

# **TRIAGE**

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## **1. Introduction**

**The word triage is derived from the French verb “trier” and means to sort, select or sift (1-4). Its first use in the 14<sup>th</sup> centuries applied to sorting grain or wool and later on coffee beans according to quality and price (2,4).**

**Military surgeons first recognized the efficacy of this process of sorting casualties into priority groups for evacuation and treatment following war injuries (2,3,5-7). Although the principles were probably used by others (8-10), Percy and Larrey, surgeons of the Napoleonic armies, introduced an echeloned system of field treatment facilities, ambulances and hospitals including initial triage and treatment of the wounded on the battlefield before transport by horse-drawn ambulances to hospitals located in the rear (3,7,10,11). The importance of triage has been repeatedly proven in successive armed conflicts of the last two centuries: American Civil War (12), World War I (6,13-15), Spanish Civil War (16), World War II (10,17,18), Korean War (19,20), Vietnam War (21,22), Arab-Israeli War (23), Lebanon War (24-26), Falklands War (27,28), and Persian Gulf War (29). The principles of triage are still emphasized in current military practice (30-34). The Emergency War Surgery NATO Handbook defines triage as “the evaluation and classification of casualties for purposes of treatment and evacuation. It is based on the principle of accomplishing the greatest good for the greatest number of wounded and injured men in the special circumstances of warfare at a particular time” (31). As such it can be adapted for use in civilian disasters (6,35).**

**Actually the word “triage” is used in many areas of medical practice, very often in a single-victim setting (2,3,36-38). Its use is widespread from protocols at the dispatch level and in routine pre-hospital settings, sorting critically injured individuals to dedicated trauma centres, clinical assessment by the emergency department nurse to triage of casualties in a disaster situation (39-45).**

## **2. Triage in disaster situations**

**From a medical point of view a disaster is characterized by the disproportion between the medical response capacity and the actual medical resources available in order to manage the casualties. This disparity can be due to a quantitative and/or qualitative shortage of resources both in manpower and equipment but also to medico-organisational problems (46). A medical disaster occurs when the demand of medical**

resources exceeds their availability and this fact implies an implicit notion of setting medical and medico-organizational priorities. Not each individual victim can therefore immediately receive the necessary care, a certain selection of casualties is inevitable. The objective of medical disaster management is to provide as rapid as possible the greatest benefit for the largest number of casualties in order to achieve a critical reduction in mortality, morbidity and indirect effects within the affected population (46). Triage is a medical management tool to achieve these primary objectives (3,5,7,35,38,47-50) and to allow medical care in an overwhelming health system to be organized into a manageable task (3,5).

Appropriate triage will identify the minority of critically injured but salvageable casualties requiring immediate care in the shortest possible time (1, 3,35,37,50-54) and is as such a survival determinant for critically injured victims (3,7,17,29,54,55). It also will ensure the efficient use of available resources in manpower, supplies, equipment, transportation means and medical facilities (3,7,37,38,49,56,57) and thus will affect the extent and quality of care delivered in the emergency medical care system (2,58). Triage, therefore, as part of the general principles applicable to disaster management, requires preplanning (3,35,59-62). Moreover, other medico-organizational aspects of disaster management including medical needs assessment, direction, coordination and communications in the entire chain of medical care, coordination with non-medical rescue services may influence effective triage (3,35,60,63,64). The concept of triage must be familiar to all medical, paramedical and non-medical personnel that may be involved in disaster response (3, 59,65,66).

Review of data on disasters indicates problems with the triage process. In many cases no or little triage actually occurred or triage has not been carried out appropriately (5,7,35,60,61,63-75). Although there have been improvements in medical disaster planning and EMS systems since the 1970s and 1980s, there is reason to believe that at least some problems in carrying out successful triage will continue to be seen (3,38,49,76-80). Short of being involved frequently in disaster situations, few medical providers are experienced at performing triage in a mass casualty situation. Problems in organized triage also occur regularly in training and testing exercises (5,81-83).

Triage is often considered in narrow terms as only the categorization of casualties on the basis of injury severity or as the decision of the priorities for patient care (4,35,53). The problems faced in the medical management of disaster casualties can be divided in four different groups (84,85):

1. The type and the severity of the injuries according to the nature of the disaster: wounded, burned, blasted, intoxicated or contaminated victims, multiply injured trauma patients, and casualties with combined injuries. The most important patients to identify are those critical injured casualties who benefit immediately from the provision of resuscitative stabilization.
2. The number of victims: in disasters priority of evacuation to definitive treatment facilities should be given to casualties with a chance of survival. The difficulty to implement such a directive relies on the evaluation of the survival probability.
3. The spatiotemporal spreading of the casualties: the spatial spreading of victims depends on the extent of the disaster area: the greater the distances, the more difficult the rescue and transport of casualties in the field medical system. The spreading in time: a massive influx of casualties within a short period of time versus a steady flow of a limited number of victims.

4. The management of the casualties in an emergency medical system:
  - a. The rescue or withdrawal of the casualties from the aggressive environment in order to neutralize or limit the immediate consequences on health.
  - b. The setting-up of a triage system.
  - c. The stabilization measures allowing an immediate survival pending more specialized care. It is essential that these measures are started on the scene of the disaster and carried on during transport to the medical facilities.
  - d. The distribution and evacuation of casualties to definitive treatment facilities.
  - e. The admission to and definitive care in medical facilities.

It is well known that a short interval between the initial injury and the definitive treatment achieves saving of life, organs and limbs, shortening the period of convalescence and rehabilitation, and decreasing of functional disability (86). Therefore, one of the most important tasks of the emergency medical services (EMS) is the setting-up of a well-organized evacuation system for the casualties from the scene of the disaster to medical facilities. Fast and correct triaging the casualties at each level of the medical care system is the keystone of the efficacy of such a system. At the scene of the disaster triage is applied to determine mainly evacuation priorities. The triage process continues in the hospitals but is now based on treatment priorities (intensive care, surgery, ...).

*Triage (on the scene of the disaster) can be defined as a medical process that determines the order of priorities of evacuation and treatment in order to use as optimal as possible the available resources for resuscitation, stabilization, dispatching, and transport of casualties and this for the benefit of the largest possible number of casualties and to return as soon as possible to the routine situation level.*

Consequently, the concept of triage must be seen in a wider context and is composed of the following elements:

1. Rapid evaluation of all disaster victims;
2. Assessment of the nature and severity of the injuries and its consequences on the vital functions of the casualties;
3. Categorization of the casualties;
4. Resuscitation, stabilization and conditioning for transport;
5. Distribution and evacuation of the casualties.

The triage process should be progressive. A primary (preliminary, early, swift, sweeping) survey reviewing quickly all victims essentially determining the number of casualties and type and severity of the injuries, and identifying those critically injured individuals who will benefit immediately from basic resuscitative procedures. This initial sorting should be reinforced at designated triage area(s) in the chain of evacuation (10,11,51,54,78,87,88). It is simple and brief at the beginning and becomes more and more thorough and accurate as the casualties will move on along the lines of medical care and as the disproportion between the needs and available resources will lessen (11,88)

**Triage is also a continuous process and must be applied as long as a disproportion exists between casualty demands and medical resources (53). Patients should be continually reassessed at all levels throughout the entire casualty management system (2,3,5,7,38,62,89-91). Categories must be adjusted as appropriate (6,7,11,89). Triage is ongoing process, and no decision should be considered final.**

**Triage is a dynamic process. Not only the nature but also the extent and severity of the injuries, the existence of associated or combined injuries, the mechanism of injuries, the prognosis, the change in patient's condition, the effect of treatment, the age of the patient, the number of patients, and cultural and religious factors must be taken into account to perform an appropriate triage (5,48,91-100). The decision process of triage takes an additional complexity in disasters when following factors must be taken into consideration: effects of the disaster (97,101,102), location and accessibility of casualties (91,94,99-101), hostile environmental conditions (2,4,37,91,97,100), delay in treatment (2,4,5,91,92,94,97,99-101), limited resources in manpower (4,5,91,100), material (2,4,5,91,97,100), transportation means (2,100), distance to hospital (2,3,7,37,92) and treatment capacities of the receiving medical facilities (3,35,96).**

### **3. Ethical considerations**

**The principle of triage is often considered an impersonal, inhuman and typically military procedure that is assumed with difficulty, especially by young physicians (1,3,4,35,48,58,85). Some have difficulties in triaging because this procedure makes a distinction between patients to be treated in priority and patients not to be treated in priority. The fact that consciously and explicitly choices must be made is felt as morally unacceptable. Medical personnel who cannot overcome the difficulties in sorting casualties do apply as well a kind of triage: they will, in fact, choose to treat some patients but based on an other criterion than the optimal use of available resources. There is no escape from triage procedures in disaster situations. The question is not “do we triage or not”, but “how will we triage”. Medical personnel who cannot alter their philosophy of care must recognize their limitations and remove themselves, without feeling of guilt, so that others can attend to these necessary tasks (91).**

**Each time medical personnel will be faced with two decisions: are resuscitation and/or surgery required or still feasible and which is the priority for treatment and/or evacuation (47). One may wonder if a discrimination against patients who all need care is in conformity with medical ethics. The necessity of triage can be justified by the disproportion between the needs and the resources available and the poor output of the medical response in the initial phase of the disaster (47,97).**

**Some patients will live no matter what medical care they receive, and some are so seriously injured as to be beyond hope of recovery. Others have been seriously injured but are expected to survive if they receive medical care immediately. Triage is, therefore, the most important way of maximally utilizing available assets (3,7,35,37,38,49,53,56). Otherwise, disaster victims do not receive the medical care they need because systems are overwhelmed and resources are not utilized efficiently and effectively. If you have a limited number of intravenous fluid units, you can only use this number. What is going to be the most efficient use of the fluids in terms of patient care? Appropriate distribution of patients among available treatment facilities alleviates the**

**burden to each to a manageable level and allows efficient use of resources (7,35,38,57,98).**

**The nature of the decision is not a decision on life or death, but triage is a process of determining priorities for action taking into account the impossibility to care immediately for all patients. In a selection system, like triage, the impossibility to settle the problem is admitted, but also the necessity to act. This action has as principle to save as many lives as possible or to give priority to those patients who will derive the most medical benefit from treatment (97, 103).**

