EMS Subspecialty Certification Review Course

4.2.2 Explosive Incidents
4.2.2.1 Improvised Explosive Devices (IEDs) and terrorist activity
4.2.2.2 Community risk assessment
4.2.2.3 Integration with search and rescue
4.2.3 Weapons of Mass Destruction and Related Injury
4.2.3.1 Secondary Devices in Scene Safety

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Learning Objectives

- Review Improvised Explosive Devices and terrorist activity
- Perform community risk assessment
- Integrate with search and rescue missions
- Discuss secondary devices and scene safety

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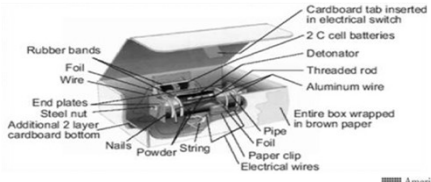
IEDs and Terrorist Activity

- An IED can take virtually any form, and its complexity is limited only by the skill and ingenuity of its builder.
- Components of a device
  - Explosive
  - Means of initiation



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Methods of Initiating IEDs

- Victim Activated
  - Targeted individual introduces a stimulus
    - Stepping on a pressure plate
- Time Activated
  - Timing mechanism will trigger the device at a predetermined time
    - Usually used for random attacks
- Command Activated
  - Controlled by the bomber

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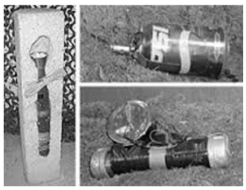
Secondary Devices

- Have been utilized to target first responders
- Increased awareness is key to identification
- Check areas of interest such as command post, routes of ingress/egress etc.
- Consider the concern for secondary devices before committing resources



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Category	Mechanism	Injury Type
Primary	A form of barotrauma, unique to explosions, which causes injuries to air-filled organs	Blast lung, TM rupture, Abdominal hemorrhage and perforation, Globe(eye) rupture, Concussion
Secondary	Trauma caused by the acceleration of shrapnel and other debris by blast	Penetrating ballistic (fragmentation), Blunt injury (deceleration), Eye penetration,
Tertiary	Casualty becomes a missile and is propelled through the air, with typical patterns of trauma	Fracture and traumatic amputation, Blunt chest/abd trauma, Impalement, Closed and open brain injury

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Category	Mechanism	Injury Type
Quaternary	All other explosion-related injuries, illnesses, or diseases, which are not due to primary, secondary or tertiary mechanisms	Burns (flash, partial full thickness) Crush, exacerbation of underlying medical problems e.g. asthma, inhalation injury,
Quinary	The intentional addition of agents that may result in injury	Radiation, Chemical, Biological (including suicide bombers with HIV, HCV)

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Blast Injury

- Primary = invisible element of injury
  - Indoor blast increases risk of overpressure injury
  - Think air-filled spaces at risk
- Secondary = traditional penetrating trauma
- Tertiary = fall-like related injuries
- Quaternary = Burns, crush injury, exacerbation of asthma/ COPD etc
- Quinary = Environmental contaminants, chem, bio, rad compounds in device

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Blast injuries

Auditory	Tympanic membrane rupture, ossicular disruption, cochlear damage, foreign body
Eye, orbit, face	Perforated globe, foreign body, air embolism, fractures
Respiratory	Blast lung, hemothorax, pneumothorax, pulmonary contusion and hemorrhage, arteriovenous fistulas (source of air embolism), airway epithelial damage, aspiration pneumonitis, sepsis
Digestive	Bowel perforation, hemorrhage, ruptured liver or spleen, sepsis, mesenteric ischemia from air embolism
Circulatory	Cardiac contusion, myocardial infarction from air embolism, shock, vasovagal hypotension, peripheral vascular injury, air embolism-induced injury
CNS injury	Concussion, closed and open brain injury, stroke, spinal cord injury, air embolism-induced injury
Renal injury	Renal contusion, laceration, acute renal failure due to rhabdomyolysis, hypotension, and hypovolemia
Extremity	Traumatic amputation, fractures, crush injuries, compartment syndrome, burns, cuts, lacerations, acute arterial occlusion, air embolism-induced injury

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Community Risk Assessment

- Identification of hazards present in the community
- Consequences of a hazard are associated with the potential to mitigate the event
- Categories of consequences
  - Human impacts
  - Economic impacts
  - Physiologic impacts
  - Functional impacts

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Community Hazards

- Categories of Community Hazards
  - Life
  - Property
  - Critical infrastructure
- Fusion Centers
  - Receive, Analyze, Disseminate, Gather information and intelligence
  - Owned and operated by state and local entities
    - Support from Federal partners

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Integration with Search and Rescue

- ESF 9 Urban Search and Rescue (USaR)
- National Response Framework
  - Limited local capacity/expertise for structural collapse
  - Specialized team members
  - Physician is part of the team
  - FEMA is primary coordinating agency

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Task Force capabilities:

- Conduct physical, canine and electronic searches in collapsed structure and confined space environments
- Provide emergency medical and ALS care to trapped victims
- Assess and control gas, electric, and hazmat threats
- Evaluate and stabilize damaged structures
- Operate heavy equipment
- Coordinate public information

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USaR

- Common injuries associated with collapsed structures
  - Fractures/lacerations, closed head injury, multisystem trauma, dehydration
  - Delayed access to patients may result in exacerbations of chronic medical conditions and increased complications of traumatic injuries
  - Compartment syndrome and treatment of rhabdomyolysis is often considered

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Take-Home Points

- USaR teams perform a specialized function. Be familiar with common treatment issues regarding crush injuries and prolonged extrication
- Community risk assessment is performed to determine vulnerability and to develop mitigation strategies
- IEDs are increasing in the domestic environment and have variable mechanisms of creating injury and terror

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