

### Hazardous Materials

 "Any substance or material in a form which poses an unreasonable risk to health, safety, and property when transported in commerce."—U.S. Department of Transportation (DOT)

What hazardous materials exist within our communities?

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### Responsibilities of the EMT

- · Recognize a hazmat incident
  - Awareness of what is in and passes through your community.
  - Never assume a scene is safe.
  - Only those trained to the appropriate level should enter the immediate site.
  - All patients leaving the site should be considered contaminated until proven otherwise.

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### Awareness Level Response Goals



- Recognize
- <u>I</u>solation
- Protection
- Notification

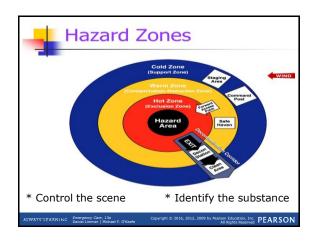
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### OSHA Training Required by Law

- First Responder Awareness
  - No minimum
- First Responder Operations
  - 8 hours
- · Hazardous Materials Technician
  - 24 hours
- Hazardous Materials Specialist
  - 24 additional hours

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### **Identify Hazardous Materials**

- · 6 Basic Clues to Recognition
  - Occupancy and Location
  - Container Shape and Size
  - Placards and Labels
  - Shipping Papers and Facility Documents
  - Markings and Colors
  - Human Senses



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### **Identify Hazardous Material**

- 1. Occupancy and Location
  - o General area
  - Fixed facilities
  - Modes of transportation
    - oRail, air, water, highway, pipeline
  - Drug labs



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### **Identify Hazardous Material**

- 2. Container Shape and Size
  - Classifications
    - Portable, fixed or transportation
  - Pressure
    - o Non-pressurized, low, or high pressure
  - Vapor pressure and storage
    - The higher the pressure, the greater the catastrophe

Boiling Liquid Expanding Vapor Explosion (BLEVE)

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### **Identify Hazardous Material**

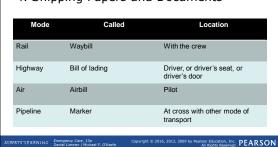
- 3. Placards and Labels
  - Limitations
  - Not always required (<1,000 pound rule)</li>
  - Based upon the DOT Hazard Classes
    - based apoli the DOT Hazard Clas.
    - Class 1: Explosives
    - o Class 2: Gases
    - o Class 3: Flammable and combustible liquids
    - o Class 4: Flammable solids
    - $_{\circ}$  Class 5: Oxidizing substances and organic peroxides
    - Class 6: Toxic substances and infectious substances
    - Class 7: Radioactive
- Class 8: Radioactive

Class 9: Miscellaneous

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### **Identify Hazardous Material**

4. Shipping Papers and Documents



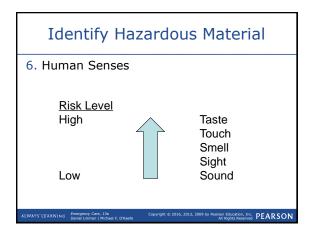
### **Identify Hazardous Material**

- 5. Markings and Colors
  - o Containers are not always standardized
  - UN/NA identification numbers
  - o NFPA 704 diamond



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### **Identify Hazardous Material**

- · Ways to obtain information safely
  - Use binoculars to look for identifying signs, labels, or placards from a safe distance.
  - Review safety data sheets (SDS).
  - Interview workers or others leaving hot zone.
  - Get expert advice next actions
    - Emergency Response Guidebook
    - Chemical Transportation Emergency Center (CHEMTREC)

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### **Rehab Operations**

- Rehabilitation operations
  - Located in the cold zone
  - Protected from weather
  - Large enough to accommodate multiple rescue crews
  - Easily accessible to EMS units
  - Free from exhaust fumes
  - Allows for rapid reentry into the emergency operation

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### Establish a Treatment Area

- Care of injured and contaminated patients
  - Decontaminate in warm zone
  - Treat in <u>cold</u> zone
  - Field-decontaminated patients are not completely "clean."
  - Personal protective equipment or clothing (PPE/PPC) is needed to prevent secondary contamination of rescuers.

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### Establish a Treatment Area

- Care of injured and contaminated patients (continued)
  - Protect vehicles from contamination.
  - Consider used equipment as disposable.
  - Structural firefighting clothing is not designed or recommended for use when working in hazardous material environments.

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### Establish a Treatment Area

- There are 4 types of patients
  - Uninjured and not contaminated
  - · Injured and not contaminated
  - · Uninjured and contaminated
  - · Injured and contaminated



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### Establish a Treatment Area

- · Care of injured and contaminated patients
  - Take BSI/PPE precautions.
  - Follow the first-aid measures listed in the Emergency Response Guidebook.
  - Manage critical ABC needs.
  - When irrigating with water remember that water only dilutes most substances.
  - After treating the patient, decontaminate yourself. Consider your clothing disposable.

