Ambulance Operations Theory

Principles of MCI

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Learning Objectives

- Define MCI and triage
- Principles of MCI management
- Roles and responsibilities

MCI

- An incident in which the number and severity of the casualties exceeds the available resources of the local emergency medical services and/or healthcare system.
- When resources become overwhelmed things change:
  - Assessments
  - Standards of care
  - triage

TRIAGE

- Triage means “to sort”
  - Sort based on the medical needs of each individual patient
  - Limited information used to categorize
  - Based on resources available – resources are assigned based on the initial assessment and consideration of available resources
    - This is a live process that is continually reassessed for the duration of the event and as resources become available

TRIAGE

- Brings order to chaos, while still providing care to all patients
- Objective: Greatest good for the greatest number of people
- Looks different in the hospital than on a scene

Why Should Responders Care About Good Triage?

- Helps to get care to those who need it and will benefit from it the most
- Helps in resource allocation
- Provides an objective framework for stressful and emotional decisions

Why are Resources Important in Triage?

- Disaster is commonly defined as an incident in which patient care needs overwhelm local response resources.
- Daily emergency care is not usually constrained by resource availability.
  - Therefore, triage systems have been developed using the following principles:
    - Triage prioritizes identification of those in need of immediate intervention
    - Triage must be modified for children
    - Requires situational awareness, decisiveness and clinical expertise

Primary Disaster Triage

- Ontario MoHLTC uses the **M**edical **E**mergency **T**riage **Tag** (METTAG) tool.
- The **S**imple **T**riage **A**nd **R**apid **T**reatment (START) tool is very similar and is also widely used across the U.S. and Canada.
- SALT – **S**ort, **A**ssess, **L**SI (Life-saving interventions), **T**reatment/Transport
- The only recognized pediatric MCI primary triage tool used in the US and Canada is the JumpSTART tool.
- Some argue that these tools ignore the “uninjured” and that they are not suitable for CBRN incidents

Typical MCI triage Categories

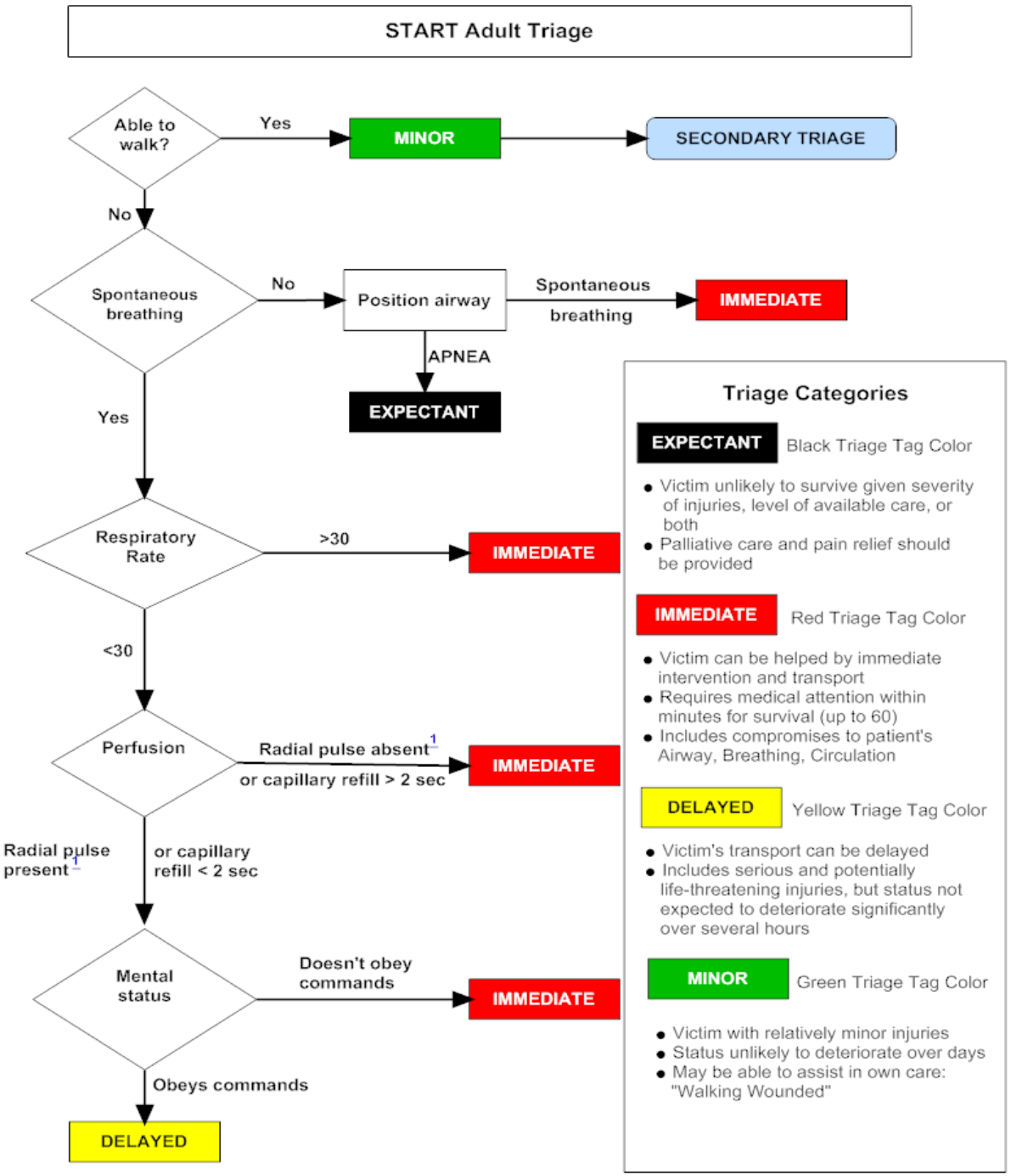
- **MINIMAL** Sick or injured, but expected to survive with or without care, sometimes referred to as “walking wounded”.
- **DELAYED** Requires care that can be safely delayed without affecting probability of survival.
- **IMMEDIATE** Requires immediate care for a good probability of survival.
- **EXPECTANT** Alive, but with little or no chance of survival given current available resources.
- **DECEASED** A fatality with no intrinsic respiratory drive and no other signs of life

Examples of Common Traumatic Injuries per Triage Category

- **Minimal**
  - Superficial wounds
  - Auditory blast injury
- **Delayed**
  - Stable abdominal wounds
  - Soft tissue wounds
- **Immediate**
  - Mechanical airway obstruction
  - Sucking chest wounds
- **Expectant**
  - Agonal respirations
  - Profound shock

START Triage System

- Sorts patients based on
  - Ability to walk
  - Mental Status
  - Hemodynamic status (uses heart rate parameters)
  - Respiratory Rate
- Has been in place since the early 1980's
- Used in many services and agencies around the globe
- Some types of injuries don't fit well into this system
- Requires calculations (HR, RR)