**The principle of triage requires that medical personnel acts outside the normal ethical code directed at the optimal well-being of the individual, but rather must consider the outcome of all casualties to select those patients who have the best chances of recovery requiring a minimum amount of time and the least stress on available resources (1,5,48,53,88,91). Thus, medical personnel must change over from a system based on individual ethics which is founded on a confidential relationship chosen freely by the patient, on a diagnostic and therapeutic freedom of the physician and on expending the maximum medical resources on each individual patient, to a system based on collective ethics in which a “collective” of disaster victims will be managed by various medical personnel at successive echelons of care, treatment will be based on simplified and standardized protocols, and limited resources will be allocated to a maximum of casualties (88). Strict adhering to the principle of maximum care for every casualty and improperly triage (usually overtriage) would interfere with the limited capabilities of the emergency medical system, resulting in an increase of mortality and morbidity (1,49,54,56,71,78,97,104).**

**The selection of criteria for triage should not be left to medical personnel at the scene of the disaster. Triage principles and protocols for mass casualty situations must be developed and promulgated by the appropriate medical authorities in conjunction with experienced legal advice (85). There is a need for an explicit legislation that also should define a disaster situation. Unfortunately, no general agreed or universally recognized triage directives exist and therefore, it is up to any appropriate authority to lay down its own policy, resulting as well nationally as internationally in a great variety of triage procedures. There is thus a need of standardization of the triage principles both on national and international level. These standardized triage guidelines must be applicable to mass casualty situations both in disasters and in armed conflicts.**

**Education and information on triage and ethical issues in mass casualty situations are important for the providers of pre-hospital and hospital care as well as the medical authorities. Implementing triage decisions is a learned skill that requires knowledge of pathology (injury assessment), pathophysiology (anatomic and physiologic determinants) and prognosis of the injuries and clear awareness of the emergency medical system, resources in manpower and material available, and treatment capacity of the receiving medical facilities. Medical personnel assigned to triage should frequently be trained in triage procedures as be organized as to each of the functions in the triage process (3,5,35,59,88). This will include assessing and sorting casualties into priorities, resuscitation and stabilization by simple procedures, preparing casualties for transport and onward distribution and evacuation of casualties to hospitals. Training methods may range from desktop rehearsals to realistic exercises with simulated patients in the field (2,5,59,82,91). Education and training in triage protocols can be facilitated with**

computer-based training facilities. In a virtual environment training system mass casualty triage in disaster situations can be simulated.

Correct triage is critical and has a profound effect on the management of disaster victims. It may be the most important medical task performed at the disaster scene (29, 56,91). Clear policy and experience gained from training in triaging mass casualties by appropriate programmes will equip most care providers to categorize easily casualties in every potential disaster and will respect the fundamental ethical principles of emergency care in disaster situations (85).

#### **4. Triage process**

##### ***Assessment of the number of casualties and the nature and seriousness of the injuries.***

It is essential to assess rapidly the number of injured and the predominant injuries. This information will be communicated to the authorities responsible for command and coordination so that the appropriate resources can be mobilized.

The assessment of the severity of the injuries and consequences on the vital functions is of utmost importance because of the significant influence on the other elements of the triage process.

The medical examination will nearly always be simple without advanced diagnostic means, yet it must

1. be carried out quickly so as not delaying the evacuation and definitive treatment of the casualties;
2. be accurate and reliable: each initial error may classify a critical injured patient in the category of the slightly injured casualties and this may prove to be fatal through the large influx of victims;
3. be thorough by removing the clothes and dressings. This is especially important in multiply injured trauma patients as each of the injuries may contribute to the general clinical condition (5,47)

The triage officer must appreciate a combination of physiologic and anatomic criteria, mechanism of injury and comorbid factors, interpret their significance and use expertise and clinical judgment to render an appropriate decision taking into consideration the capacity of care available (3,29).

The outcome of the casualties as well as the smooth operational running of the emergency medical care system will depend on a correct assessment. Therefore, personnel with appropriate experience must take on this responsibility; not the most senior or best qualified but the most experienced. It should be understood that his or her decision about the patient's triage is not questioned at the time (4,48).

At the scene of the disaster this may be an experienced EMTs or paramedics, at the triage area (clearing area, treatment area) emergency medicine physicians and nurses; in the hospital this is usually an experienced surgeon (1,3,4,83). In any case, for a triage team to be effective, members must receive training in their roles and have a means of maintaining their skills (1,3,4,59).

## ***Categorization of casualties***

Four categorization procedures will be examined: military categorization procedures, triage systems in civilian disaster situations, injury severity scoring methods, and tagging systems.

### **1. Military classification procedures**

Armed forces have extensive experience in dealing with large numbers of casualties and recognized the value and efficacy of triage on the battlefield (2,3,5-7,10,31,56,105).

Armed forces generally recognize the need for two triage systems, conventional triage for use when medical logistics are coping with casualty inflow and mass casualty triage when resources are overwhelmed (2,6,33,34,106).

#### ***Conventional triage procedures***

The aim of conventional triage procedures is to utilize effectively and efficiently the surgical and medical treatment potential and the transportation means in order to assure optimum medical care. Triage is applied at each site or facility in the four echelons of the treatment and evacuation process. Casualties are generally sorted into three to five categories or priorities (2,4,6,11,31-34,59,83,105,107). (See annex 1). The level of priority determines the time of treatment and evacuation on the assumption that ALL casualties will receive the appropriate care within a fixed time-limit (usually within 24 hours) according to organizational factors which affect time between, and location in the evacuation chain, and by additional considerations such as the surgery and/of evacuation policy within the theatre of operations (32,33).

#### ***Mass casualty classification***

A sudden massive influx of casualties, large enough to overwhelm the medical resources at hand, demands a rather different approach to categorize the patients. In these circumstances the aim of the medical services must be to give useful medical care to the largest number. The mass casualty classification recognizes four groups of casualties: immediate, delayed, minimal and expectant treatment group (6,10,33,34,105,106). (See annex 1).

### **2. Categorization in civil disaster situations**

As was stated above, no generally accepted or universally recognized triage classification system exists. The number of categories used may vary from 2 to 5 or more, depending on the particular system in use. (3,11,35,47,53,89,108-112). Various colour codes, numbers, letters, and symbols have been used to identify these categories. The triage category is often identified by the use of a triage tag, the design of which is also variable (see below).

**Military triage methodology, tailored to need, has been applied in civilian mass casualty situations (6,30,35, 89,94,107).**

**The majority of categorization systems divide the casualties in four groups: “priority one, “immediate”, “emergency” or the colour red indicates the need for immediate intervention; priority two, “delayed”, or the colour yellow indicates that care may be delayed for a limited period of time without immediate life-threatening; and priority three, “minimal” or the colour green indicates that victims are not seriously injured and likely to survive even if care is delayed hours to days. A fourth group, described with the term “expectant” or the colour black (blue) has been added by some to denote patients who are moribund, unlikely to survive or are in such a poor condition that they can only be saved if extensive resources were diverted from more salvageable cases. Some medical personnel experience difficulties in categorizing patient as “expectant” because in normal circumstances they will attempt to save their lives by extraordinary medical support. Although this is a very difficult decision, it is necessary when many casualties require more resources than may be available. It is axiomatic that committing resources to save the life of a person who is most likely to live if cared for promptly, outweighs committing resources to victims who probably will not survive even if such resources are administered (see ethical considerations above). Some advocate treating these patients after the “immediate” or “delayed” casualties according to the extent of the disaster and the resources available (7,35).**

**It is impossible to enumerate all civilian categorization systems, some of them can be found in annex 2.**

**The S.T.A.R.T. (Simple Triage and Rapid Treatment) system was developed to give EMTs and paramedics a triage algorithm that quickly and accurately triages victims into treatment groups (111-112). It categorizes casualties based on their ability to walk, the presence or absence of breathing and capillary perfusion or radial pulse, and their mental status (see annex 3). The algorithm allows evaluation of a patient’s respiration, circulation and mental status in 60 seconds or less. The system does not require the ability to diagnose specific injuries. The EMT doing triage only needs a fundamental knowledge of basic life support to assess and categorize patients as immediate (red), delayed (yellow), minor (green) or deceased (black) using a triage tag (METTAG or equivalent). The only treatments rendered during the triage phase are manually opening an obstructed airway or controlling severe arterial bleeding.**

### **3. Injury Severity Scoring**

**Numerous systems have been proposed to characterize injury severity including scales, indices, scores and lists (113,114). Some of these were originally developed to predict outcome in hospitalised patients, while others were specifically designed for use as a triage tool to direct patient flow to appropriate definitive care facilities. Other applications of injury severity scoring methods include comparing divergent sets of trauma patients for epidemiological studies, and for the evaluation of pre-hospital care and in-hospital management (113-116).**

**Injury severity determination incorporated those primarily based on degree of anatomical injury, those primarily based on measured physiological variables, and those**



based on combinations of physiological indicators, anatomical criteria and injury mechanism. Associated morbid factors such as age or other indicators of general medical condition are also considered by several approaches. The most widely used systems are outlined in table 1.

### **Injury Severity Determination**

<b><u>Anatomic Injury</u></b>	<b><u>Year</u></b>	<b><u>References</u></b>
Abbreviated Injury Scale (AIS)	1971	117, 118
Injury Severity Score (ISS)	1974	119-121
New Injury Severity Score (NISS)	1997	122
<b><u>Physiologic Scores</u></b>		
Trauma Index	1971	123-125
Glasgow Coma Scale (GCS)	1974	126
Triage Index	1980	127
Trauma Score (TS)	1981	128-130
CRAMS Scale	1982	131,132
Prehospital Index (PHI)	1986	133,134
Revised Trauma Score (RTS)	1989	135
Trauma Triage Rule (TTR)	1990	136,137
<b><u>Combination Schemes</u></b>		
TRISS	1981	128,138
American College of Surgeons' Field triage Guidelines	1986	139-141
Mechanism of Injury		113,142-148
Anatomic Criteria		142,145,146,149
Comorbid Factors		150-152

Anatomic scales quantify the injury according to the parts of the body affected and the amount of structural or tissue damage inflicted on these parts (116).