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### Phases of Decontamination

- Phases of decontamination
  - Gross decontamination
  - Chemical or majority of contaminant
  - Secondary decontamination
    - Residual product contamination
    - · More thorough

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### Phases of Decontamination

- Mechanisms for decontamination (pg. 1065)
  - Emulsification using surfactant, soap or detergent
  - Chemical reaction neutralizes, degrades
  - Disinfection destroys microorganisms
  - Dilution reduces the concentration
  - Absorption or adsorption water soaking sponge
  - Removal removal by pressure or vacuum
  - Disposal aseptic removal of object

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### Decontamination

- Decontamination Objectives
  - Determine the appropriate level of PPE based on materials and associated hazards
  - Properly wear and operate in PPE
  - Establish operating time log
  - · Set up, operate decontamination line
  - Prioritize the decontamination of patients according to a triage system
  - Perform triage in PPE
  - · Be able to communicate while in PPE

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### Decontamination

- Basic list of decontamination equipment
  - Buckets
  - Brushes
  - Decontamination solution
  - · Decontamination tubs
  - Dedicated water supply
  - Tarps or plastic sheeting

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### Decontamination

- Decontamination equipment (cont.)
  - Containment vessel for water runoff
  - Pump to transfer wastewater from decontamination tubs to a containment vessel
  - A-frame ladder
  - Appropriate-level PPE for responders performing decontamination

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### Decontamination

- Decontamination for patients wearing PPE
  - Scrub suit with brush, starting at head and working down.
  - Rinse again, starting at head and working down.
  - · Assist responder in removing PPE.
  - · Contain runoff of hazardous wastewater.

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### Establish a Treatment Area

- Decontamination for patients not wearing PPE
  - First consideration is for responder safety.
  - Use PA system to direct ambulatory patient to decontamination line.
  - · Patients remove clothes and contact lenses.
  - Double-bag clothing.
  - Receive 2- to 5-minute water rinse, starting at the head.
  - · Provide patient cover for modesty.

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### Multiple-Casualty Incidents

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### Multiple-Casualty Incidents



Multiple-casualty incidents may range from small to large. In this bus crash, all passengers were triaged and forty-four patients were transported to area hospitals.

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# Multiple-Casualty-Incident Operations

- Know local disaster plan
  - Written to address events conceivable for particular location
  - Well publicized
  - Realistic
  - Rehearsed

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### National Incident Management System (NIMS)



### **Incident Command System**

- Command functions
  - Incident Command assumed by most senior member of first service on scene
    - Once reinforcements arrive they can:
      - · Continue to be in Command
      - Transfer Command to someone of higher rank

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### **Incident Command System**

- Scene size-up
  - Arrive at scene and establish Incident Command.
  - Do a quick walk through the scene to assess number of patients, hazards, and degree of entrapment.
  - Get as calm and composed as possible to radio in an initial scene report and call for additional resources.

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### **Incident Command System**

- Communications
  - On arrival, give brief report and request necessary resources.
  - Incident Commander only person to converse with communications center, disseminates information to others
  - Have face-to-face conversations among command staff whenever possible.

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### **Incident Command System**

- Organization
  - Early and aggressive organization vital
  - Have a plan to deploy resources.
  - Think about supply and staging areas.
  - Think big. Order big.
  - Prevent "freelancing."
  - Have some personal tools, such as a "tactical worksheet."

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### **Incident Command System**

- · EMS branch functions
  - Mobile command center
  - Extrication
  - Staging area
  - Triage area
  - Treatment area
  - Transportation area
  - Rehabilitation area

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### Triage

- · Goal of Triage
  - Afford greatest number of people greatest chance of survival
- Most knowledgeable EMS provider becomes the triage supervisor (not necessarily your highest trained).

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### **Primary Triage**

- Priority 1 (red)
  - Treatable life-threatening illnesses or injuries
- Priority 2 (yellow)
  - Serious but not life-threatening illnesses or injuries
- Priority 3 (green)
  - "Walking wounded"
- Priority 4 (sometimes called Priority 0, black)
  - Dead or fatally injured

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## START Triage: A National Standard for Rapid Primary Triage

- Simple Triage and Rapid Treatment
- Speed, simplicity, consistency of application
- Simple commands to patients
- Patient evaluation based on RPM
  - Respiration
  - Pulse
  - Mental status

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### START Triage: A National Standard for Rapid Primary Triage

- Only three treatments provided during START triage
  - Open an airway and insert an oropharyngeal airway.
  - Apply pressure to bleeding.
  - Elevate an extremity.