START Adult Triage
Able to walk?
Yes
MINOR
SECONDARY TRIAGE
No
Spontaneous breathing
No
Position airway
Spontaneous breathing
IMMEDIATE
APNEA
EXPECTANT
Yes
Respiratory Rate
>30
IMMEDIATE
<30
Perfusion
Radial pulse absent[1] or capillary refill > 2 sec
IMMEDIATE
Radial pulse present[1]
or capillary refill < 2 sec
Mental status
Doesn't obey commands
IMMEDIATE
Obeys commands
DELAYED
Triage Categories
EXPECTANT
Black Triage Tag Color
Victim unlikely to survive given severity of injuries, level of available care, or both
Palliative care and pain relief should be provided
IMMEDIATE
Red Triage Tag Color
Victim can be helped by immediate intervention and transport
Requires medical attention within minutes for survival (up to 60)
Includes compromises to patient's Airway, Breathing, Circulation
DELAYED
Yellow Triage Tag Color
Victim's transport can be delayed
Includes serious and potentially life-threatening injuries, but status not expected to deteriorate significantly over several hours
MINOR
Green Triage Tag Color
Victim with relatively minor injuries
Status unlikely to deteriorate over days
May be able to assist in own care: "Walking Wounded"

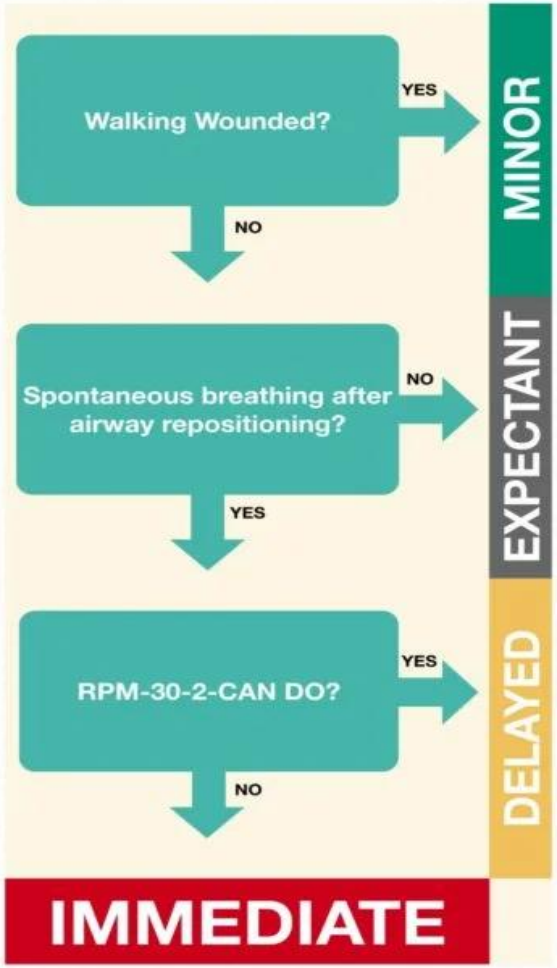
START Triage

- Immediate victims with bleeding
  - It is expected that efforts to control bleeding be made before moving on
  - Patients tagged expectant or deceased (unless obviously dead) should be reassessed once critical interventions for immediate and delayed victims have been completed

RPM-30-2-Can Do

A CanadiEM Tiny Tip for Mass Casualty Triage

START Triage Algorithm



RPM-30-2-Can Do

R	Respiration	RR < 30
P	Perfusion	Cap refill < 2s
M	Mental status	Can do commands

Patients with any of the RPM features beyond the limits belong in the 'red' category.

References

Schultz, C., and Koenig, K. (2018). Disaster Preparedness. Rosen's Emergency Medicine: Concepts and Clinical Practice. Ninth Edition.

Credits

Dr. S. Luckett-Gatopoulos wrote the original piece on CanadiEM.

Dr. Mark Woodcroft and Kevin Lam created the infographic for CanadiEM with editing by Dr. Alvin Chin.

Memory Aid

A= No Respirations

B = RR > 30
C = Cap > 2s/No Rad Pulse
D= Can't follow commands

Not Green, Red or Black

Able to walk and follow commands

In Medical Concepts, Tiny Tips by Brent Thoma, May 21, 2013

SALT Triage System

- Step 1 – Global **Sort** (Walk, Wave or still)
- Step 2 – Initial **Assessment**
  - **Life Saving Interventions - MARCH** (Hemorrhage control, open airway (if child consider 2 rescue breaths, antidote injections, needle decompression), Hypothermia
  - Assign Category
- Step 3 **Treatment** and/or **transport;** ongoing assessment
- Simple
- Easy to remember
- Group large # of patients quickly
- Applies early life saving interventions
- Applies to all types of incidents/hazards
- Applies to all populations
- Used in Simcoe