Physiologic measures, on the other hand, quantify the body's response to injury rather than the injury itself. Common used physiologic parameters include indicators of the respiratory, cardiovascular, and neurological function. These scores presume that response to injury results in departures from normal physiology as reflected in the patient's vital signs or clinical condition (114).

A number of triage guidelines incorporate injury mechanisms and injuries believed to warrant trauma centre care. The significance of these anatomic criteria relates to their proximity to vital structures or their known relationship to lethal injury (114).

A victim's comorbid factors (e.g. age, underlying illness, medications) may influence outcome (150-152). Yet some of these factors are often unknown in the pre-hospital environment.

Some examples of triage guidelines for directing trauma patients to trauma centres can be found in annex 4.

#### *Use of injury severity scoring methods in disaster situations.*

A cross relationship between mass casualty priority classification and trauma scores was proposed by Champion (45,153).

<u>Priority</u>		<u>TS</u>	<u>RTS</u>
Immediate	T1	4 – 10	4 – 9
Delayed	T2	11 – 12	10 – 11
Minimal	T3	15 – 16	12
Expectant	T4	< 3	≤ 2

Numerous studies revealed that, although all triage guidelines based on injury severity systems could accurately predict mortality (45,115,116,120,122,134,154,155) (see annex 5), they were incapable of accurately determining injury severity in the field or identifying victims who should survive despite major injury (29,113,114,125,130,137,145,147-150, 154,157,158,160-162). A disastrous prospect in disaster situations!

Each of the various injury severity indices has their own limitations in predicting or identifying trauma severity.

Data required to apply an anatomic indicator are usually not available in the field. This makes them time dependent prohibiting their application in triaging function (6,114,116).

Physiologic scores may also be time dependent, as many patients with lethal injuries have a normal physiological status immediately following injury (6,45,116,138,143,147). Many injury severity scores were developed for blunt trauma patients and thus the parameters and the assigned values to the different components of each parameter were chosen according to this type of injury (6,77,116,163,164). Several other types of injury can be found according to the nature of the disaster. The applicability of these triage methods cannot, therefore, be generalized to the full range of human injury.

A number of other explanations for the inefficacy of these criteria have been proposed. These include dependency on medical provider's impression and diagnostic skills, differences in interrater reliability, the changing nature of patient and disease characteristics, as well as limitations of pre-hospital data accuracy and completeness (6,114,144,154,156).

The ideal triage tool would be 100 percent accurate with no undertriage or overtriage; however this is not possible (144).

Undertriage occurs when a patient with serious injury is triaged to facilities where resources and treatment are inadequate. It will occur if criteria for triage are not sufficiently sensitive.

Overtriage occurs when a patient with minor injuries is directed to a sophisticated trauma centre. It will occur if criteria for triage lack specificity.

If the triage criteria are adapted to yield higher sensitivity in order to limit undertriage, large numbers of patients with slight injuries will incorrectly be identified as major trauma victims because of the inverse relationship between sensitivity and specificity (54,114,147,149,154,156).

The triage method in mass casualty situations must be as sensitive as possible in order to identify the critically injured victims who will benefit immediately from the provision of the limited resources and to keep the number of injured patients who are predicted to die but who survived as low as possible. Initiating resuscitation and stabilization in disaster situations depend on the probability of survival of each casualty. A so-called "comfort" treatment can only be administered if the casualty has minimal or no chance of survival.

Moreover, a not very specific triage method, i.e. treating many casualties with minor injuries or with a very low probability of survival, may interfere with the capability of limited resources to provide timely and adequate care for more seriously injured but salvageable victims and therefore endanger the objective of providing the greatest benefit for the largest number of patients. Frykberg et al (54) established a direct relationship between overtriage and critical mortality in their review of 14 terrorist bombing incidents.

Either type of mistriage may increase mortality or morbidity or may result in inappropriate use of limited resources.

At the scene of the disaster, the ability to make good triage decisions is compromised due to a lack of precise anatomic information and the disappointing performances of these scores. The only use of the injury severity indices in mass casualty situations is the selection of those patients with a low probability of survival since they correlate well with mortality for definite injuries (45,115,116,120,122,134,154,155). They can facilitate

the ethical decision to delay definitive treatment by setting the cut-off point of the score according to all factors that can affect the triage process.

#### **4. Tagging Systems**

Many emergency medical services use a variety of tagging systems to identify the priority of each patient and record medical information. There is no universal agreement regarding the design of such tagging systems. Several methods, including attaching labels to victims, tying coloured ribbons to limbs, and marking Xs on patient's forehead, have been used to denote triage category. There are several commercially available tag systems that can be purchased. They usually consist of cards allowing the recording of physical findings, medical interventions and medications, as well as the triage group to which the patient has been assigned. The most widely recognized is the METTAG (Medical Emergency Triage tag), containing a section with tear-off coloured strips to categorize the patient's condition. Each colour (e.g., red, yellow, green, black) represents a different triage category. The strips are torn off up to the appropriate coloured strip, allowing for unidirectional changes in the patient's condition, from better to worse. (See annex 6).

Another system has a cruciform design using the inside card to record information and folding the coloured cards in such a way that the appropriate category of the patient is on top of the tag.

Advocates of triage tags claim that they are simple to apply and a reliable way to transmit information from the field assessment to the receiving facilities (77,165). They can be used for keeping track of casualties (35,38), allow accurate patient count (38), and tracking of all personnel who had contact with the patient for later documentation (38).

However, many problems have been observed in disasters. In many mass casualty incidents triage tags are rarely or not been used (3,5,72,166). The most likely reason for the failure of tagging is that the use of triage tags represents a change from day-to-day operations at a time when stress and disorder are highest (5,167,168). In several mass casualty situations the triage tags have been unavailable at the incident site (3,35,60,72,99,166,169), in short supply (170) or unfamiliar to users (171). They are easily separated from the victim, unreadable because of darkness, inclement weather or blood, incorrectly completed, delay patient care and evacuation, cause confusion, causing significant expenditure, and have not sufficient space for the amount of information needed during a prolonged patient stay in the field (3,5,35,38,48,64,76,99,170,172-174). When strips are torn off the tag to identify patient's priority, it is difficult to indicate an improving condition (3,5,35,38,99). An additional tag must be placed on the patient to indicate a priority change. Patients tagged with the cruciform labels can change themselves the triage category. Finally, if triage tags are used consistently on the scene of the disaster, they discourage rescuers from conducting repeated triage and thorough secondary assessment (5,168).

If the number of patients, topographical features or organizational difficulties makes tagging advisable some simple form of identification can be affixed to only the highest priority patients, i.e. those who will not survive without immediate care and the deceased (5,85).

Clinical information should best be recorded on the same form that is in daily use. This provide for the highest rate of compliance in data completion (5,68,76). For convenience and efficiency in disaster situations, a simplified and small-sized variant of the standard patient report form can be used, including pre-printed patient identification numbers for retrospectively tracking a patient's progress through the system (5).

### *Resuscitation, stabilization and conditioning for transport.*

Resuscitation and stabilization at the site may be necessary in view of the important impact on the outcome of the casualties: prevention of numerous early deaths, prolongation of the time-limit for definitive treatment, and change of priority group (47,85).

However, the care on the scene of the disaster must be restricted in order to not delay the evacuation and hence the definitive treatment in appropriate medical facilities. Stabilization and rendering the casualties transportable must remain simple allowing an easy adaptation to unexpected situations. The treatment procedures must be similar to those used in the every-day emergency medical services in order to achieve an immediate and efficient response. They will be confined to maintaining cardio-respiratory functions without the mobilization of too important resources in manpower and material, control of bleeding and preservation of shock, splinting fractures, dressing wounds, analgesia, and the prevention of environmental hazards (hypothermia, ...).

### *Dispatching and evacuation of casualties*

Dispatching (regulation) and evacuation of casualties to the most appropriate medical facilities is an integral and essential part of the triage process (1, 3,35,85).

Medical regulation is the process that coordinates the evacuation of casualties from the site of the disaster to the appropriate medical facilities allowing efficient use of hospital resources. The dispatching process will be influenced by numerous factors such as treatment capacity of medical facilities, specialized treatment capacities such as trauma and burn centres, transportation capabilities of the affected area, time-limit of definitive treatment, distance to the medical facilities, and number and clinical condition of casualties (85).

Efficient communications are critical in the regulation process. A dedicated communication network must be available for the medical coordination at the scene of the disaster and for the dispatching and transportation of the casualties to the medical facilities.

The disaster victims should be evacuated in appropriate means of transportation with appropriate supervision.

## **5. Conclusions**

- 1. Triage is a process not a single procedure carried out throughout the entire emergency medical system. Triage should be a tool by which a seemingly unmanageable, overwhelming situation can be organized. It should be performed by the most experienced individuals available at the different levels of this system.**
- 2. Triage in disaster situations is not identical to sorting in the routine EMS. Priority is given to those critically injured casualties who gain the most benefit from the treatment. Patients who probably will die with an appropriate treatment and those who will live without treatment are lower priority.**
- 3. Triage is a dynamic process. Not only anatomic and physiological criteria influence the triage decision process but also organizational and environmental factors. Triage is a continuous process: it must be repeated at each stage in the chain of emergency medical care. Finally, triage is a progressive process with a preliminary triage in the beginning and a more thorough triage as the casualty will move on in the lines of medical care.**
- 4. While the principles of triage are the same throughout the different levels of care, the application must be flexible depending on the nature of the disaster and a myriad of other factors. Clinical and organizational judgment, coupled with training and experience is invaluable.**
- 5. Military triage methods based on proven efficacy appear to be most valuable in disaster situations. The use of injury severity scoring methods or triage tags as exists from civilian experience, have not improved the current military triage systems. The military categorization procedures must be adapted to disaster pathology and civilian logistics. To achieve the objective of providing the greatest benefit to the largest numbers of victims, casualties should be sorted into following categories:**

### **Immediate Treatment Group (T1)**

**Casualties needing life-saving resuscitation and/or surgery and with high chance of good quality survival. The treatment procedures may not be time-consuming.**

### **Delayed Treatment Group (T2)**

**Casualties requiring in-hospital treatment, but their clinical condition permit a delay of treatment without endangering life. Sustaining measures will be administered in order to mitigate the effects of delayed treatment.**

### **Minimal Treatment Group (T3)**

**Slightly injured and/or ambulatory casualties who need outpatient treatment or minor care that can be given by non-specialized personnel.**

### **Expectant Treatment Group (T4)**

**Severely injured casualties, often with multiple injuries needing extensive treatment or with very poor or no chance of survival. They may not be abandoned to their fate, but a comfort treatment will be administered. As some casualties may have a minimal chance of survival, definitive treatment will be given as soon as the mass casualty situation is under control.**

- 6. Triage systems need to be standardized both at national and international level. The standardized triage policy must be applicable to mass casualty situations both in disasters and armed conflicts.**

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## **Annex 1. Military Categorization Procedures**

### **1. The Emergency War Surgery NATO Handbook - 1988 (31)**

Casualties are generally sorted into five categories or priorities.

