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ABSTRACT

Following the September 11, 2001 attacks, experts from several academic medical centers formed the National Disaster Life Support Education Consortium (NDLSEC) to develop educational programs to meet a perceived lack of medical disaster preparedness. These institutions, along with the American Medical Association (AMA), established the AMA Committee on Disaster Preparedness and Emergency Response to coordinate efforts and resources to enhance the education and training of health care professionals. The NDLSEC has developed two courses, Basic Disaster Life Support (BDLS) and Advanced Disaster Life Support (ADLS). BDLS is the didactic component of the training and is presented in a traditional classroom setting via lecture and PowerPoint presentations. The curriculum has an all-hazards recognition and management approach, based on a unifying algorithm that organizes the providers' disaster planning and response. The curricula covers natural and manmade disasters; traumatic and explosive events; nuclear and radiological weapon attacks; biological events; chemical events; medical decontamination; mitigating stress on health care workers; legal issues of disaster response; health care facility and disaster planning; and mass fatality incidents. Unlike ACLS and ATLS, participants can receive certification for completion of this didactic portion of the course.

The Advanced Disaster Life Support (ADLS) curriculum consists of hands-on, interactive scenarios and drills, focusing on skills drawn from BDLS course work. The AMA is providing continuing medical education (CME) credit for both courses. The target audience for the BDLS and ADLS courses includes emergency and critical care physicians and nurses, public health physicians, medical planners, emergency medical technicians, paramedics, pharmacists, allied health professionals and medical students. Currently, students from these various professions take the course together. These health care professionals have different levels of baseline knowledge when starting the course. Learning could be greatly enhanced if the coursework was tailored to the student's existing level of knowledge of disaster medicine. This could be rapidly accomplished through an online course that complies with the Sharable Courseware Object Reference Model (SCORM) standards. SCORM is a suite of technical standards that enable web-based learning systems to find, import, share, reuse, and export learning content in a standardized way. SCORM-compliant learning management systems (LMS) can launch learning content, keep track of learner progress, determine the sequence of learning objects, and report student performance. SCORM standards ensure that the LMS is "smart" and provides specific content to the end user, when he/she has mastered a skill or competency, and can branch to deliver the right content when needed (e.g., for remediation). Utilizing SCORM will standardize launching and tracking directed BDLS learning, and define the intended behavior and logic of complex learning experiences so content can be reused, moved, searched for, and recontexualized for different health care professionals.

BODY

Our proposed funding amount for the "SCORM-Compliant, Disaster Life Support Distance Learning for Military Medical Education" grant was cut by 55%. At the time we received funding for the AMEDD Advanced Medical Technology Initiative (AAMTI) Disaster Life Support Distance Learning grant, we had also applied for and received funding for an AAMTI grant entitled "Updating the Medical Military Unique Curriculum (MUC) using the SOFMH Online Editorial Review System." The funding we received for the MUC grant was cut by 60%, so the Director of the Center for Total Access and the Principal Investigators (PI) for both of these grant projects decided to combine resources. It was decided to use the eight Disaster Life Support modules to update the eight modules of the Military Unique Curriculum that dealt with Chemical, Biological, Radiological, Nuclear, and Explosive (CBRNE) topics.

The disaster life support course upon which this was to be based was called the Basic Disaster Life Support Course (BDLS), developed by the National Disaster Life Support Education Consortium (NDLSEC). The Medical College of Georgia (MCG) is a member of the NDLSEC and the CTA had maintained a close working relationship with MCG for many years. Several CTA staff members have held adjunct faculty positions at the Medical College of Georgia and others contributed to the development of the Basic Disaster Life Support (BDLS) curricula and/or taken the course itself.

BDLS is the official American Medical Association (AMA) disaster preparedness and response curriculum, and seemed to correlate directly with MEDCOM's Chemical, Biological, Radiological, Nuclear, and Explosives (CBRNE) disaster training requirements for military physicians and other disaster responders. Live BDLS courses had been successfully used in the Joint Services Installation Pilot Program (JSIPP) training events in small numbers of MEDCOM and installation responders. Providing all of these disaster responders with a coherent, integrated online BDLS curriculum that meets Sharable Courseware Object Reference Model (SCORM) standards could accomplish this complicated task. The online curriculum, once established, could be easily updated, tailored and delivered to an almost infinite number of disaster responders in any location at any time. There was strong US Army MEDCOM interest that the CTA assist in the establishment of a core competency curriculum for regional response SMART teams (Special Medical Augmentation Response Teams) that aligned with the state-level DMAT teams (Disaster Medical Assistance Team) in FY04. This training center included a core all-hazards disaster response for the SMART teams. By migrating the classroom BDLS curricula to a web-based solution, the AMEDD would be positioned to offer this standardized training to all SMART team members, to include personnel involved in disaster response preparedness.