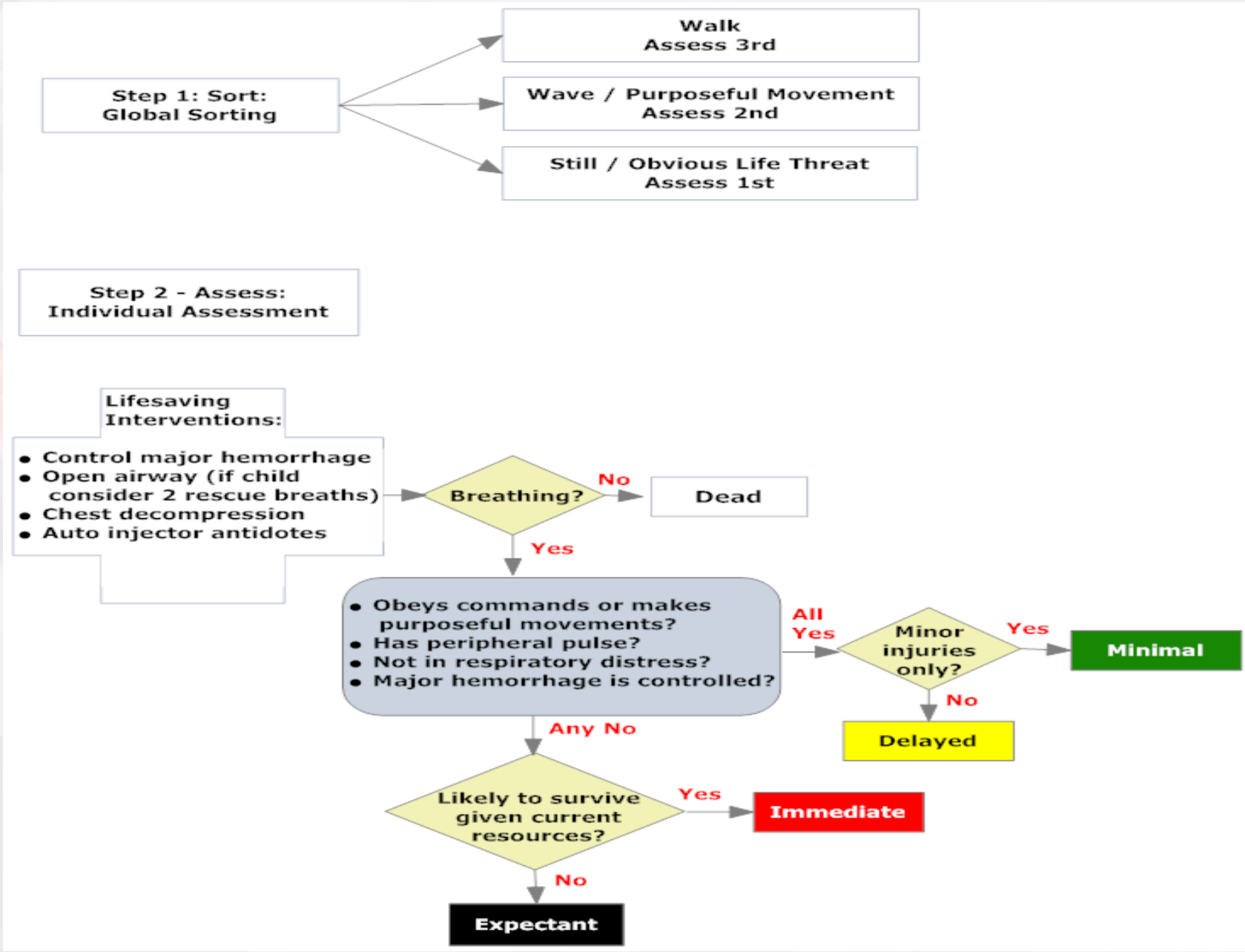
SALT

- More easily considers injury severity vs START
- Includes expectant and dead categories (grey/black)
  - START has black – which is for both expectant or dead patients.
- Considered to me more accurate (less under triaging occurs (according to a 2017 publication in American Journal of Disaster Medicine)
- Does not require any calculations (HR, RR)

Comparison of START and SALT triage methodologies to reference standard definitions and to a field mass casualty simulation. American Journal of Disaster Medicine. 2017;12:27.

SALT Triage Categories

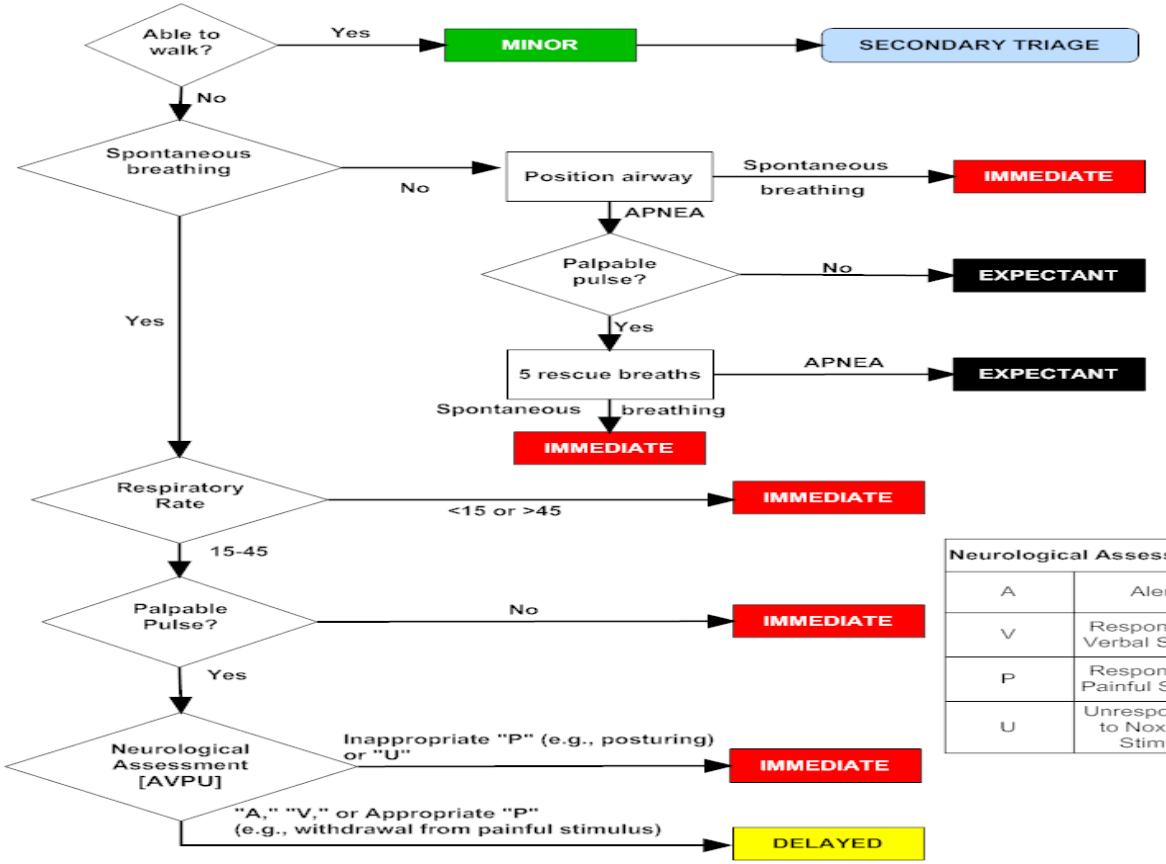
BDLS
Basic Disaster Life Support


Step 1: Sort:
Global Sorting
Walk
Assess 3rd
Wave / Purposeful Movement
Assess 2nd
Still / Obvious Life Threat
Assess 1st
Step 2 - Assess:
Individual Assessment
Lifesaving Interventions:
Control major hemorrhage
Open airway (if child consider 2 rescue breaths)
Chest decompression
Auto injector antidotes
Breathing?
No
Dead
Yes
Obeys commands or makes purposeful movements?
Has peripheral pulse?
Not in respiratory distress?
Major hemorrhage is controlled?
All Yes
Minor injuries only?
Yes
Minimal
No
Delayed
Any No
Likely to survive given current resources?
Yes
Immediate
No
Expectant

JumpSTART - Pediatric

- The only recognized pediatric MCI primary triage tool used in the US and Canada is the JumpSTART tool.
- Considers Pediatrics as a separate population
- Designed for children 1-8 years of age
- Babies <12 months should be marked as **IMMEDIATE** in all cases

JumpSTART Pediatric Multiple Casualty Incident Triage



Neurological Assessment	
A	Alert
V	Responds to Verbal Stimuli
P	Responds to Painful Stimuli
U	Unresponsive to Noxious Stimuli

Use JumpSTART if the Patient appears to be a child.

Use an adult system, such as START, if the patient appears to be a young adult.