#### **URGENT.**

This group requiring urgent intervention if death is to be prevented. This category includes those with asphyxia, respiratory obstruction from mechanical causes, sucking chest wounds, tension pneumothorax, maxillofacial wounds with asphyxia or where asphyxia is likely to develop, exsanguinating internal hemorrhage unresponsive to vigorous volume replacement, most cardiac injuries, and central nervous system (CNS) wounds with deteriorating neurological status.

Therapeutic interventions range from tracheal intubation, placement of chest tubes, and rapid volume replacement to urgent laparotomy, thoracotomy, or craniotomy. Shock caused by major internal hemorrhage will, in these circumstances, require urgent operative intervention to control exsanguinating hemorrhage.

If the initial resuscitative interventions are successful and some degree of stability is achieved, the urgent casualty may occasionally revert to a lower priority. The hopelessly wounded and those with many life-threatening wounds, who require extraordinary efforts should not be included in this category.

#### **IMMEDIATE**

Casualties in this category present with severe, life-threatening wounds that require procedures of moderately short duration. Casualties within this group have a high likelihood of survival. They tend to remain temporarily stable while undergoing replacement therapy and methodical evaluation. The key word is temporarily. Examples of the immediate category are: unstable chest and abdominal wounds, inaccessible vascular wounds with limb ischemia, incomplete amputations, open fractures of long bones, white phosphorous burns, and second- or third-degree burns of 15-40% or more of the total body surface.

#### **DELAYED**

Casualties in the delayed category can tolerate delay prior to operative intervention without unduly compromising the likelihood of a successful outcome. When medical resources are overwhelmed, individuals in this category are held until the urgent and immediate cases are cared for. Examples include stable abdominal wounds with probable visceral injury, but without significant hemorrhage. These cases may go unoperated for eight or ten hours, after which there is a direct relationship between the time lapse and the advent of complications. Other examples include soft tissue wounds requiring debridement, maxillofacial wounds without airway compromise, vascular injuries with adequate collateral circulation, genitourinary tract disruption, fractures requiring operative manipulation, debridement and external fixation, and most eye and CNS injuries.

#### **MINIMAL OR AMBULATORY**

This category is comprised of casualties with wounds that are so superficial that they require no more than cleansing, minimal debridement under local anesthesia, tetanus

toxoid, and first-aid-type dressings. They must be rapidly directed away from the triage area to uncongested areas where first aid and non-specialty medical personnel are available. Examples include burns of less than 15% total body surface area, with the exception of those involving the face, hands, or genitalia. Other examples include upper extremity fractures, sprains, abrasions, early phases of symptomatic but unquantified radiation exposure, suspicion of blast injury (perforated tympanic membranes), and behavioural disorders or other obvious psychiatric disturbances.

#### **EXPECTANT**

Casualties in the expectant category have wounds that are so extensive that even if they were sole casualty and had the benefit of optimal medical resource application, their survival still would be very unlikely. During a mass casualty situation, this sort of casualty would require an unjustifiable expenditure of limited resources, resources that are more wisely applied to several other more salvageable individuals. To categorize a soldier to this category requires a resolve that comes only with prior experience in futile surgery that ties up operating rooms and personnel while other more salvageable casualties wait, deteriorate, or even die. The expectant casualties should be separated from the view of other casualties; however, they should not be abandoned. Above all, one attempts to make them comfortable by whatever means necessary and provides attendance by a minimal but competent staff. Examples: unresponsive patients with penetrating head wounds, high spinal cord injuries, mutilating explosive wounds involving multiple anatomical sites and organs, second- and third-degree burns in excess of 60% total body surface area, convulsions and vomiting within twenty-four hours of radiation exposure, profound shock with multiple injuries, and agonal respiration.

### **2. Principles of medical policy in the management of a mass casualty situation** **(NATO STANAG 2879 (1986)) (106)**

The magnitude of problems in a mass casualty situation will necessitate that the conventional treatment priorities must be abandoned. This means a radical departure from the traditional practice of providing early complete definitive treatment to each patient on the basis of his individual needs. For this new concept of treatment, priorities designed to assist in providing the greatest benefit for the largest number of patients, without wasting specialist skill and medical resources, the following system of sorting (triage) is to be used:

#### **IMMEDIATE TREATMENT (GROUP T1)**

To include those requiring emergency life-saving surgery. These procedures should not be time-consuming and should concern only these patients with high chances of survival. Examples: Respiratory obstruction, accessible hemorrhage, emergency amputation.

#### **DELAYED TREATMENT (GROUP T2)**

To include those badly in need of time-consuming major surgery, but whose general condition permits delay in surgical treatment without unduly endangering life. To mitigate the effects of – often critical – delay in surgery, sustaining treatment (for example: Stabilizing IV fluids and splinting, administration of antibiotics, catheterisation, gastric decompression and relief of pain) will be required.

**Examples:** Large muscle wounds, fractures of major bones, intra-abdominal and/or thoracic, head or spinal injuries; also uncomplicated major burns.

#### **MINIMAL TREATMENT (GROUP T3)**

To include those with relatively minor injuries who can effectively care for themselves or who can be helped by untrained personnel.

**Examples:** Minor lacerations, abrasions, fractures of small bones and minor burns.

#### **EXPECTANT TREATMENT (GROUP T4)**

This group comprise patients who have received serious and often multiple injuries, and whose treatment would be time-consuming and complicated with a low chance of survival. If fully treated they make heavy demands on medical manpower and supplies. Until the mass casualty situation is under control, they will receive appropriate supportive treatment. The extent of treatment will depend on available supplies and manpower and may involve the use of large doses of narcotic analgesics. These patients should not be abandoned, but every effort should be devoted to their comfort, and the possibility of survival with even alarming injuries always kept in mind.

**Examples:** Severe multiple injuries, severe head or spinal injuries, large doses of radiation, widespread severe burns.

### **3. French Medical Service - 1992 (34)**

#### **Catégorisation des urgences**

Ces données sont statistiques et doivent donc être considérées avec précaution. Elles permettent néanmoins aux planificateurs médicaux de calculer les besoins et de proposer un schéma d'organisation du soutien médical.

Les blessés se répartissent en cinq catégories :

- **Extrême urgence (EU) [ 5% des cas],** il s'agit de blessés en danger de mort et dont le traitement doit être immédiat.
- **Première urgence (U1) [25% des cas],** il s'agit de blessés en danger de mort à brefs délais et dont le traitement doit intervenir avant six heures.
- **Deuxième urgence (U2) [30% des cas],** ces blessés ne sont pas immédiatement en danger de mort, leur traitement peut attendre jusqu'à dix-huit heures.
- **Troisième urgence (U3) [40% des cas],** il s'agit des blessés ne rentrant pas dans les catégories précédentes et dont le traitement peut attendre trente six heures.
- **Eclopés,** il s'agit de blessés très légèrement atteints et qui peuvent regagner leur unité, après avoir reçu quelques soins. En principe ces patients ne dépassent pas le poste de secours.

Cette catégorisation n'est valable qu'à l'instant précis où elle est effectuée. Elle est susceptible de modification au long de l'évacuation, bien souvent dans le sens de l'aggravation.

### **Le triage adapté aux pertes massives**

Lorsque l'importance des pertes santé, notamment après une frappe nucléaire dépasse les possibilités normales des moyens de triage fonctionnant d'une façon dite « classique », un plan spécial de triage dit de pertes massives, est mis en œuvre.

La mise en œuvre du plan spécial de triage, consiste à donner la priorité d'évacuation aux blessés dont la récupération fonctionnelle ou la survie peut être escomptée d'un traitement ne demandant pas de soins initiaux prolongés et complexes.

Ce plan aboutit à la classification suivante :

- **Priorité 0 (20 à 25% des cas) :** il s'agit de blessés légers ne nécessitant pas une évacuation et pouvant reprendre leur service malgré de légères blessures, brûlures (< 15%) ou irradiations (< de 150 cGy).
- **Priorité 1 (10% des cas) :** il s'agit de blessés dont la vie peut être sauvée par un acte chirurgical relativement court appliqué moins de 6 heures après la blessure et dont le résultat favorable est quasi certain.
- **Priorité 2 (25% des cas) :** il s'agit de blessés dont le traitement chirurgical peut être différé jusqu'à la 18<sup>e</sup> heure.
- **Priorité 3 (15% des cas) :** il s'agit des blessés dont les délais pré-opératoires peuvent atteindre 24 heures et parfois davantage (notamment irradiés purs entre 150 et 400 cGy, brûlés au visage et aux mains).
- **Priorité 4 (25 à 30% des cas) :** il s'agit de blessés très graves nécessitant un traitement long et complexe et à résultat aléatoire (notamment irradiés purs ayant reçu une dose supérieure à 400 cGy, brûlés à plus de 40%). Ces blessés, irradiés ou brûlés relèvent d'une évacuation différée.

#### **4. Textbook of Military Medicine (U.S.A.) - 1995 (3)**

Regardless of the echelon, the medical officer will be responsible for establishing priorities for evacuation and treatment. Advanced Trauma Life Support (ATLS) concepts can usefully be combined with existing military criteria for triage at first- and second-echelon medical facilities:

- **Priority I – URGENT and Priority IA – URGENT-SURG:** the casualty fails to respond or responds transiently to ATLS airway, breathing, and circulation (ABC) skills;

- **Priority II – PRIORITY:** the casualty responds to ATLS ABC skills and remain stable; and
- **Priority III – ROUTINE:** ATLS ABC skills are not needed to stabilize the casualty.

