



# **Overview of the Terrorism Injuries: Information Dissemination and Exchange (TIIDE) Program**

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**National Center for Injury Prevention and Control**

**Centers for Disease Control and Prevention**

# Background

- **In many states and communities, acute care, EMS, and public health systems are poorly integrated**
- **Recent terrorist events and natural disasters worldwide demonstrate need for interoperable and integrated emergency health system**
- **Relationships must be forged and strengthened between organizations to work together on issues to improve public safety/health and healthcare system preparedness**

# Background

- **FY 2003, RFA issued for “Linkages of Acute Care and Emergency Medical Services to State and Local Public Health Programs”**
- **Established through a cooperative agreement, came to be known as Terrorism Injuries: Information Dissemination and Exchange (TIIDE) Project**
- **Formed to support collaboration between national organizations of professionals in acute medical care, trauma, emergency medical services (EMS) with state and local public health programs**

# TIIDE Partners, 2004-2007



# **TIIDE Partners, 2004-2007**

- **American College of Emergency Physicians (ACEP)**
- **American College of Surgeons, Committee on Trauma (ACS-COT)**
- **American Medical Association (AMA)**
- **American Trauma Society (ATS)**
- **National Association of EMS Physicians (NAEMSP)**
- **National Association of Emergency Medical Technicians (NAEMT)**
- **National Association of State EMS Officials (NASEMSO)**
- **National Native American EMS Association (NNAEMSA)**
- **State and Territorial Injury Prevention Director's Association (STIPDA)**

# TIIDE Activities: Leadership Summit

- American Medical Association and American Public Health Association
- Leadership of 17 national organizations
- Specific recommendations that are feasible and achievable
- Resulted in publishing *Improving Health System Preparedness for Terrorism and Mass Casualty Events*

# **TIIDE Activities: Model Communities**

- **Establish relationships between the emergency care community and public health to effectively respond to events that may cause large numbers of injuries**
- **Communities selected as best practice models for EMS and public health interoperation**
- **Seven Model Communities initially chosen**
- **Twelve Model Communities as of FY 2008**

# TIIDE Model Communities

- **Clark County Health District, Las Vegas, Nevada**
- **Erie County, New York**
- **Livingston County, New York**
- **Monroe County, New York**
- **Louisville, Kentucky**
- **Boston, Massachusetts**
- **Eau Claire County, Wisconsin**
- **County of San Diego, CA**
- **Palm Beach County, FL**
- **Chouteau County, MT**
- **Southeast Wisconsin-Region 7**
- **Pinellas County, FL**

# **TIIDE Activities: Blast Injury Care Education**

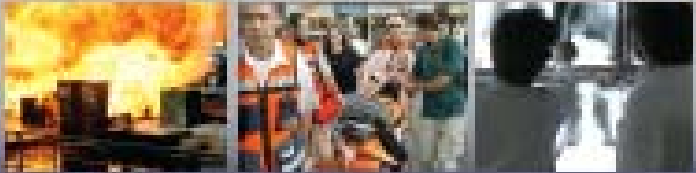
- **Led by American College of Emergency Physicians**
- **Expert panel review of 50 national courses**
- **Identification of gaps**
- **Course / module development**
- **Pilot courses**
- **Final products distributed in late 2006 and 2007**

# **TIIDE Activities: Blast Injury Care Education**

- ***Bombings: Injury Patterns and Care*** (CD format)
  - PowerPoint presentation
  - Curriculum guides with teaching points
  - One-hour lecture
  - Three-hour seminar
- **Interactive scenario-based training** (CD format)
- **Quick reference wall poster**
- **Quick reference pocket guide**


# TIIDE Activities: Blast Injury Care Education

**Bombings: Injury Patterns and Care**



**PowerPoint presentations**

**Curriculum guides with teaching points**




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**Bombings: Injury Patterns and Care**



**Interactive Scenario-based Training**



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# TIIDE Activities: Blast Injury Care Education

## Bombings: Injury Patterns and Care Pocket Guide



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## UNIVERSAL BLAST

### *Blast Event*

#### SCENE SAFETY

- Check in at staging area for safety briefing.
- Personal safety.
- PPE – Protective clothing, hard hats, eye protection, respiratory protection.
- Protection of uninjured public and volunteers.
- Protection of injured.
- Be aware of secondary explosive devices.
- Be aware of multi-agent devices, e.g. chemical release, dirty bomb, etc.

#### TRIAGE CONSIDERATIONS

- Unique patterns, multiple and occult injuries.
- Death is often a result of combined blast, ballistic, and thermal effect injuries.
- Waling Wounded and non-critical patients are time intensive.
- Hidden/internal injuries.
- Downfalls can increase critical mortality – resulting from poor patient distribution from scene and self-referrals to hospitals.
- Up to 75% of victims self-refer to hospital.
- Do patients require decontamination?

**Initial triage, trauma resuscitation, and transport should follow standard protocols for multiple injured patients or mass casualties.**

#### FACTORS THAT CONTRIBUTE TO BLAST INJURY SEVERITY

##### ENVIRONMENT

- **Was The Bombing In An Open Or Closed Space?** The effects of the blast wave are more intense in a confined space such as a building, bus or train.