Triage Categories

EXPECTANT Black Triage Tag Color

- Victim unlikely to survive given severity of injuries, level of available care, or both
- Palliative care and pain relief should be provided

DELAYED Yellow Triage Tag Color

- Victim's transport can be delayed
- Includes serious and potentially life-threatening injuries, but status not expected to deteriorate significantly over several hours

IMMEDIATE Red Triage Tag Color

- Victim can be helped by immediate intervention and transport
- Requires medical attention within minutes for survival (up to 60)
- Includes compromises to patient's Airway, Breathing, Circulation

MINOR Green Triage Tag Color

- Victim with relatively minor injuries
- Status unlikely to deteriorate over days
- May be able to assist in own care: "Walking Wounded"

JumpSTART

- **MINIMAL**
  - All victims who are considered “walking wounded” are directed to the minimal injuries treatment area
- **DELAYED**
  - If the victim can follow simple commands when undergoing a mental assessment, or has bleeding that can be stopped, they are directed to the delayed treatment area
- **IMMEDIATE**
  - If the victim cannot follow simple commands when undergoing a mental assessment, if bleeding cannot be stopped, the respiratory rate is under 15 or over 45, or there is no peripheral pulse
- **EXPECTANT**
  - All victims struggling with injuries incompatible with life
- **DECEASED**
  - All victims displaying no signs or symptoms of life/obviously dead

MUCC Triage System

- Apply a model uniform core criteria (MUCC)-compliant triage method to manage multiple casualty incidents
- Developed in the US between federal and public safety entities, experts, committees and others
- Rely on evidence and research
- It is NOT a new separate triage system
- NOT used for individual patient assessment
- Future – standardize various systems across the country (US) and Canada
- Addresses ONLY the first level of sorting

Comparison of Triage systems

- No overwhelming Evidence that supports any particular system (SALT vs START)
- All have identified pros and cons
- MUCC is an alternative approach that combines triage system to allow a better collaboration between neighbouring jurisdictions

No matter the tool…

Priority is to maximize survival of the greatest number of victims.

Triage Considerations

Three stages of triage

- Primary
  - Performed at arrival and first encounter with the patient
- Secondary
  - After all patients have been identified and triaged
  - After initial interventions have been made for Immediate and Delayed patients
- Tertiary
  - Performed on an ongoing basis or at definitive care

As additional resources become available, patient status' can be reassessed

Pediatric Triage Considerations

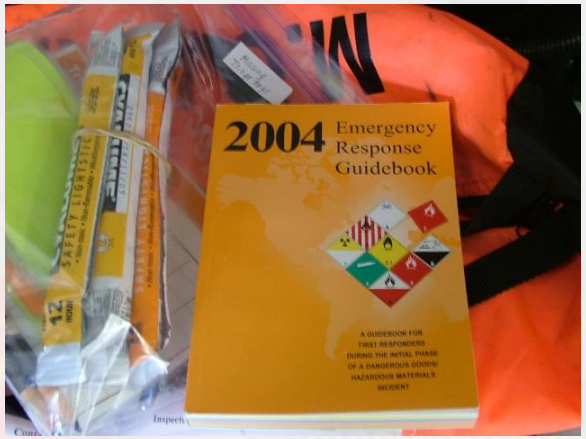
- Acknowledge that children have unique needs and may present differently
- If possible group children together in appropriate triage areas
- Transport to appropriate facilities (if applicable)