ATLS concepts can also be used to establish treatment priorities not only at first- and second-echelon facilities but also for third-echelon war surgery:

- **URGENT:** this triage category includes the uncommon casualty who is at risk of rapid death after an injury that causes airway compromise, respiratory derangement, or shock that is not responsive to ATLS stabilization. Emergency surgery must be performed within minutes for there to be any hope that the casualty will survive.
- **IMMEDIATE:** this triage category includes most casualties with abdominal or chest wounds who responded to ATLS emergency lifesaving skills and those with extensive soft-tissue and bony injuries, especially when a major vascular injury is present. Surgery is needed within 6 hours.
- **DELAYED:** this triage category includes most casualties with fractures or soft-tissue wounds. ATLS ABC skills are not needed, but surgical care must be provided within 12 to 24 hours.
- **MIMIMAL or AMBULATORY:** this triage category includes casualties who are carded for record only. These soldiers require outpatient treatment and should not be evacuated to higher echelons.
- **EXPECTANT:** this triage category includes casualties whose injuries are so severe that they cannot reasonably be expected to survive given the available medical care. Those who are brain dead or who have deep burns over much of their bodies are in this category. These casualties are not evacuated from the echelon that assigns this priority.

#### 4. Battlefield Advanced Trauma Life Support, 2000 (Army Medical Services, UK)

## CHAPTER 3

## TRIAGE

## AIM

0301. On successfully completing this topic you will have a sound understanding of how to prioritise casualties for treatment and evacuation, so that the survival of the maximum number is ensured.

## INTRODUCTION

0302. The management of a single seriously injured casualty in peacetime military or civilian practice is frequently problematic. On the battlefield, problems are compounded by: environment, difficult terrain and tactical constraints. The situation is even more difficult when faced with large numbers of casualties.

0303. If a system for prioritisation of care of the injured is not in place, many salvageable casualties may die unnecessarily. Triage (from the French verb *trier*, to sieve or to sort), has evolved through military conflicts dating from the Napoloenic Wars to recent civilian disasters.

## DEFINITION

0304. The process of triage is complex. The preferred definition is:

*Sorting casualties and the assignment of treatment and evacuation priorities to wounded at each role of medical care.*

## TRIAGE PRIORITIES

0305. There are four triage priorities:

- *Priority One (P1).* Those needing immediate life-saving resuscitation and/or surgery.
- *Priority Two (P2).* Those needing early resuscitation and/or surgery, but some delay is acceptable.
- *Priority Three (P3).* Those who require treatment but where, a longer delay is acceptable.
- *Dead.*

3-1

0306. This is the *P (Priority) System*, of triage. Triage **must** be repeated at every link of the evacuation chain and the priority adjusted to reflect deterioration or improvement in the casualty's clinical condition.



## MASS CASUALTIES

0307. A mass casualty situation overwhelms the available medical and logistic capabilities (JSP 110). In these circumstances the aim of the medical services must be to give care to the greatest benefit of the largest number – that is ‘*to do the most for the most*’.

0308. The term *mass casualties* is reserved for a situation when medical resources are overwhelmed. When resources are adequate, the incident is said to be ‘*compensated*’. In a military setting, an ‘*uncompensated*’ situation may exist temporarily or over a prolonged period. It may be appropriate for the local commander to introduce mass casualty triage without a formal declaration having been made by a higher authority.

0309. The triage system in an *uncompensated* situation thus becomes:

- ***P1 - Immediate Treatment.*** Those needing emergency life-saving treatment. Procedures should not be time consuming and concern only those with a high chance of good quality survival. Examples are remedial airway obstruction, accessible haemorrhage and emergency amputations.
- ***P2 - Delayed Treatment.*** Those needing major surgery (after initial sustaining treatment such as intravenous fluids, antibiotics and splinting), or medical treatment, but where conditions permit delay without endangering life. Examples are open fractures of long bones, large joint dislocations and burns covering 15-30% BSA.
- ***P3 - Minimal Treatment.*** Those with relatively minor injuries who can effectively take care of themselves or be helped by untrained personnel. Examples are minor lacerations and uncomplicated fractures.
- ***P1 Hold - Expectant Treatment.*** Those with serious multiple injuries needing extensive treatment or with poor chance of survival. These casualties receive appropriate supportive treatment compatible with resources, for example, analgesia. Examples are severe head and spinal injuries, extensive burns and large doses of radiation.

0310. The *T (Treatment) System* of triage, is an alternative to the *P System* and is routinely used by the RN, the RAF, NATO allies, the International Committee of the Red Cross, civilian ambulance services and in civilian disaster programmes.

0311. The relationship between the two systems is as follows:

- **P1** is equivalent to **T1**
- **P2** is equivalent to **T2**
- **P3** is equivalent to **T3**
- **P1 Hold** is equivalent to **T4**
- **Dead** is still **Dead**

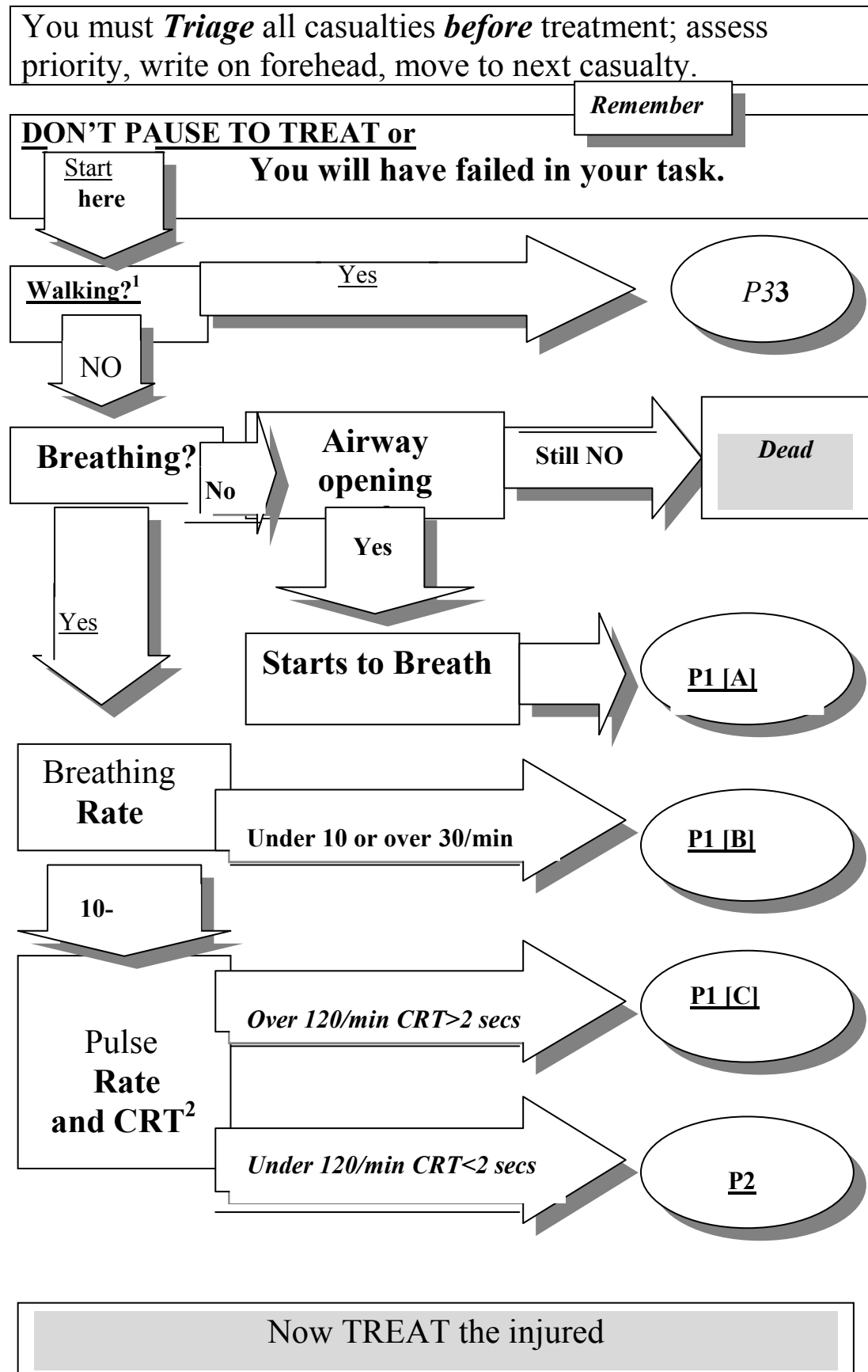
## TRIAGE FOR TREATMENT

0312. A simple, safe, rapid and reproducible system is required that can be applied by any Serviceman with appropriate medical training. Physiological systems that look at the consequences of injury (a change in the vital signs: *Respiratory Rate*, *Pulse Rate* and *Capillary Refill Time [CRT]* ) are more reliable than anatomical systems (which require extensive clinical knowledge and a need to undress the casualty).

0313. A widely accepted physiological method of triage for treatment is the *Triage Sieve*. This involves an assessment of the casualty's mobility, then an assessment of the airway, breathing and circulation (see Table 3.1).

0314. Triage is only a '*snapshot*' of how the casualty is at the time of assessment. In order to identify changes in the casualty's condition, the triage sieve **must** be repeated at each link of the evacuation chain. It is important initially **not** to try to predict how a casualty may deteriorate, this will lead to over-triage (a higher than necessary triage category) and can overwhelm the system with P1 and P2 casualties.

Table 3.1 The triage sieve



1 It must also be realised that some in this group, despite being ambulatory, may have injuries of sufficient magnitude to cause clinical deterioration requiring a change in priority.

2 Is unreliable in the cold or dark.

## **TRIAGE FOR EVACUATION**

0315. Limited time and personnel resources may prohibit a more detailed triage assessment other than that given by the triage sieve. When possible, the *Triage Sort*

can be used to refine triage sieve 3-4. The sort uses the respiratory rate, systolic blood pressure and Glasgow Coma Scale to numerically score the casualty from 0 to 12 and give an indication of priority for evacuation and/or the need for further intervention. This score has a proven direct relationship to outcome from severe injury.