##### AGENT

- Low-order Explosive
- High-order Explosive

##### OTHER FACTORS

- Device type – large (vehicle) or small (suicide)
- Delivery method
- Distance from device
- Protective barriers

Additional resources can be found at: [www.acep.org/blastinjury](http://www.acep.org/blastinjury) or [www.ajdc.org/practitionerofblast](http://www.ajdc.org/practitionerofblast)

# UNIVERSAL BLAST

## Blast Event

### SCENE SAFETY

- Check in at staging area for safety briefing.
- Personnel safety
- PPE – Protective clothing, hard hats, eye protection, respiratory protection.

- Protection of uninvolved public and volunteers.
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### TRIAGE CONSIDERATIONS

- Unique patterns, multiple and occult injuries.
- Death is often a result of combined blast, ballistic, and thermal effect injuries.
- Walking wounded and non-critical patients are time intensive.
- Hidden/internal injuries

- Overtriage can increase critical mortality – resulting from poor patient distribution from scene and self-referrals to hospitals.
- Up to 75% of victims self-refer to hospital.
- Do patients require decontamination?

**Initial triage, trauma resuscitation, and transport should follow standard protocols for multiple injured patients or mass casualties.**

### FACTORS THAT CONTRIBUTE TO BLAST INJURY SEVERITY

#### ENVIRONMENT

- **Was The Bombing In An Open Or Closed Space?** The effects of the blast wave are more intense in a confined space such as a building, bus or train.

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#### OTHER FACTORS

- Device type – large (vehicle) or small (suitcase)
- Delivery method
- Distance from device
- Protective barriers

SECONDARY, TERTIARY, AND QUATERNARY INJURIES ARE COMMON IN BLAST EVENTS, AND LARGE MAJORITY ARE NOT CRITICAL.

IT IS UNLIKELY TO EXPERIENCE PATIENTS WITH INJURIES ISOLATED TO ONE CATEGORY. A MORE LIKELY SCENARIO WOULD BE TO EXPERIENCE PATIENTS WITH A COMBINATION OF ALL THE INJURIES LISTED BELOW.

TREATMENT FOR MOST OF THESE BLAST INJURIES FOLLOWS ESTABLISHED PROTOCOLS FOR THAT SPECIFIC INJURY.

### PRIMARY INJURIES

Unique to high-order explosives; results from the impact of the over-pressurization wave with body surfaces by the blast wave.

#### HEAD INJURIES

- May or may not include history of loss of consciousness
- Headache, seizures, dizziness, memory problems
- Gait/balance problems, nausea/vomiting, difficulty concentrating.
- Visual disturbances, tinnitus, slurred speech.
- Disoriented, irritability, confusion.
- Extremity weakness or numbness.

#### TYMPANIC MEMBRANE – EAR INJURIES

- Evaluate and resuscitate per standing protocols.
- Impaired hearing may complicate triage process.
- Secondary evaluation and examination to identify all blast-related injuries including perforated tympanic membranes.
- Serious blast injuries can occur in the absence or presence of tympanic membrane rupture.
- Stable patients without signs and symptoms of significant blast injury, may be discharged after 4 to 6 hours of observation despite the presence of TM rupture.
- Patients should have urgent consultation and follow up care with ENT specialist.
- Spontaneous healing occurs in 50-80% of all patients with perforations.



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# Bombings: Injury Patterns and Care

## CRUSH INJURY

### Blast Event

#### ENTRAPPED PATIENT TREATMENT

- Fluid resuscitation before extrication
  - ▶ 1 L NS bolus, 1-1.5 L/hr infusion
- Limb Stabilization
- Minimize potential systemic effects of reperfusion (tourniquets)
- Consider alkalinization
  - ▶ 1 ampule Sodium Bicarbonate (50 mEq) prior to extrication, followed by 1 ampule of Sodium Bicarbonate with each liter of NS infused at 1-1.5 L/hr. Maintain a second IV w/o Sodium Bicarbonate.

Vital signs, oxygen, EKG, IV — Additional treatment and transport

#### IS CRUSH SYNDROME OR COMPARTMENT SYNDROME SUSPECTED?

Areas commonly affected:

- Lower/ Upper extremities
- Gluteal region
- Pelvis
- Abdominal muscles

#### SIGNS AND PRESENTATION OF CRUSH SYNDROME

The general condition of a patient with crush injury is dictated by: (1) other injuries, (2) delay in extrication, and (3) environmental conditions.

Common presentations are:

- Hypothermia or hyperthermia dehydration/shock
- Mental status varies from alert to comatose

Clinical concerns:

- The systemic effects are due to rhabdomyolysis and reperfusion of hypoxic and damaged tissues.
- Reperfusion of body part results in the systemic effects of crush injury.
- Patients may appear well until extricated, and then precipitously decompensate.
- Skeletal muscle damage is greatest after reperfusion.
- Cardiovascular instability due to massive fluid shift, electrolyte abnormalities, and direct myocardial toxicity.