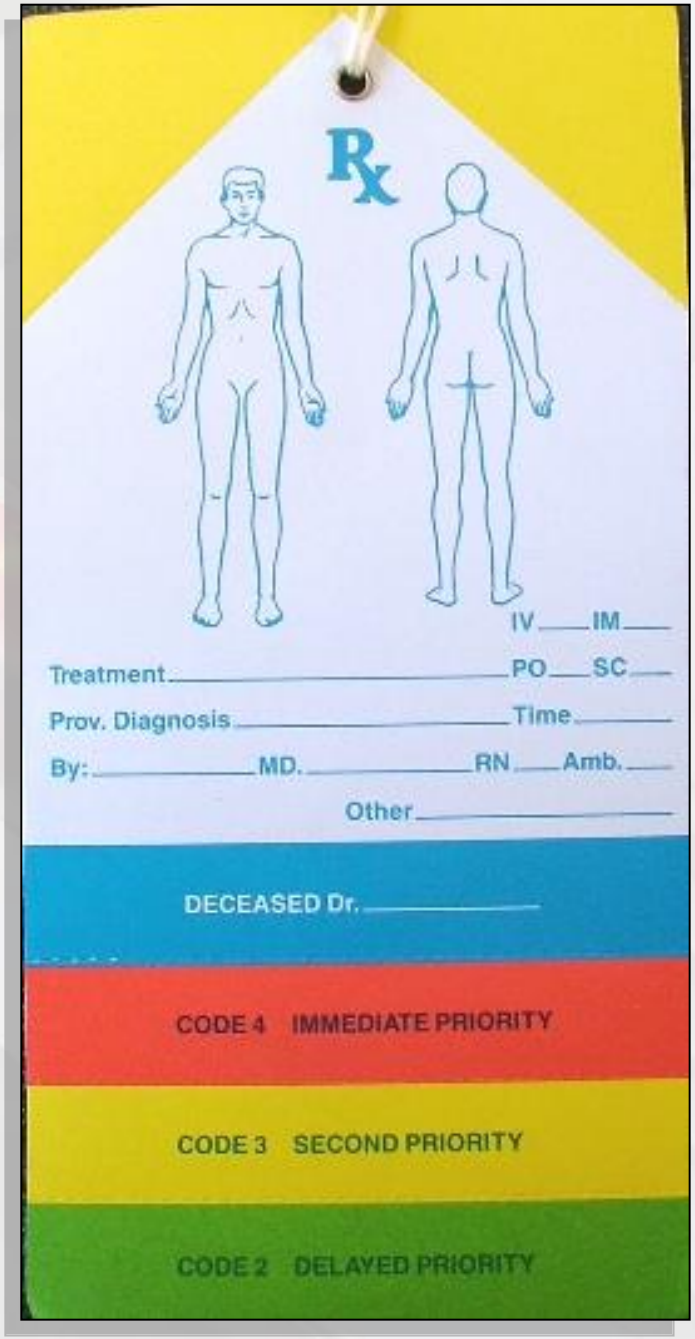
Arriving at an MCI

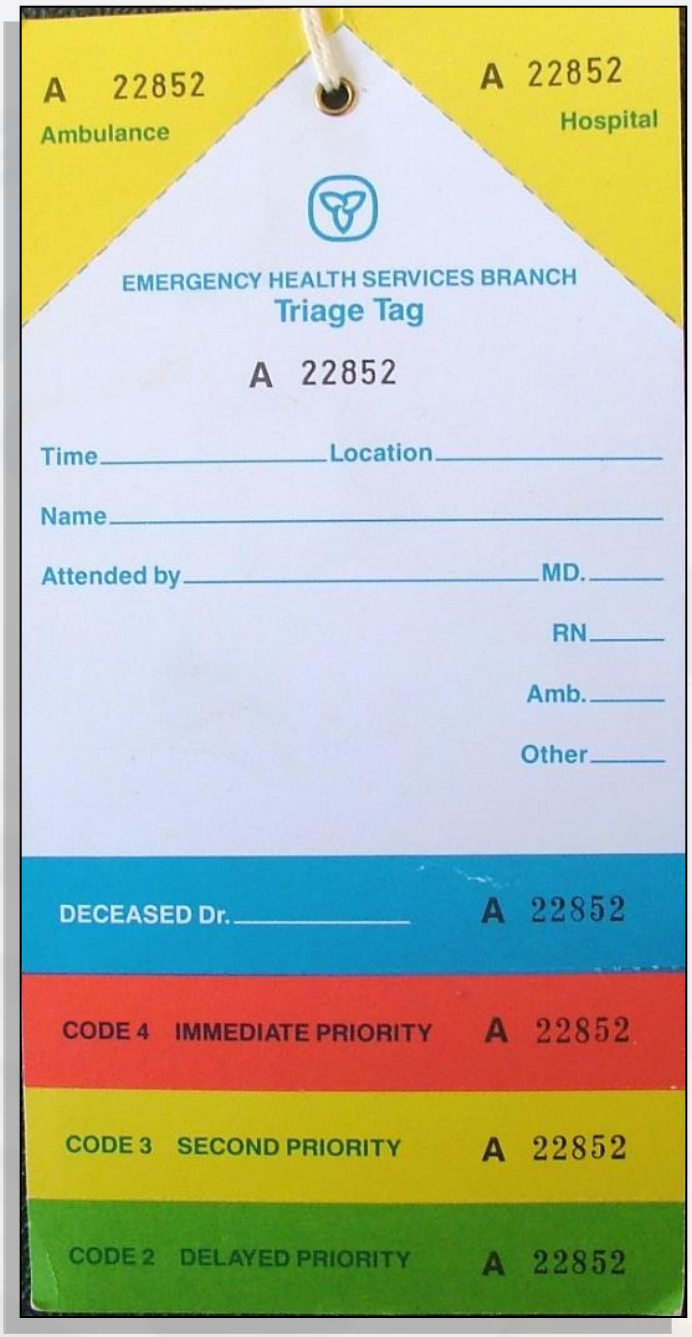
- First crew in, last crew out
- Scene Command
- Triage Officer
- Communications officer
- Maintain Communication with CACC – dedicated channel
- Consider Resources

Multi Casualty Incident (MCI) Kit

- 1 MCI duffle bag per vehicle
- 1 vest for the site coordinator
- 2 vests for multi purpose
- 50 triage tags/ribbons
- 2 black grease pencils
- 6 light sticks with clips
- 1 Emergency Response Guidebook
- 1 set of 4 MCI reference cards




Rx
IV IM
Treatment PO SC
Prov. Diagnosis Time
By: MD. RN Amb.
Other
DECEASED Dr.
CODE 4 IMMEDIATE PRIORITY
CODE 3 SECOND PRIORITY
CODE 2 DELAYED PRIORITY


A 22852
Ambulance
A 22852
Hospital
EMERGENCY HEALTH SERVICES BRANCH
Triage Tag
A 22852
Time Location
Name
Attended by MD.
RN
Amb.
Other
DECEASED Dr.
A 22852
CODE 4 IMMEDIATE PRIORITY
A 22852
CODE 3 SECOND PRIORITY
A 22852
CODE 2 DELAYED PRIORITY
A 22852

Key Initial Steps

- Assess the scene for safety
  - Park and triage upwind (if applicable)
- Wear appropriate PPE (identification vests/helmets)
- Designate a triage area at a safe distance
- **Direct** the walking wounded and uninjured to assemble in a safe area
  - Assign someone prn with first aid to monitor and provide initial care (e.g. bystander)
- conducts systematic ABC triage of all casualties
  - Identify each with appropriate Triage Tag
- Liaise with the ambulance site coordinator

Secondary Actions

- Establish patient holding area(s) in conjunction with ***ambulance site coordinator***
  - According to triage tag priority
- Perform a *secondary* triage – revise as needed
- Coordinate the transport of casualties with site coordinator and traffic control
- Cover up but do not move Blue/Black Tag (dead/dying) casualties unless necessary to gain access to other injured – coordinate with police
  - Secure the area with police
  - Crime scene preservation principles apply

Moving the Dead

- Any Dead persons should **NOT** be moved unless access to another alive person is needed
- If a body has to be moved to access others, mark their location within the site
  - Make mental notes and put them to paper as soon as practical to be transferred to your incident report

Triage Principles

- Rapid Assessment – remember do the best you can for the greatest number of people
  - You must first sort ALL patients
- No benefit to full resuscitation
  - Must leave until resources are available – this is NOT an emotional decision
  - Initial interventions are limited to:
  - **Opening the airway**
  - **controlling severe bleeding**
  - ***categorize the patient***

Triage Principles

- Triage is based on “absolute” not “relative” condition
  - Are they critical? Are they not?
- Patient condition should not be judged relative to the condition of the other patients encountered at the scene
- This is the role of the secondary triage process
  - After they’ve been moved to the designated areas

Triage Principles

- Identify triage level of all patients
- Group them according to priority (if practical)
- There MUST be some form of identification
  - Avoids confusion
  - Avoids repeated assessment of the same patients
- Allows for monitoring of changes
- Secondary triage occurs following initial sort of all patients
- Transportation should occur from designated areas of categorized patients and not directly from site (depending on incident size)

Coordinated Transportation

- Coordinated transportation and distribution of patients, based on triage categories, must occur
- Control and coordination by Triage Officer & Site Coordinator
  - Will maximize resources
  - Minimize hospital overloading
  - Ensure no one is “missed”

Chemical, Biological, Radiological, Nuclear, and Explosive Events (CBRNE) Special Considerations

CBRNE

- Chemical, Biological, Radiological, Nuclear, and Explosive events
- Require access to information regarding common agents and their treatments and response protocols
- Identify any resources available with specific training
  - Source facility personnel
  - Specialized first response teams
  - HAZMAT
  - Specialized PPE
  - Decontamination facilities and equipment