**Table 3.2 Triage sort coded values**

<i>Physiological variable</i>	<i>Measured value</i>	<i>Score</i>
<b><u>Respiratory rate</u></b>	10-30	4
	>30	3
	6-9	2
	1-5	1
	0	0
<i>Systolic blood pressure</i>	>90	4
	89-76	3
	75-50	2
	<49	1
	0	0
<i>Glasgow Coma Scale</i>	15-13	4
	12-9	3
	8-6	2
	5-4	1
	3	0

0316. Priorities are assigned as follows:

- **P1 (T1)** 1-10<sup>3</sup>
- **P2 (T2)** 11
- **P3 (T3)** 12
- **P1 Hold (T4)** 1-3<sup>3</sup>
- **Dead** 0

0317. The coded values for the *Triage Sort* are given in Table 3.2. After coding each of the three parameters, add them together to give a score ranging from 0 (dead) to 12 (physiologically normal).

0318. *Evacuation will be delayed when the number of casualties outstrips available transport. In this situation, the greater time spent with the casualty will allow additional anatomical assessment of injuries. Where the priority determined by physiology does not match the anatomical severity of injuries, the priority can be upgraded.*

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3. *The overlap in scores allows for the seriously injured to be placed in either category, depending on number of casualties and resources available for evacuation.*

### 3-5

**Example:** A soldier loses his left leg in a landmine incident. Immediate first aid is effective in stopping haemorrhage. He is transported to the RAP. He cannot walk, his respiratory rate is 22 and his pulse is 110/minute. He is triaged P2 for treatment (*Triage Sieve*). He then receives intravenous fluids and analgesia. His systolic BP is 115 mmHg, his respiratory rate is 20, he is fully alert, with a GCS of 15. He scores 12 on his *Triage Sort*, which is P3 for evacuation. Clearly, he requires early surgical treatment and the RMO upgrades his priority to P2 for evacuation to the field hospital.

0319. To help understand priority allocations for evacuation, it is appropriate to consider the standard casualty evacuation chain which is usually through the logistical Lines of Support. These lines of support relate to the Combat Services Support (CSS) provided at levels of operational deployment, that is, *First Line* at unit level, *Second Line* at brigade or divisional level, *Third Line* between the divisional rear boundary and point of entry, and *Fourth Line* at the base<sup>4</sup>. These should not be confused with **Roles of Medical Support** which is the term used throughout NATO to define the levels of medical capability<sup>5</sup>:

- **Role 1** Treatment to restore and stabilise vital functions. (Regimental Aid Post/Medical Section(s)).
- **Role 2** Resuscitation and stabilising treatment – may include stabilising (Damage Control) surgery (Dressing Station).
- **Role 3** Hospitalisation and life-saving surgery, definitive surgery (Field Hospital).
- **Role 4** Time consuming specialist and long term treatment (NHS Hospital).

0320. *It should be assumed that early surgery takes place at the field hospital, with subsequent care taking place back in the United Kingdom, within the National Health Service. There will be occasions when surgery, through a field surgical team being attached, is available forward of field hospitals. This will be the norm in airborne and airmobile operations and when FIRST<sup>6</sup> teams are attached to Close Support Squadrons of Medical Regiments. Specialist teams, such as burns teams and*

*head and neck teams, can be allocated to selected field hospitals: this will influence the disposal and transfer of candidate casualties.*

*0321. United Kingdom military operations are increasingly Joint Service in nature, for example, surgical support at Role Three may be found from the RN in the form of a Primary Casualty Receiving Ship (PCRS). An intermediate hospital may be set up, at a convenient location on either the tactical or strategic LOCs.*

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4. See Army Doctrinal Publication Vol 3 Logistics (Army Code 71566).
  5. For example, there will be Role 1 and Role 2 medical units at Third Line.
  6. Forward Immediate Resuscitation and Surgery Teams.

3-6

## APPLICATION AT ROLE ONE AND ROLE TWO

*0322. For the regimental medical officer (RMO) and the dressing station medical officer, casualties are likely to be graded for treatment and/or evacuation as follows:*

- *P1*

**A**irway: Obstruction including that due to maxillofacial injury.

Airway burns with the potential for obstruction.

**B**reathing: Tension pneumothorax – open chest wound – flail chest/pulmonary contusion.  
Respiratory rate <10 >30. Triage Sort Score 1-10.

**C**irculation: Major haemorrhage – external or internal – compressible or non compressible. CRT >2S. Pulse rate >120/mm  
*Massive muscle injuries.*  
Multiple fractures and/or multiple wounds.  
*Burns between 15 and 30% Body Surface Area (BSA).*

- *P2*

Lesser visceral injuries.  
Vascular injuries not having features of P1.  
Cerebral injuries which are deteriorating (See table

8.2).

hands,

Burns of less than 15% BSA involving face, eyelids, perineum and across joints (see paragraph 1222).  
Large joint dislocations.

- *P3*

Lesser fractures and dislocations.

Lesser soft tissue injuries ultimately requiring surgery.

Maxillofacial injuries with no airway problems.

Eye injuries.

Other burns less than 15% BSA.

*0323. Expectant (P1 Hold [T4]) cases would include, for example, burns of greater than 30% BSA, gunshot wounds to the brain and other injuries with a poor prognosis.*

*0324. Medical cases are categorised in exactly the same way in relation to their need for resuscitation and timely intervention by a physician. Psychiatric cases invariably tend to fit into the P3 bracket, with the particular caveat they should be treated as far forward as possible; this approach will result in the maximum number being rendered fit and returned to duty. The further rearward a psychiatric case is evacuated, the less likely this is to happen.*

3-7

### **APPLICATION AT ROLE THREE**

*0325. The critical decision at the field hospital is whether the casualty needs resuscitation and surgery now, or whether he can withstand further delay. The identification of casualties requiring expert treatment by specialist teams must also be considered.*

*0326. At this level, in the presence of mass casualties, the P1 Hold (T4) category will represent:*

- Cases whose survival is uncertain.
- Cases who require prolonged surgery, who must wait until time and facilities are available.
- Major burns cases who are kept for 48 hours prior to transfer to a specialist burns team.

*0327. When there are many casualties, the expedient of the greatest good of the greatest number must prevail.*

### **SUMMARY**

- Triage is the sorting of casualties into orders of priority for *treatment* and *evacuation*. The triage process is dynamic and needs reassessment throughout the casualty evacuation chain. It will be coloured by doctrinal and organisational factors which affect time between and location of, medical echelons in the chain. Even when faced with large numbers of casualties, the **A B C** routine must be followed in order to identify life-threatening problems and indicate priorities.
- The principles of management of the injured remain as primary survey, resuscitation, secondary survey and definitive care, albeit that the last two may be carried out at a more rearward echelon. The philosophy of treatment for large numbers of casualties is:
  - To evacuate rearwards all those who can withstand the journey.
  - To address the medical resources towards those who have the best chance of survival.

***This is achieved through effective and efficient triage.***



## **Annex 2. Civilian Categorization Systems**

### **1. Freeman JW - 1976 (108)**

**Critically injured patients:**      **require immediate attention**

**Seriously injured patients:**      **need further medical attention but are not in immediate danger**

**Slightly injured patients:**      **probably will be released to home care after treatment**

**Dead**

### **2. Yates DW - 1979 (53)**

**Dead**

**Critically**      **will die**  
                     **may die**

**Serious**

**Slight**

**Sorrowful**

### **3. Thomas J-P - 1983 (47)**

#### **Category I: Immediate treatment**

- **major uncontrollable hemorrhage (internal hemorrhage, inaccessible vascular wounds);**
- **asphyxia ( major thoracic wounds, cervico-maxillary asphyxia);**
- **traumatic shock;**
- **major burns of face and respiratory tract.**

#### **Category II: Delayed treatment**

- **vascular injuries, abdominal wounds without shock;**
- **open fractures and wounds involving joints;**
- **closed fractures and dislocations;**

- second-degree burns of 20-40% of the total body surface;
- CNS wounds;
- eye injuries.

**Category III: Ambulatory treatment**

- minor injuries;
- minor closed trauma;
- second-degree burns less than 20% total body surface area;
- third-degree burns less than 10% total body surface area.

**Category IV: Expectant treatment.**

- burns in excess of 40% total body surface area
- very severe injury with no chance of survival (injuries of the major internal vessels, unresponsive patients with severe head wounds, major thoracic crush injuries).

**4. Noto, Huguenard and Larcan - 1987 (89)**

**1. Absolute Emergencies (AE)**

This group is composed of all extreme emergencies and all priority 1 emergencies and is characterized by two actions:

- resuscitation as soon as possible with basic surgical procedures local conditions permitting;
- priority evacuation under constant medical or paramedical supervision whatever the means of transportation.

**a. Extreme Emergencies (EE)**

This category includes all casualties whose clinical condition requires immediate care in order to maintain short-term survival and to allow evacuation to a medical facility. They can be treated either on the scene immediately after rescue and possibly before a long extrication or on arrival in a forward medical facility.

**b. Priority 1 (P1) Emergencies**

P1 patients are characterized by:

- the need of medical care prior evacuation in order to avoid a worsening in the clinical condition;
- the need of supervision during transport;
- the need of surgery or intensive care within 5 to 6 hours.

**2. Relative Emergencies (RE)**

This group is composed of all priority 2 (P2) and Priority 3 (P3) emergencies and is characterized by three actions:

- simple procedures for stabilizing the patients;
- more or less delayed evacuation without specific supervision;
- delayed surgery without endangering life.

#### **a. P2 Emergencies**

**P 2 casualties are characterized by:**

- surgical or medical treatment within 6 to 18 hours;
- medical supervision of transport unnecessary;

**Examples:** closed fractures of long bones, open fracture of small bones, major soft tissue injuries, head injuries with light coma, 2<sup>nd</sup> and 3<sup>rd</sup> degree burn less than 20% of total body surface area, dislocation of large joints, eye injuries, ear injuries due to a blast, joint injuries, moderate crush injuries without shock, inhalation injuries with disappearance of neurological and respiratory symptoms, intoxications with cutaneous signs.

#### **b. P3 Emergencies**

**P3 casualties are characterized by:**

- very slow progressive nature of the injuries allowing treatment beyond 18 hours;
- minor care
- no supervision of transport required, often in sitting position.

