care triage protocol must be easy to use, not require laboratory tests, have good inter-rater reliability, determine priorities accurately, and apply to patients with a wide variety of critical illnesses and injuries. Although the end product (front end) must be simple, the development process itself is complex and time-consuming. Moreover, the triage protocol itself is only 1 aspect of conducting triage. Systems and processes must be in place to allow effective triage.

V. SYSTEMS AND PROCESSES OF TRIAGE

In a mass casualty incident, triage is performed on the local level, but to ensure effectiveness, each triage station must act as an interdependent element of a much larger, coordinated effort. Planning and preparation should be undertaken well before disaster strikes. The process starts with coordination between individual hospitals and continues up to the state level, where all is integrated into a comprehensive command and control system (ie, incident management system). Planning at the highest level includes the development of an overall triage protocol to be followed during a mass casualty incident.

If a disaster occurs, the triage protocol must be quickly activated. This requires information about both the demand for and the supply of resources at the local, regional, and state levels so that scarcities can be identified. Because individual hospitals do not normally have access to such information, they cannot initiate triage unilaterally. To ensure uniformity, the job of analyzing available resources and determining their adequacy is performed by a central triage committee that is integrated into the state incident management system. Gathering the essential information and then activating the protocol requires timely and efficient communication between local and regional healthcare officials and the central triage committee. The central triage committee is also responsible for monitoring triage outcomes to identify possible undertriage or overtriage and for adjusting treatment cut-off thresholds in response to changes in supply and demand (14). Triage with rationing of critical care resources should take place only when resources are overwhelmed at the state level or higher.

A system of triage officers distinct from those providing clinical care is necessary for effective triage (4, 14, 17, 18). Clinicians working directly with patients often find it difficult to categorize casualties as unlikely to benefit from medical care or to shift their perspective from the good of the individual patient to the good of the community at large (7). Triage officers should have prior training, but above all they need to be seasoned clinicians (4, 7, 18, 19). Specifically, senior surgeons should conduct tertiary triage of patients to operating rooms in mass trauma situations, and intensivists should triage patients for critical care in other types of disasters. Two or more triage officers will be required to cover a 24-hour period at a given hospital. Triage officers may be assisted by allied healthcare workers, but final decisions should be made by the triage officers themselves. Psychological support services should be available both during and after the event because triage officers and their team members are likely to carry heavy emotional burdens stemming from the necessary decision making.

In addition the triage protocol for mass casualty incidents must create processes for documenting triage decisions and a legal framework to support triage officers. All systems and processes (ie, information technology systems and communication processes used to support the triage process) should be based upon those used daily. A disaster is not the time to implement a new system (7). Further, given that tertiary triage protocols are rarely used, regular exercises are necessary to work out systems problems and provide staff with experience (1). Finally, because tertiary triage decisions are likely to result in the exclusion of some patients from critical care, the provision of palliative care and other alternatives for these patients must be fully integrated into the disaster response system.

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> *Because the exclusion of some patients from critical care is implicit in tertiary triage decisions, the provision of palliative care and other alternatives must be fully integrated into the disaster response system.*
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VI. ETHICAL CONSIDERATIONS IN TRIAGE AND RESOURCE ALLOCATION

If faced with resource limitations, physicians will be forced to decide how best to distribute potentially life-saving care (1, 4, 18). Such decisions are complex and should be guided by an ethical framework. An in-depth discussion of the ethical issues related to triage is beyond the scope of this chapter, but several detailed papers on that topic are included in the Suggested Readings section at the end of the chapter. For now, a few key ethical principles must suffice.

The use of a sound ethical framework not only aids in developing an appropriate triage protocol but also promotes effective application of the protocol. It is important for triage officers, healthcare workers, and the public to understand the ethical basis of triage decisions. Triage officers who do not understand the ethical basis of their decisions are likely to suffer a significant emotional toll and may be indecisive (18). If healthcare workers managing patients or the public do not understand the ethical reasoning behind triage decisions, they are unlikely to accept the decisions that are made.

There are a few common ways to distribute scarce resources: 1) first come, first served; 2) focusing resources where they will be the most effective in order to do the most good for the greatest number of people; and 3) directing the resources to those in greatest need.

Allocating scarce resources is an exercise in distributive justice. In medical triage, particularly if the goal is to do the most good for the most people or to direct resources to those in greatest need, one can look at either the medical or the social factors involved. Medical factors relate to how sick a person is. An individual's medical condition and outcome are the primary factors considered. Social factors pertain to such issues as a person's role in society (ie, community leader, healthcare worker, criminal), a person's potential to contribute to society, and prior social injustices an individual may have faced. Although social issues seem important in lifeboat-style theoretical exercises, they are incredibly difficult if not impossible to judge at a bedside during an actual disaster. Because evaluation based on social factors is very subjective, medical triage typically focuses on the more objective medical factors.