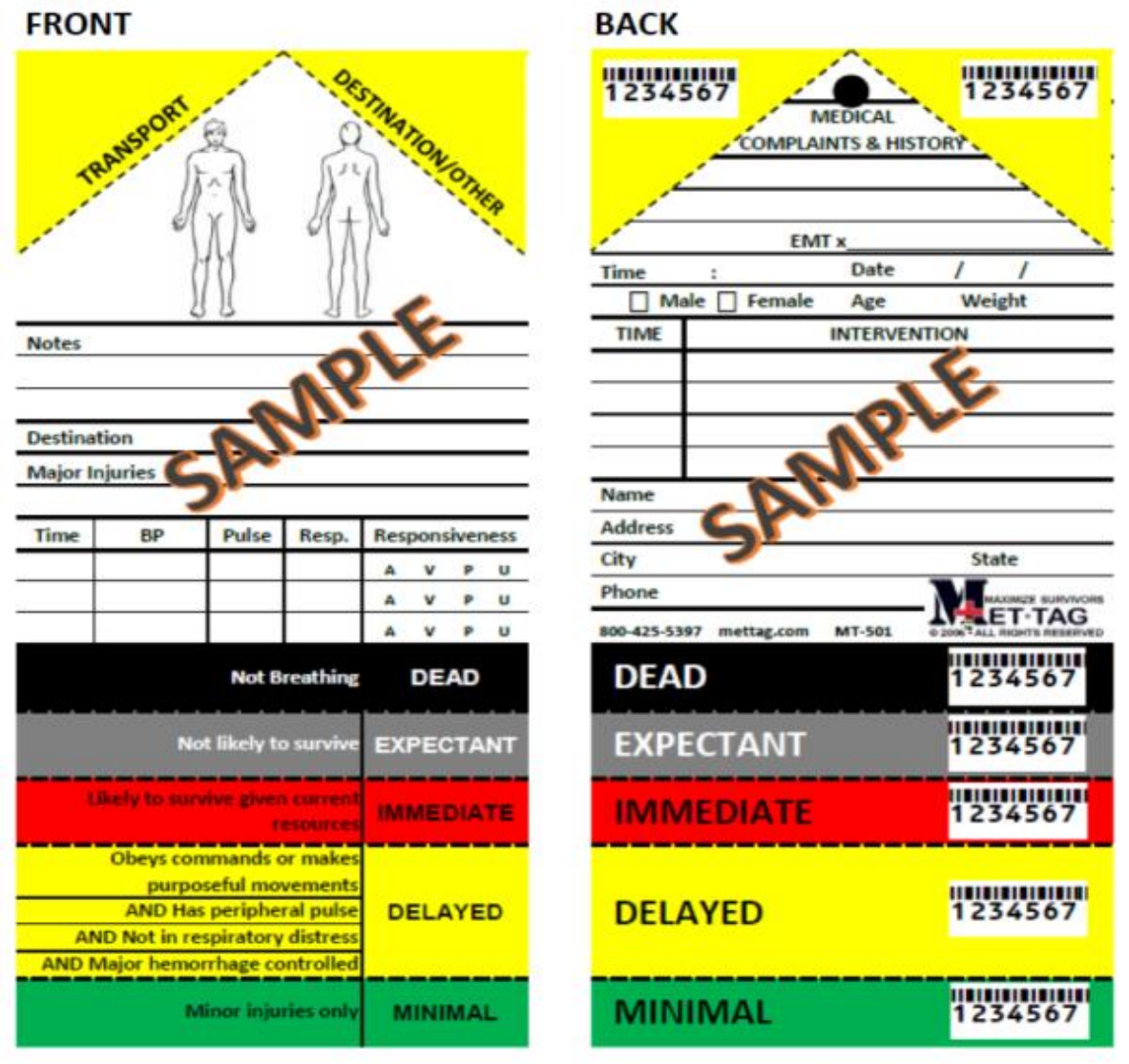
CBRNE

- Look for signs or other warnings that a CBRNE event may have occurred
  - Debris field
  - Mass casualties with similar/same symptoms
  - Dead animal or plant life
  - Initial responder casualties
  - Unusual smells or smoke colour
  - Smoke or vapour clouds

Triaging Patients

START triage tags

SALT triage tag



SALT triage ribbon style

Triage tags

- Colours assist with rapid identification of patient category
  - **Green**
    - No life threat; extended delay acceptable
  - **Yellow**
    - Urgent (priority 3) Serious or potential life threat
    - 2-3 hour delay should not affect outcome
  - **Red**
    - Immediate life threat: High probability of survival if transported to definitive care within 30 – 60 minutes

Triage Tags

- **Deceased** – Dead or dying – patient is not breathing/no pulse
- Expectant –Patient not yet dead but unlikely to survive (even with intervention) SALT
- Full resuscitation can take place but only when adequate resources are available

Clinical Criteria for Triage

GREEN (Minor)

- Walking
  - Triage officer will call out “all persons who can walk, please get up and walk over to me”
    - From here they should be directed to a designated area
    - Secondary triage will take place here once all patients have been triaged
    - Initial identification will be **GREEN**

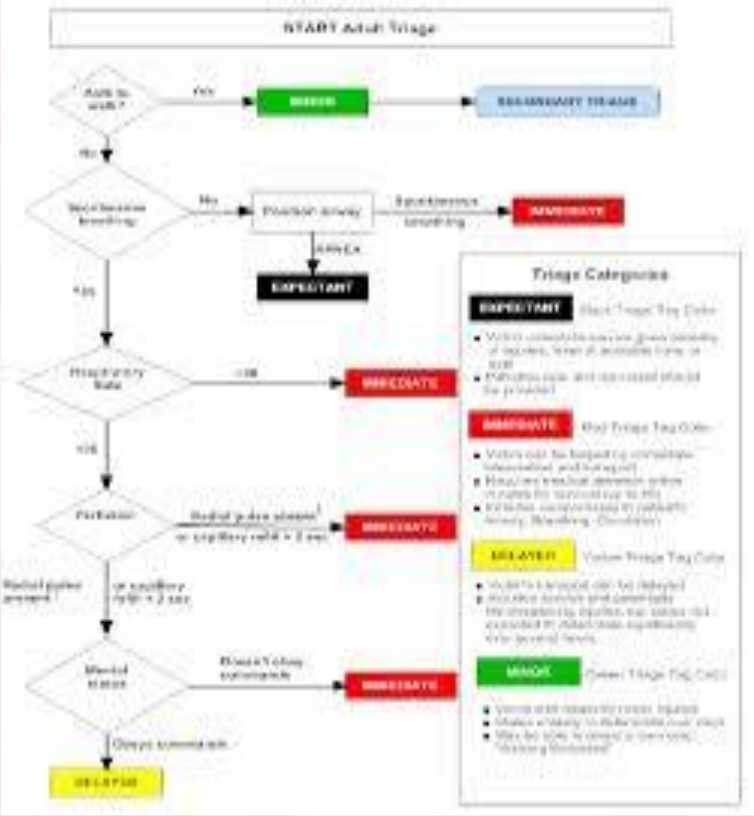
Clinical Criteria

- CODE 5 – no intervention
- Dead – no intervention
- Dying (those not expected to live despite intervention) open airway, assess for breathing, place in recovery position