**Examples:** closed trauma of extremities, concussion, minor lacerations and contusions, burns less than 10% of total body surface area;

### **3. Slightly injured casualties**

**Slightly injured individuals (walked wounded) are more or less “involved” casualties with extremely minor injuries who, after treatment, return to their homes or to emergency shelters.**

### **4. Emergencies with very low probability of survival (Expectant Emergencies)**

**This group comprises all casualties with very severe injuries who either cannot be treated immediately and/or will have a very low chance of survival.**

### **5. Progressive Emergencies**

**This group consists of all casualties with injuries susceptible of worsening either unexpectedly or due to transportation and as such justify systematic supervision and stabilization in order to prevent any deterioration. Progressive emergencies can be categorized as P1 or P2 emergencies according to the number of casualties, the means of transportation and the acceptable delay in treatment. Examples: blunt abdominal and thoracic injuries, pulmonary and abdominal blast injuries, certain inhalation injuries, crush injuries, certain burn injuries.**

### **6. Functional Emergencies.**

This group comprises several types of injuries characterized mainly by their localization (face, eye, hand), nature (wound, burn), lack of impact on the short- and long-term vital prognosis, the possibility, on the other hand, of a functional impact due to rescue actions, evacuation delay, the choice of the receiving medical facility. Functional emergencies can comprise crush injuries of the hands, certain maxillofacial injuries, certain eye injuries, and some ear injuries following a blast.

#### 5. Auf der Heide E - 1989 (35)

#### 5 – Category Triage System

<u>Priority</u>	<u>Color</u>	<u>Symbol</u>	<u>Casualty Condition</u>
First	Red	R	Critical: Likely to survive if simple (1) care given within minutes.
Second	Blue	B	Catastrophic: Unlikely to survive and/or extensive or complicated care needed within minutes (2).
Third	Yellow	Y	Urgent: Likely to survive if simple (1) care given within hours.
Fourth	Green	G	Minor: Likely to survive even if care delayed hours to days. May be walking OR stretcher cases.
None	Black	X	Dead.

(1) Simple: Care that doesn't require unusual equipment, or excessive use of time or personnel.

(2) Assigned third priority (after yellows) when there are so many casualties that if resources are used in vain to try to save blue cases, the yellows will needlessly die.

## **6. Nemitz B - 1992 (11)**

### **I. Absolute Emergencies**

#### **Extreme Emergencies (EE)**

- Cannot be transported without prior resuscitation
- Very urgent surgery
- Medical supervision of transport indispensable
  - Respiratory distress due to chest, neck or facial injuries
  - Circulatory failure: shock, uncontrollable hemorrhage

#### **First Emergencies (E1)**

- Need for care before transport
- Surgery required within 6 hours
- Medical supervision of transport desirable
  - Multiply injured trauma patients
  - Severe crush injuries of extremities
  - Abdominal wounds
  - Controlled vascular injuries
  - Head injuries with coma
  - Burns > 20% total body surface area

### **II. Relative Emergencies (RE)**

#### **Second Emergencies (E2)**

- Need for care
- Surgery required within 18 hours
- Medical supervision of transport not needed
  - Fractures of limbs
  - Soft tissue wounds
  - Head injuries without coma
  - Eye, ear, mouth injuries
  - Burns < 20% total body surface area

#### **Third Emergencies (E3)**

- Minor care
- If necessary, surgery within 36 hours
- No supervision of transport required
  - Minor injuries

## **7. Triage categories used in ICRC hospitals - 1992 (48)**

### **Category I**

**Those patients for whom urgent surgery is required and from whom there is good chance of reasonable survival.**

### **Category II**

**Those patients who do not require surgery (This includes both patients with wounds so slight that they do need surgery *and* those who are severely injured and for whom reasonable survival is unlikely).**

### **Category III**

**Those who requires surgery but not on an urgent basis.**

## **8. Hall SK - 1995 (175)**

### **Immediate Treatment**

**Victims who suffered life-threatening injuries and are in a critical, yet potentially salvageable condition fall into this category. Frequently these victims have suffered shock and severe blood loss, been unconscious, have unresolved respiratory problems, severe chest or abdominal injuries, or major fractures. Three levels of burn severity are considered life-threatening and warrant expeditious care and transport: burns associated with respiratory compromise, third degree burns of more than 10% of the total body surface, and second degree burns of more than 30% of the total body surface.**

### **Second Priority Treatment.**

**Victims who are considered to be urgently in need of treatment, but generally can be stabilized at the staging area with appropriate advanced life support interventions fall in this category. These victims should receive treatment within two hours. They include those who have suffered back injuries or moderate loss of blood or conscious victims with head injuries. Also included are burned victims: those without respiratory compromise, those with third degree burns of less than 10% of the total surface, and those with second degree burns of less than 30% of the total body surface.**

### **Delayed Treatment**

**Victims who have suffered the least severe injuries, or at least have normal physiology following injury fall into this category. Their treatment and transport is less urgent. Medical care can be delayed up to more than two hours.. These injuries include minor fractures, burns, and soft tissue injuries.**

### **Impending Death or Dead**

**Victims with no spontaneous respiratory or cardiac effort for more than 15 minutes and in whom cardio-respiratory resuscitation would be impossible due to the type of injury sustained are assigned to this category. This category is also reserved for victims who have suffered mortal wounds in which death appears imminent. Examples of such injuries include third and fourth degree burns of greater than 60% of the total body surface coupled with other major injuries, or severe head or chest injuries.**

**9. Gans L and Kennedy T - 1996 (7)**

**Triage Categories**

<b><u>Group</u></b>	<b><u>Colour</u></b>	<b><u>Type of injuries</u></b>
<b>Priority 1 / emergent</b>	<b>Red</b>	<b>Critical: may survive if simple lifesaving measures applied.</b>
<b>Priority 2 / urgent</b>	<b>Yellow</b>	<b>Likely to survive if simple care given within hours.</b>
<b>Priority 3 / nonurgent</b>	<b>Green</b>	<b>Minor injuries: care may be delayed while other patient receive treatment.</b>
<b>Priority 2 or 3</b>	<b>Blue</b>	<b>Catastrophic: patients unlikely to survive or those who need extensive care within minutes.</b>
<b>None</b>	<b>Black</b>	<b>Dead or very severely injured and not expected to survive.</b>

**10. Ryan J et al - 1998 (62)**

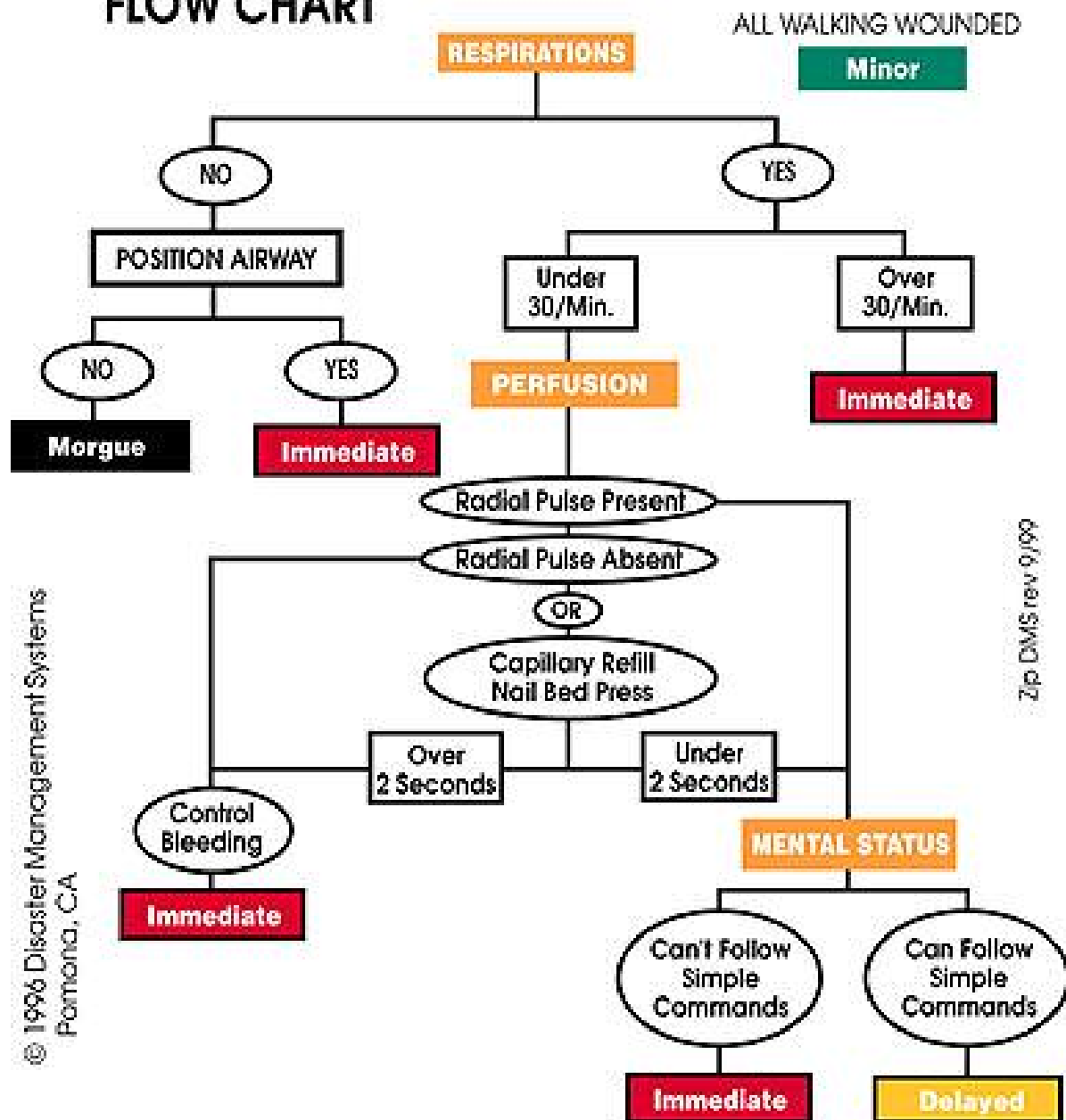
**Triage systems in common use**

<b><u>System</u></b>	<b><u>Priority/P</u></b>	<b><u>Treatment/T</u></b>	<b><u>Descriptive</u></b>	<b><u>Colour</u></b>
<b><u>Classification</u></b>				
	<b>1</b>	<b>1</b>	<b>Immediate</b>	<b>Red</b>
	<b>2</b>	<b>2</b>	<b>Urgent</b>	<b>Yellow</b>
	<b>3</b>	<b>3</b>	<b>Delayed</b>	<b>Green</b>
	<b>1 (Hold)</b>	<b>4</b>	<b>Expectant</b>	<b>Blue</b>

