pennsylvania
DEPARTMENT OF HEALTH

BUREAU OF EMERGENCY MEDICAL SERVICES

EMS Information Bulletin - # 072

DATE: September 15, 2009

SUBJECT: Statewide ALS (6005) and BLS (605) Blast Protocols

TO: Regional EMS Councils
Quick Response Services
Ambulance Services

FROM: Bureau of Emergency Medical Services
PA Department of Health
(717) 787-8740

The Bureau of Emergency Medical Services (EMS) is publishing two new protocols dealing with Blast Injuries.

The BLS Blast Protocol is number 605.

The ALS Blast Protocol is number 6005.

BLAST/ EXPLOSIVE INJURY
STATEWIDE BLS PROTOCOL

Criteria:

A. Injuries sustained in a blast or explosion, including:

1. Industrial explosions
2. Terrorist bombings
3. Any other type of explosion

Exclusion Criteria:

A. None

System Requirements:

A. If elevated threat of terrorist bombing, services should consider carrying several commercial tourniquets.

B. If elevated threat of terrorist bombing, fire/rescue/EMS services should consider availability of a Geiger counter with initial responding units.

C. Personal Protective Equipment:

1. If toxic materials are suspected, only appropriately trained and equipped personnel should enter the immediate area.
2. Without suspected toxic hazards, appropriate PPE for explosion scenes include outerwear (like coveralls and heavy “turn out” coat), heavy gloves, steel-toed shoes, hard hat, eye protection, dust particle mask.

Treatment:

A. All Patients:

1. Scene Safety – see Protocol # 102
   a. Consider risks of secondary explosions at scene, triage area, staging area, or receiving facilities
      1) Be observant for victims, vehicles, packages or containers that seem out of place.
   b. Consider risks of radiation contaminated victims of terrorist explosions.
      1) Screen scene with Geiger counter, if radiation is suspected and device is available
   c. Consider risks of unstable buildings and infrastructure.
2. Initial Patient Contact – see Protocol #201
   a. Initiate regional MCI plan if needed
      1) Triage patients using regional MCI plan[1,2,3]
         a) During triage, apply tourniquets to severely bleeding extremities.
      2) Explosion scenes should be presumed to be crime scenes until cleared by authorities – see Protocol # 919
   b. Explosions/ blasts may cause bilateral ruptured tympanic membranes – consider that communications with patients may be impaired.
   c. If thrown by explosion, immobilize spine if indicated – see Protocol # 261
3. If severe bleeding, see Protocol #501
   a. Use tourniquets early if severe extremity bleeding.
4. Consider blast-related injuries:
   [a.] Primary blast injuries (from blast pressure wave)[4]
      1) If Blast Lung suspected due to: SOB, rapid respirations, hypoxia[5] (pulse oximetry <95% when available), wheezing, cough, or coughing blood.

a) Administer high-flow oxygen

b) Monitor pulse oximetry [Optional], if available[5]

c) Observe stable patients for signs of blast lung

b. Secondary blast injuries (from projectiles)[6]

1) If impaled objects, follow Protocol #632

c. Tertiary blast injuries (from patient falling or being thrown by blast or pinned by debris)[7]

1) Immobilize spine, if required – see Protocol # 261

2) If multisystem trauma – see Protocol # 602

3) If crush syndrome suspected due to entrapment for >30 minutes under heavy object/debris – obtain ALS if possible.

d. Quaternary blast injuries (all other injuries/conditions) [8]

1) If burns – see Protocol # 671

5. Transport

a. Do not delay transport if ALS is unavailable

b. Transport to trauma center if Category I or II trauma patient – see Protocol # 105

c. Closest ED may not be most appropriate receiving facility [9]

6. Contact Medical Command, if needed

Notes:

1. Severe internal injuries caused by blast wave may not be apparent initially. Eardrum (tympanic membrane – TM) rupture is the most common type of blast pressure injury and may be associated with other more serious blast injuries. When TM rupture is not present, other blast pressure injuries are less likely.
2. Projectile injuries (e.g. from nails or other sharp objects) may be overlooked at initial triage.
3. In MCIs with explosions, most patients have minor injuries. Overtriage may delay treatment of the smaller number of patients with salvageable life-threatening injuries.
4. Primary blast injuries are caused by the pressure wave of the blast. These include ear drum (tympanic membrane – TM) rupture, eye globe rupture, blast lung, intestinal rupture, and intraabdominal bleeding.
5. Hypoxia may precede other signs of blast lung injury like tachypnea or shortness of breath. Hypoxia despite high-flow oxygen is an indication for early endotracheal intubation, and highest priority triage and priority transport are indicated.
6. Secondary blast injuries are caused by projectiles. These may include debris from structures like glass or wood or may include debris from improvised explosive devices (IEDs) like nails in a pipe bomb. Serious injuries from penetrating objects may be overlooked during triage.
7. Tertiary blast injuries are caused by falling, being thrown or being pinned or entrapped. These include fractures and other injuries seen in blunt trauma. They also may include crush syndrome and compartment syndrome in entrapped patients.
8. Quaternary blast injuries are caused by other trauma/ environment related to explosions or by preexisting conditions of patient. Examples include burns and respiratory distress due to post-explosion dust.
9. Historically, in explosions with a large number of patients, the closest ED becomes overwhelmed with ambulatory patients before any EMS patients arrive. These overwhelmed facilities may not be able to appropriately treat more serious patients arriving by EMS. Transport officer should take this into consideration when dispersing patients to receiving facilities.