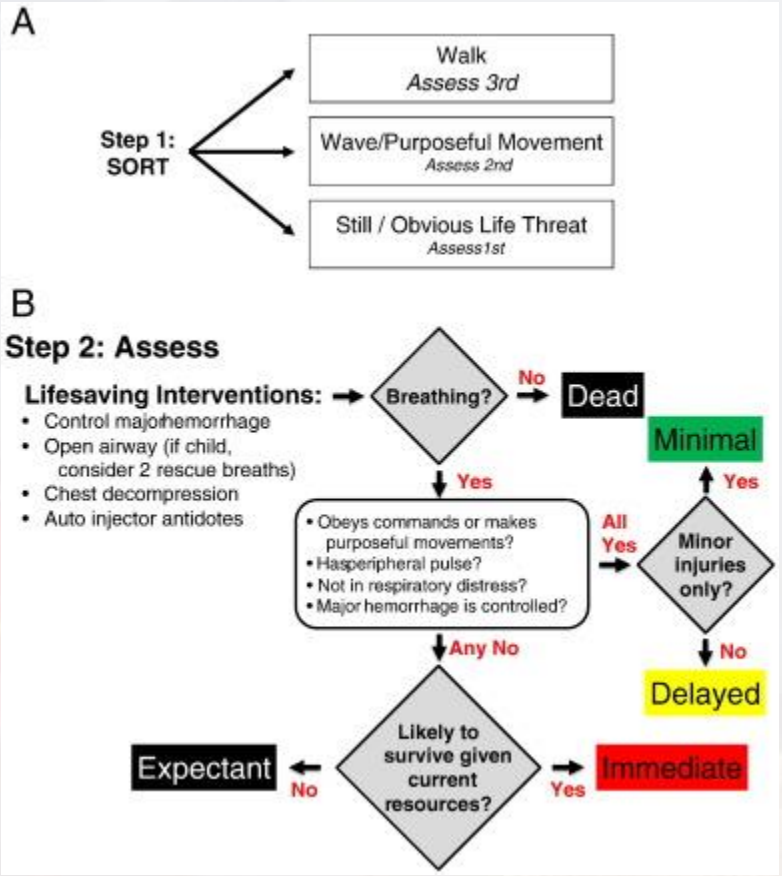
  - Will be classified as **black** or **grey** depending on the System used
  - IF! Appropriate resources are available, these patients may be categorized as **RED** and resuscitation may be attempted

Clinical Criteria - Breathing

- START
- R-P-M-30-2-CAN DO



- SALT



Clinical Criteria -Circulation

- Check for radial pulse/cap refill
- If bleeding, apply pressure and/or tourniquet

Clinical Criteria

LOC – Response to stimuli (AVPU)

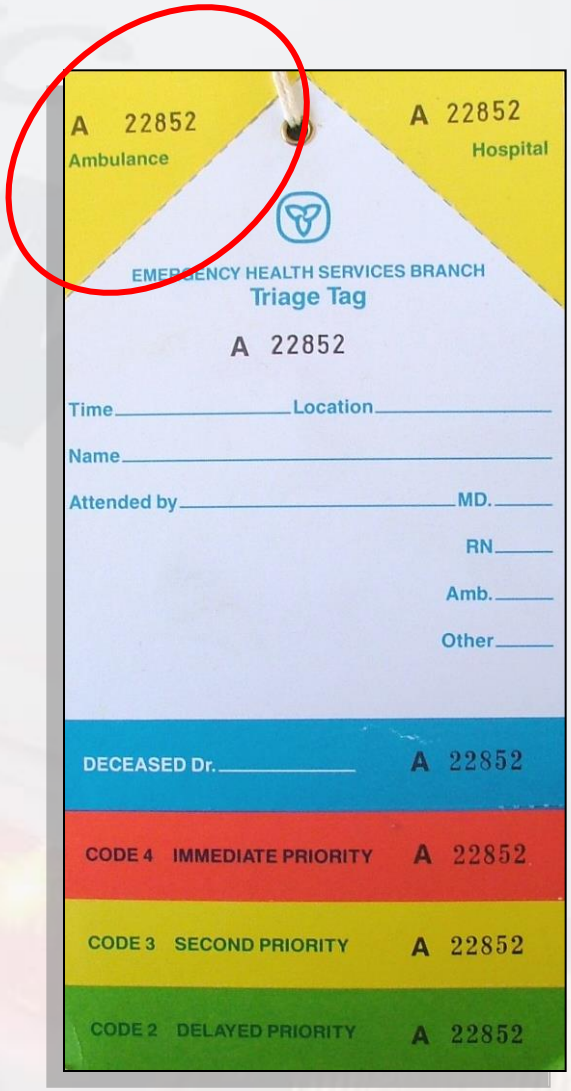
- **A**lert
  - no potential life-threats - GREEN
  - potential life-threat - YELLOW
- **V**erbal
  - no potential life-threats - GREEN
  - Confused - YELLOW
- **P**ain
  - no potential life-threats - YELLOW
  - potential life-threat - RED
- **U**nresponsive
  - RED

Clinical Criteria - review

- Determine the category
  - Position airway to keep open
  - Apply dressing to control hemorrhage
  - Move on to the next casualty
- Secondary triage is performed only after all casualties are tagged
  - Patient condition is reviewed and triage tag is revised
- The card (if using) should always remain with the patient and should be completed prior to the transfer of care in the hospital

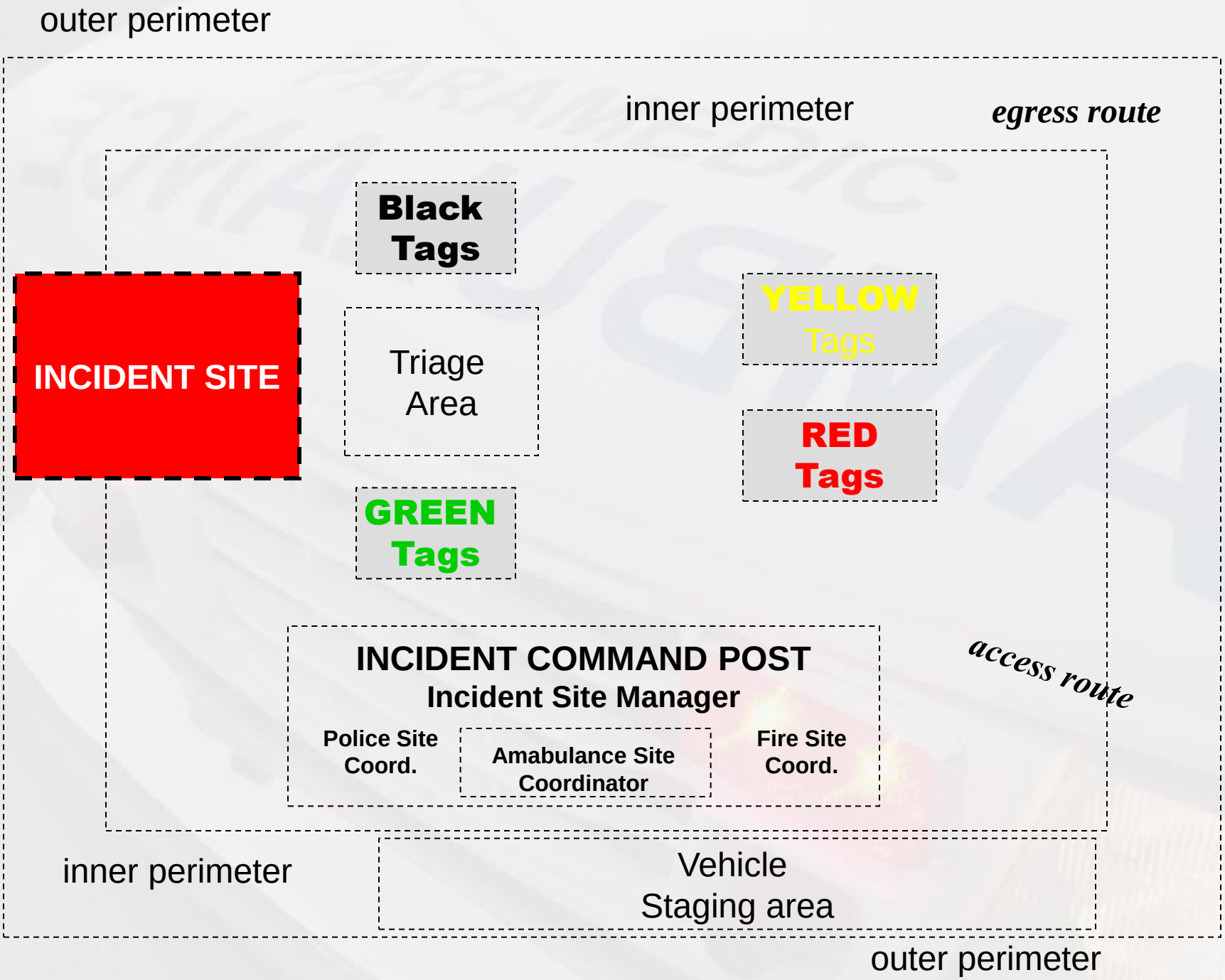
Category Strips – if using the card system