**N.B. The dead should not be identified and removed and are not classified in hospital Triage systems.**

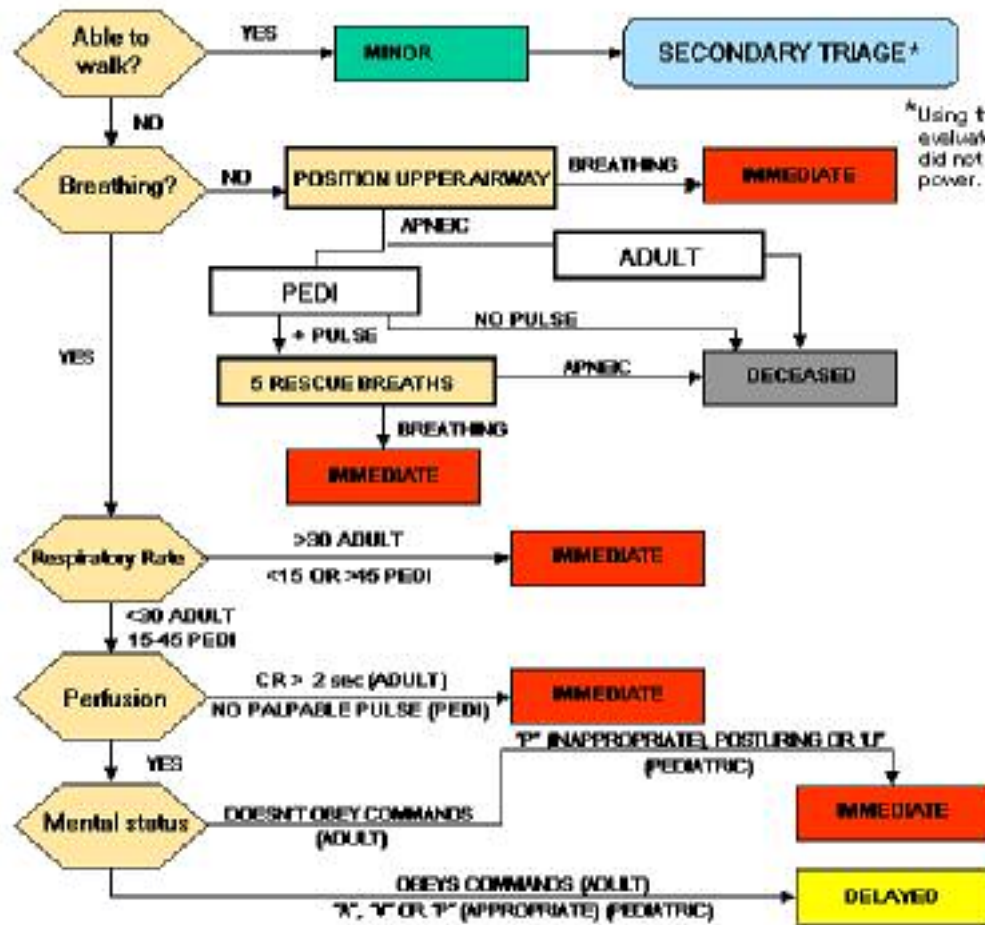
Annex 3.

## TRIAGE FLOW CHART





# Combined START/JumpSTART Triage Algorithm



## **Annex 4. Prehospital Triage Guidelines**

### **1. Champion HR - 1982 (142)**

#### **Triage Guidelines**

**Patients with any of the following should be taken to the Nearest trauma center (Level 1 or Level 2 ACS)**

#### **Mechanism of Blunt Injury**

- Patients involved in high speed (> 40mph) moving vehicular accidents.
- Patients hit by vehicles at greater than 20 mph.
- Patients thrown from vehicles.
- Patients falling from heights greater than 20 feet.

#### **Location of Penetrating Injury**

- Patients with penetrating injury to head, neck, chest, abdomen, pelvis or groin

#### **Location of Blunt Injury**

- Blunt injury: single systems: significant involvement of head, neck, chest, abdomen, or pelvis.
- Any combination of above.
- Two or more proximal long bone fractures.

#### **Physiological Distress**

- A degree of respiratory distress, shock, or coma that results in a Trauma Score of 12 or less or a Coma Score of 10 or less.

### **2. Kane G et al - 1985 (156)**

#### **Revised Triage Checklist**

**A patient with any of the listed conditions would be taken to a trauma center;**

- 1. No spontaneous eye opening**
- 2. Abnormal capillary refill**
- 3. Penetrating cranial injuries**
- 4. Penetrating neck injuries**
- 5. Penetrating chest injuries**
- 6. Penetrating abdominal injuries**
- 7. Blunt thoracic trauma with systolic blood pressure less than 90 mm Hg**
- 8. Involvement in motor vehicle vs. pedestrian accidents (patient is a pedestrian) and sustaining blunt abdominal trauma**
- 9. Flail chest**
- 10. Involvement in motorcycle accident (as a motorcyclist) and sustaining blunt abdominal trauma**
- 11. Fall greater than 15 feet**
- 12. Age less than 5 or greater than 65 years**

### 3. West JG et al - 1986 (149)

**Triage List: For automatic triage to a trauma center**

1. BP < 90 mm Hg – Pulse > 120 – Resp < 12 > 30/min
2. Penetrating head or torso trauma
3. Unconscious or deteriorating level of consciousness or lateralizing neurologic signs
4. Traumatic amputation above wrist or ankle
5. Flail chest
6. Two or more proximal long bone fractures

### 4. Knudson P et al. - 1988 (147)

**Guidelines for Field Triage of Trauma Patients**

1. Trauma Score  $\leq 14$  or CRAMS scale  $\leq 8$
2. Motor Vehicle Accident > 40 mph
3. Auto vs. pedestrian accident > 5 mph
4. Major assault
5. Penetrating wound to the neck or torso

### 5. Kreis DJ et al - 1988 (148)

**Field Triage Criteria**

**A. Physiologic:**

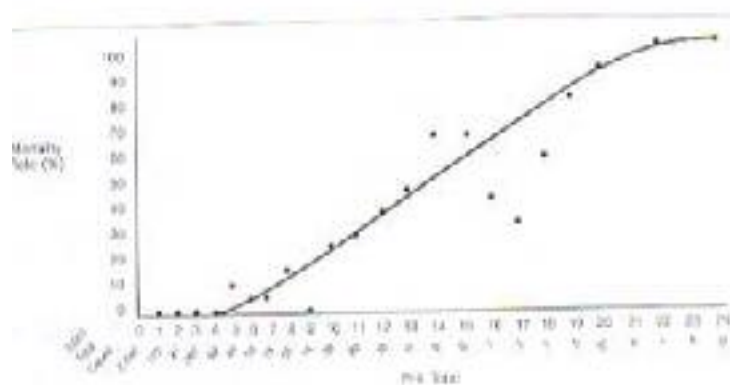
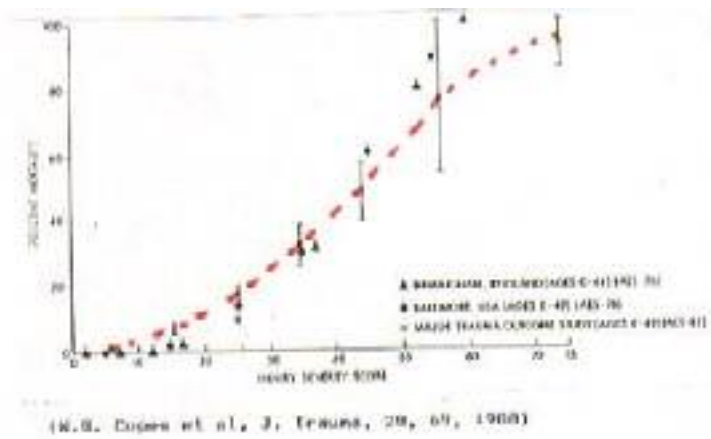
1. Trauma score  $\leq 12$  or Glasgow Coma Scale  $\leq 10$

**B. Mechanism of injury:**

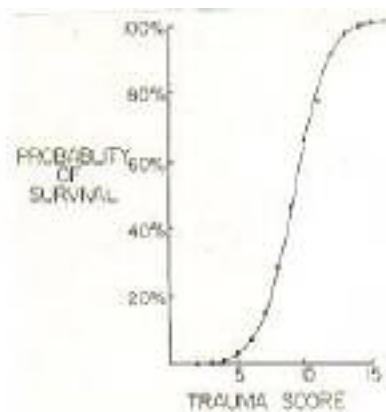
2. High Speed Traffic Accident (> 40 mph)
  1. Evidence of High Energy Dissipation
  2. Penetrating Trauma to Head, Neck, Torso, Groin to Mid-Thigh
  3. Vehicle Space Invaded  $\geq 1$  Foot
  4. Pedestrian Accident (age < 12 or > 65 years)
  5. Pedestrian Accident (> 20 mph)
  6. Ejection from Vehicle
  7. Death of other in Vehicle
  8. Fall > 20 feet
  9. Major Burn (> 20% Second or Third Degree)
  10. Drowning

- 11. Hostile Environment (e.g., swamp)**
- 12. Prolonged Extrication Time**
- C. Anatomic Factors:**
- 13. Major Head Injury**
- 14. Paralysis**
- 15. Amputation**
- 16. Major Multiple Systems Injury**

## **Annex 5. Relationship Injury Severity and Mortality.**



Koehler JJ et al. Ann Emerg Med 1987; 16: 380



Champion HR et al. J Trauma 1983 ; 23 : 185

## Annex 6. Tagging Systems