Performance Parameters:

A. Transport Category I and II trauma patients within 10 minutes of EMS patient contact unless delayed because patients exceed medical resources available

Additional Resources:

www.emergency.cdc.gov/BlastInjuries Centers for Disease Control

BLAST/ EXPLOSIVE INJURY
STATEWIDE ALS PROTOCOL

Criteria:

A. Injuries sustained in a blast or explosion, including:
1. Industrial explosions
2. Terrorist bombings
3. Any other type of explosion

Exclusion Criteria:

A. None

System Requirements:

A. If elevated threat of terrorist bombing, services should consider carrying several commercial tourniquets.

B. If elevated threat of terrorist bombing, fire/rescue/EMS services should consider availability of a Geiger counter with initial responding units.

C. Personal Protective Equipment:
1. If toxic materials are suspected, only appropriately trained and equipped personnel should enter the immediate area.
2. Without suspected toxic hazards, appropriate PPE for explosion scenes include outerwear (like coveralls and heavy "turn out" coat), heavy gloves, steel-toed shoes, hardhat, eye protection, dust particle mask.

Treatment:

A. All Patients:
1. Scene Safety – see Protocol # 102
   a. Consider risks of secondary explosions at scene, triage area, staging area, or receiving facilities
      1) Be observant for victims, vehicles, packages or containers that seem out of place.
   b. Consider risks of radiation contaminated victims of terrorist explosions.
      1) Screen scene with Geiger counter, if radiation is suspected and device is available
   c. Consider risks of unstable buildings and infrastructure.
2. Initial Patient Contact – see Protocol #201
   a. Initiate regional MCI plan if needed
      1) Triage patients using regional MCI plan [1,2,3]
         a) During triage, apply tourniquets to severely bleeding extremities.
      2) Explosion scenes should be presumed to be crime scenes until cleared by authorities – see Protocol # 919
   b. Explosions/ blasts may cause bilateral ruptured tympanic membranes – consider that communications with patients may be impaired.
   c. If thrown by explosion, immobilize spine if indicated – see Protocol # 261
3. If severe bleeding, see Protocol #501
   a. Use tourniquets early if severe extremity bleeding.
4. Consider blast-related injuries:
   a. Primary blast injuries (from blast pressure wave) [4]
      1) If Blast Lung suspected due to: SOB, rapid respirations, hypoxia[5] (pulse oximetry <95% when available), wheezing, cough, or coughing blood. Bradycardia may occur with blast lung.
         a) Administer high-flow oxygen
         b) Monitor pulse oximetry [Optional], if available [5]
         c) Initiate IV/IO NSS at KVO
            (1) Fluids may accumulate in lungs as edema

(2) If hypotension, hypovolemia, crush injury, or burns, infusion rates should be guided by appropriate related protocol(s), but Medical Command should be contacted, if possible, before exceeding 250 mL (Peds: 20 mL/kg) if concern for associated Blast Lung.

d) Observe stable patients for signs of blast lung

b. Secondary blast injuries (from projectiles) [6]

1) If impaled objects, follow Protocol #632

c. Tertiary blast injuries (from patient falling or being thrown by blast or pinned by debris) [7]

1) Immobilize spine, if required – see Protocol # 261
2) If multisystem trauma – see Protocol # 6002
3) If crush syndrome suspected – see Protocol # 6004

d. Quaternary blast injuries (all other injuries/conditions) [8]

1) If burns – see Protocol # 6071

5. Transport

a. Transport to trauma center if Category I or II trauma patient – see Protocol # 180

b. Closest ED may not be most appropriate receiving facility [9]

6. Contact Medical Command, if needed

Notes:

1. Severe internal injuries caused by blast wave may not be apparent initially. Eardrum (tympanic membrane – TM) rupture is the most common type of blast pressure injury and may be associated with other more serious blast injuries. When TM rupture is not present, other blast pressure injuries are less likely.
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