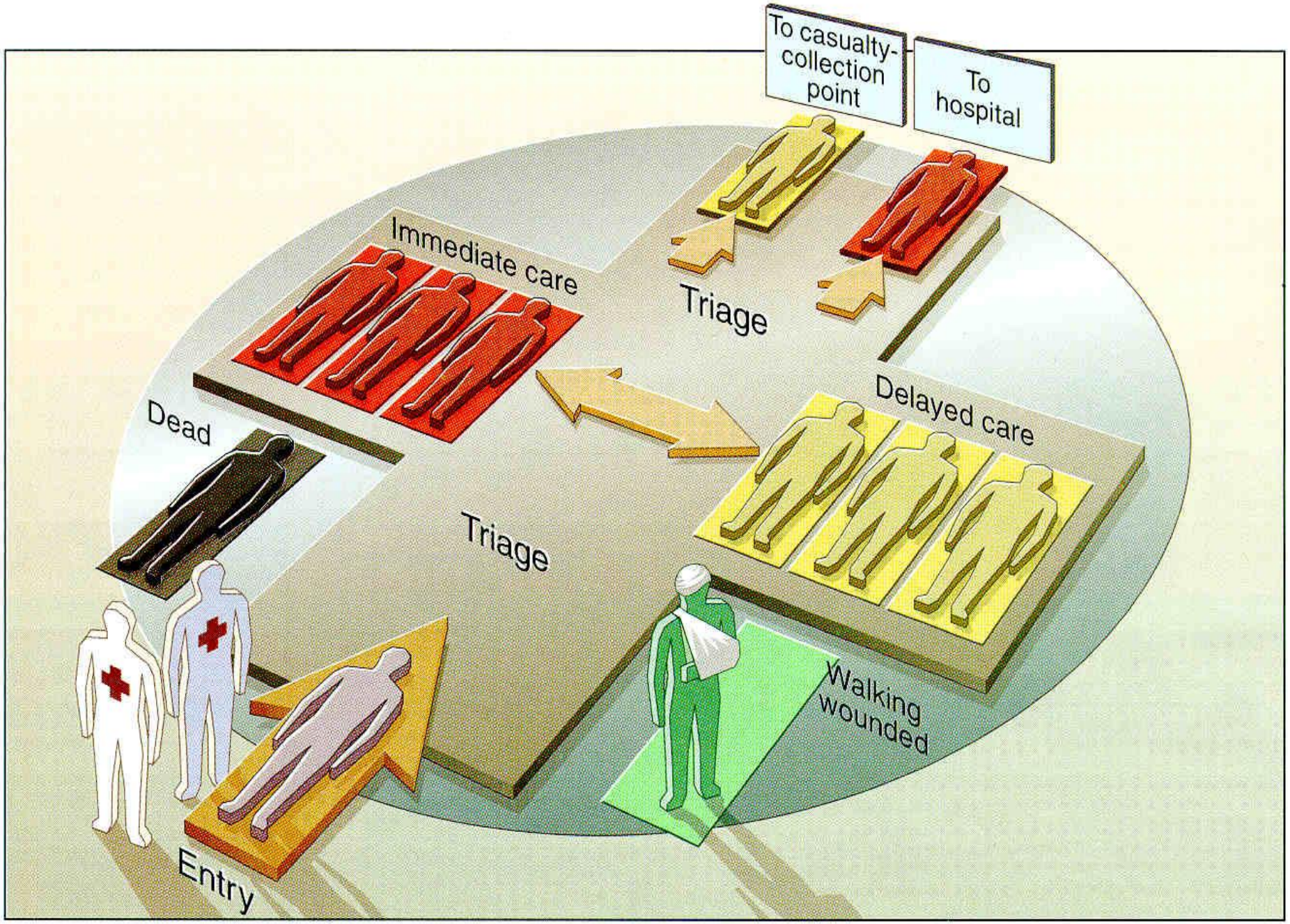
- The transporting crew should detach and retain the "Ambulance" corner for later documentation
- The "Hospital" should be attached to the patient chart copy of the ACR



Principles of Triage - ACP

- Same as PCP
  - ACP's may sometimes feel the need to re-triage (with the perception that they are the highest medical authority and held accountable to this)
- ACP's should be directed by incident command or the triage officer
  - Triage officers should direct ACP's to the most appropriate patients – *they will not re-triage*
  - Transport


outer perimeter
inner perimeter
egress route
Black Tags
INCIDENT SITE
Triage Area
YELLOW Tags
RED Tags
GREEN Tags
INCIDENT COMMAND POST
Incident Site Manager
Police Site Coord.
Amabulance Site Coordinator
Fire Site Coord.
access route
inner perimeter
Vehicle Staging area
outer perimeter


To casualty-collection point
To hospital
Immediate care
Triage
Delayed care
Dead
Triage
Walking wounded
Entry

Triage Categories

Second, third…responding Vehicles

While en route obtain the following information:

- Potential hazards on-scene
- Location of staging area
- Site radio frequency, if one has been assigned

Second, third…responding Vehicles

Upon arrive:

- Notify CACC of arrive at scene
- Park vehicle in Staging Area & keep ingress/egress route clear
- Turn off emergency lights and radio repeater systems
- Wear appropriate PPE
- Report to Ambulance Site Coordinator or Traffic Control Officer

MCI Triage: Key Points

- Resources and patient numbers and acuity are limiting factors.
- Must be dynamic, responsive to changes in both resources and patient needs.
- There is currently no civilian MCI triage system that has been validated by outcome data.

TRIAGE

A **DYNAMIC** PROCESS

NOT

A STATIC PROCESS

Triage and secondary triage should continue until all patients are transported.

Triage may be done multiple times before all patients are transported

First crew on scene, last crew to leave (typically)

QUESTIONS?