#### SIGNS OF COMPARTMENT SYNDROME

Pain, Pallor, Paresthesia, Paralysis, Pulselessness Progression of symptoms (the 6P's)

Clinical concerns:

- Bone fractures with extravasation of blood or edema within a closed compartment.
- High velocity penetrating injury to muscles in closed compartment with extensive tissue disruption.
- Can also occur in sub acute fashion due to prolonged immobilization on hard surface.
- Compartment syndrome typically occurs in major muscle groups enclosed by inelastic, fibrous sheaths.
- Principal areas for compartment syndrome are upper extremities, including thenar and hypothenar eminences of hand, and lower extremities, including the foot.
- Untreated compartment syndrome will produce the same effects as a crush injury.

#### FIELD AMPUTATION INDICATED?

##### INDICATIONS

- Inability to safely extricate the patient.
- Continued environmental toxins that pose a hazard to victims or rescuers.
- When the extrication time would be long enough that it would endanger the patient's life without field amputation.

#### Field Amputation

- Best performed by an appropriately trained physician, such as a trauma or orthopedic surgeon.
- Ensure adequate analgesia and anesthesia.

#### CRUSH INJURY TREATMENT PREHOSPITAL

##### CRUSH SYNDROME

- Primary survey and initial stabilization (ABCs)
- Fluid resuscitation before patient is extricated with severe or prolonged entrapment of limb or pelvis (more than a hand or foot).

##### COMPARTMENT SYNDROME

- Primary survey and initial stabilization (ABCs)
- Suspect compartment syndrome due to mechanisms of injury, examination, and patient complaints.
- Treat other injuries
- Immobilize affected part; do not use constricting bandages or MAST trousers.

#### CRUSH INJURY TREATMENT HOSPITAL

##### CRUSH SYNDROME

- Fluid resuscitation
- Diagnose and treat other metabolic derangements:
  - ▶ Hyperkalemia
  - ▶ Hypocalcemia
- Brisk diuresis (2 ml/kg/hr)
- Pain control
- Anxiolysis

##### COMPARTMENT SYNDROME

- Primary survey, stabilization and resuscitation, secondary survey.
- Diagnosis through examination and confirmation with compartment pressure measurements.
- Treat systemic effects of compartment syndrome similar to crush injury.
- If injury is open:
  - ▶ Antibiotics, tetanus, jet irrigation.
  - ▶ Debridement of nonviable tissues.
  - ▶ Early amputation for severely injured limbs may be required to reduce sepsis.
- Fasciotomy

## BLAST LUNG INJURY

# TIIDE Activities

- **Translate military injury care advances from Iraq/Afghanistan to US civilian health care**
- **Develop mass casualty field triage criteria**
- **Develop clinical primers on different aspects of blast injuries**

# Clinical Primers

- Blast Lung
- Mental Health
- Extremity Injuries
- Abdominal Injuries
- Eye Injuries
- Ear Injuries
- Crush Injuries
- Burns
- Radiology
- Special Populations: Pediatric Injuries
- Special Populations: Seniors
- Dirty Bombs
- Immunizations

# TIIDE Partners, 2007-2010



# **TIIDE Partners, 2004-2007**

- **American College of Emergency Physicians (ACEP)**
- **American Medical Association (AMA)**
- **American Trauma Society (ATS)**
- **National Association of EMS Physicians (NAEMSP)**
- **National Association of County & City Health Officials (NACCHO)**
- **Southern Nevada Health District**

# TIIDE 2007-2010 Activities

- **Solicit participation from a minimum of two additional model communities each year**
- **Develop a system for disseminating timely information related to injuries resulting from terrorism**
- **Identify evidence-based disaster response training needs posed by terrorist attacks and mass casualty events**

# **TIIDE 2007-2010 Activities**

- **Determine a set of minimum data elements to monitor and detect injuries as a result of terrorism**
- **Assess potential problems with emergency care and public health interventions associated with a possible terrorist bombing or mass casualty event**
- **Develop and implement a pilot program for addressing patient surge issues in one comprehensive health care system**

# More Information

- CDC Mass Casualty Event Preparedness & Response  
<http://emergency.cdc.gov/masscasualties/>
- TIIDE Project  
[http://www.bt.cdc.gov/masscasualties/pdf/tiide\\_fact\\_sheet2.pdf](http://www.bt.cdc.gov/masscasualties/pdf/tiide_fact_sheet2.pdf)
- *In A Moment's Notice: Surge Capacity in Terrorist Bombings*  
[emergency.cdc.gov/masscasualties/surgecapacity.asp](http://emergency.cdc.gov/masscasualties/surgecapacity.asp)
- Model Communities  
[\*\*www.bt.cdc.gov/masscasualties/modelcommunities.asp\*\*](http://www.bt.cdc.gov/masscasualties/modelcommunities.asp)
- Blast injury education products  
[www.acep.org/blastinjury](http://www.acep.org/blastinjury)