A. Principle of Equal Chances: First Come, First Served

The basic premise of the first-come, first-served approach is that all casualties deserve to be treated equally (18). The easiest way to give everyone an equal chance is to use a random allocation process, such as a lottery. Of course, a lottery would not be a useful tool in a disaster or pandemic because it is impossible to know in advance who is going to be injured or fall ill and require a medical resource. Thus, in a disaster or pandemic, first come, first served is the next best option, serving as somewhat of a cosmic random number generator. The primary strengths of this approach are that it is easy to apply and that at first glance it seems fair. However, closer examination reveals several fatal flaws. It has been well documented that the first patients to present to hospitals in a disaster are the walking wounded and minimally injured who can extricate and transport themselves. Many of those patients are suffering primarily from emotional stress (18-21). Giving priority to this group would rapidly consume resources before the truly injured ever arrived. Moreover, although vulnerable populations are more likely to be affected by a mass casualty incident, the people who are healthiest and wealthiest are often the best able to save themselves and seek help first. The calamities that accompanied Hurricane Katrina in 2005 are prime examples of this.

B. Utilitarianism: The Greatest Good for the Greatest Number

The utilitarian approach to triage focuses on the end result and aims to create the greatest good possible. Put another way, at the end of a disaster the available resources should have been used to help the most people to survive. This most commonly used guiding philosophy of medical triage dates back to the early 1900s. Its primary strength is that it holds out the hope that the greatest efficiency will be obtained from the resources available. This concept appeals strongly to medical personnel, especially in an era of outcome-driven, evidence-based medicine. However, the most significant shortcoming of this philosophy is that it necessitates an ability to predict the future. To achieve the goal of efficiency, healthcare workers must have some capacity to judge who is going to benefit from a resource, if applied.

C. Egalitarianism: Those Most in Need Should Receive

Under an egalitarian approach and the maximin principle (22) the available critical care resources would be directed to the sickest patients. This approach, which is similar to how healthcare is practiced on a daily basis, is morally comforting for many healthcare workers because it seems to minimize internal conflict by eliminating the need to make difficult decisions. It also fulfills the need to “do something” that many people feel when faced with someone who is suffering, especially in an emergency. However, the primary limitation of egalitarianism is that it will lead to a vast amount of resources being expended on many patients who will not survive. Further, the initial gratification of “doing something” for someone who is suffering may be short lived. As many seasoned ICU professionals report, the provision of care to a patient when the situation is futile produces significant moral distress (23-25). Unless a mechanism is included to limit critical care interventions, this approach could well lead to more harm than good. Moskop and Iserson report that the World Medical Association states that it is unethical for physicians to waste resources by persisting to provide care in futile situations (18).

Overall, triage seeks to preserve and protect endangered lives (18). Because an overwhelmed system may deteriorate into a chaos in which no one will be helped, triage aims to provide a methodical approach to using the resources that are available to help the most people possible (1, 4, 18, 26). **Table 13-4** lists a number of principles that authors have advocated to guide the triage process. No 1 ethical principle taken in its purest form is adequate to steer triage decisions. Many current triage approaches actually combine aspects of all 3 ethical theories by focusing care on patients who are in the greatest need but likely to survive and preserving the option to use first come, first served in cases where patients’ needs and chances for recovery are equal. Further, many ethicists tend to look at the triage of critical care resources in isolation. Ultimately, the provision of critical care is only 1 small, albeit important, aspect of disaster response and must be viewed in the context of the overall government or societal response. Significant resources are also directed to disaster preparedness, mitigation, rescue, and recovery.

Table 13-4. Guiding Principles of Triage[a]

Substantive	Procedural
• Individual liberty	• Reasonable
• Protection of the public from harm	• Open and transparent
• Proportionality	• Inclusive
• Privacy	• Responsive
• Duty to provide care	• Accountable
• Reciprocity	
• Equity	
• Trust	
• Solidarity	
• Stewardship	

[a] Data from the Upshur REG, Faith K, Gibson JL, et al. University of Toronto Joint Centre for Bioethics - Pandemic Influenza Working Group. Stand on guard for thee: ethical considerations in preparedness planning for pandemic influenza. http://www.jointcentreforbioethics.ca/publications/documents/stand_on_guard.pdf.

Key Points

DISASTER TRIAGE AND ALLOCATION OF SCARCE RESOURCES

- The ability of a healthcare system to respond to a surge is determined by such factors as the resources available, the number of patients, the time period over which those patients arrive, and the need for specialized services.
- Resource allocation strategies must take into account both supply and demand. When demand exceeds supply, scarcities will ensue and triage will be required to prioritize and ration resources.
- Triage is a dynamic process requiring protocol adjustments to ensure that rationing (infringement on individual liberties) does not exceed the expected or experienced shortfall between demand and supply.
- Triage is commonly used throughout the healthcare system to set priorities for patient care. Only in rare disaster circumstances does it form the basis for rationing resources.
- Disaster triage occurs at various points along the continuum of care and is classified accordingly as primary, secondary, or tertiary. Tertiary triage involves decisions related to allocating critical care resources.
- Standard tertiary triage protocols are lacking. Effective tertiary triage requires significant planning and an infrastructure that can support the process during a disaster.
- A strong ethical framework is necessary to guide the development and implementation of a triage protocol.

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Suggested Readings

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