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### START Triage: A National Standard for Rapid Primary Triage

- First goal is to remove patients who are mobile.
- Are you able to walk?
  - Yes
    - Priority 3 (green)



- No Start RPM
  - Check respirations

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# START Triage: A National Standard for Rapid Primary Triage

- Assess respiration (breathing status)
  - No breaths
    - · Position airway; recheck respirations
  - Not breathing and attempts to open airway do not start breathing
    - Priority 0

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## START Triage: A National Standard for Rapid Primary Triage

- Assess respiration (breathing status)
  - Yes and >30/minute
    - Priority 1 (red)



- Yes and <30/minute</li>
  - Check pulse

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### START Triage: A National Standard for Rapid Primary Triage

- Assess radial pulse second (RPM).
  - Unresponsive, not breathing, no pulse
    - Priority 0 (black)
  - Breathing, no apparent pulse
    - Priority 1 (red)
  - Respirations < 30, Perfusion good
    - Check mental status

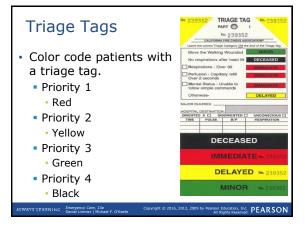
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# START Triage: A National Standard for Rapid Primary Triage • Assess level of consciousness (RPM - mental status) third. • Altered mental status • Priority 1 (red) • Alert • Priority 2 (yellow)

# START Triage Flowchart All walking Wounded NO YES NO Respirations Respirations Radial Pulse Absent Radial Pulse Present Over 2 Seconds + Capillary Refill + Under 2 Seconds Control Bleeding CAN Follow Simple Commands Simple Commands Simple Commands Simple Commands DELATED AUMAYSTEARNING RESPIRATIONS AUMAYSTEARNING RESPIRA

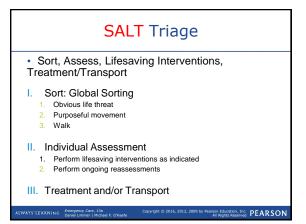
# Re-Triage the Walking Wounded Now re-triage the Priority 3 "walking wounded" patients. Respiration Pulse Mental status

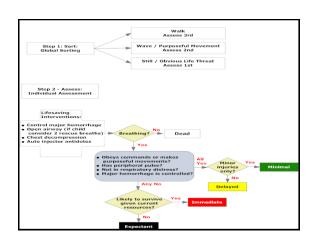


### MUCC Model Uniform Core Criteria

- A science and consensus-based national guideline that recommends 24 core criteria for all mass casualty triage systems.
- Used as the basis for the CDC Field Triage Decision scheme and SALT
- Alternate triage format to START

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### Secondary Triage and Treatment

- Secondary triage is performed at a patient collection point or triage area.
- Patients are separated into treatment groups based on their priority level.
  - Each treatment area should have its own treatment supervisor.
- It may be necessary to recategorize a patient whose condition has deteriorated or improved.

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## Transportation and Staging Logistics

- Transported once patients are triaged and treated according to priority.
- Ambulances remain in staging area until directed to patients.
- Staging and Transportation supervisors
- Overwhelming a hospital's surge capacity could bring about poor outcomes.

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### Communicating with Hospitals

- Receiving facilities contacted early to determine capabilities and update on expected patient counts
- Transportation officer, not individual EMTs, should communicate.
- Generally too many patients to allow a good radio report
  - Only basic information given

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### Psychological Aspects of MCIs

- Caring, honest demeanor can reassure patient.
- Do not attempt to psychoanalyze a person's distress.
- "Psychological first aid" may be necessary on the scene of MCI.



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### Think About It

 If you are the first rescue vehicle to reach the scene of an MCI, what should you do?

# Chapter Review

### **Chapter Review**

- Maintain a high index of suspicion and awareness. Many hazmat incidents start out as routine EMS calls.
- The biggest problem in most hazmat incidents in identifying the offending substance. Look for the shipping placard and the SDS. Use the Emergency Response Guide to help determine your initial actions.

### **Chapter Review**

- Remember the hot zone—warm zone cold zone. Once you realize it's a hazmat incident, get to the cold zone and call for help.
- Keep responders in rehab until they are rested, hydrated, and vitals return to normal.

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### **Chapter Review**

- · Patients who have been "decontaminated" almost always still have some contamination.
- Patients being transported must be cared for by competent EMS responders with Operations-level training and equipment.

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### **Chapter Review**

- Use your MCI plan and procedure at small incidents, as this will make managing larger ones will be easier.
- NIMS and Incident Management are the national standard for incident management.

### **Chapter Review**

- Learn and practice START triage essentials.
- Be alert for signs of stress after incidents, and seek help as necessary.

### Remember

· A hazardous materials response requires specialized training and resources. Common responsibilities of initial responders must be identification of the incident, scene control, and activation of appropriate resources.

### Remember

- Scene safety is highest priority; when possible, use scene clues, product information, and specific resources to identify hazardous materials.
- Decontamination prevents the spread of a hazardous material. EMTs are commonly involved in various levels of this process.

### Remember

- Multiple-casualty incident overwhelms resources of responding units. When this occurs, organization is the most important priority.
- NIMS and its incident command system provide organization resources and structure to improve management of large-scale incidents.

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### **Questions to Consider**

- What is the hazardous substance? What risk does it pose?
- If a patient has some contamination, can we safely start decontamination?
- Should I start using triage tags?

### Critical Thinking

 Your call is to a motor-vehicle collision with an unknown number of injuries. As your unit approaches the scene, you see that three cars and downed wires are involved. You get a whiff of gasoline as you pass by.

### **Critical Thinking**

 The drivers are visible in each vehicle one appears to be conscious and the other two are bent forward or slumped back. There are passengers visible in two vehicles, one or more of whom may need extrication. How should you proceed?

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