The initial problems arose when there did not seem to be any "version control" in the different versions we received of the BDLS curriculum from the MCG Department of Operational Medicine (DOM). The BDLS book did not match the version on the CD, and it was very difficult to discern what the latest version of the book or the CD was. BDLS as it was taught in the classroom was an eight part one-day course with a 25 question exam at the end of the day. In order to put BDLS in an online version, we planned to break up the curriculum into eight separate one-hour courses. This would enable to providers to complete as little or as much of the BDLS course at a sitting as they were able. We developed ten test questions for each of the eight BDLS segments and these eighty questions were given to the MCG DOM for approval (Appendix A) to use in the online version.

We designed a graphical user interface (GUI) for the BDLS registration page. In addition to this, we also designed the registration questions to capture demographic data on the registrants. (Appendix C)

An extremely detailed comparative analysis of the eight Military Unique Curriculum modules that resembled BDLS most closely and the actual eight BDLS modules was completed by LTC Richard Moore, the PI for the "SCORM-Compliant, Disaster Life Support Distance Learning for Military Medical Education" grant.

LTC Moore's report found that the MUC courses are aimed at military healthcare providers who may need to deal with these issues on a battlefield. The courses deal with the issues that such healthcare providers will have to deal with on a battlefield. It also provides information of a historical nature useful in understanding the historical context of the issues and agents.

The BDLS course is aimed at a very different audience dealing with many of the same issues and agents but in a very different context. The context for BDLS is how to plan, organize, and manage a mass casualty situation at home in the US.

Although there is a great deal of general overlap between the sets of courses, they are aimed and designed for two very different audiences. Although the overlap is real, much of the overlap is illusory. This is not to say that either set of courses are perfect, but rather to say that one must approach any merging of the two with great caution. Inclusion of much of the material of BDLS into the MUC courses would change the basic nature of the course and turn it into a super-BDLS. Inclusion of much material from the MUC courses into BDLS would make a course which is already pregnant with essential information top heavy with good but superfluous information.

A summary of LTC Moore's analysis can be found in the Key Research Accomplishments section of this report. All Appendices referred to in LTC Moore's analysis can be found in Appendix D of this report.

We discovered later than the American Medical Association, who had acquired the rights to BDLS, would not allow it to be altered in any way.

During this grant's cycle last year, the CTA participated in a Chemical, Biological, Radiological, Nuclear, or High Yield Explosive (CBRNE) Training Effectiveness Analysis (TEA) with the US Army Office of the Surgeon General, the Medical Nuclear Biological and Chemical Branch (OTSG Medical NBC), the US Army Medical Command, Homeland Security Branch (MEDCOM HLS), the Army Medical Department Center and School (AMEDD C&S), and the Southeast Regional Medical Command (SERMC). This analysis was done for the Defense Medical Readiness Training Institute (DMRTI). DMRTI had specific Enabling Learning Objectives (ELOs) and Terminal Learning Objectives (TLOs) by which to compare the various CBRNE programs. These TLOs and ELOs are included in this report as the document called the "Defense Medical Readiness Training Institute Chemical, Biological, Radiological, Nuclear, and High Yield Explosive (CBRNE) Training: Standards of Proficiency and Metrics", which is Appendix E. The CBRNE TEA approach leveraged a coordinated staff effort between the OTSG Medical NBC, MEDCOM HLS, AMEDD C&S and the CTA-SERMC. All relevant standards, guidelines and requirements were collected and sorted into appropriate training categories. Training objectives, course curricula and anecdotal details about each available CBRNE training option were collected. This information was then systematically analyzed with respect to quantitative and qualitative criteria for a comprehensive CBRNE training program by a review team panel. The results were compiled and reviewed for statistical significance. Based upon the results of both the quantitative and qualitative analysis, it was determined that the AMEDD C&S – NDLSTC (of which BLDS is a part) training program provided the most robust training option, with respect to all relevant CBRNE training standards, guidelines and formal recommendations. BDLS met DMRTI's TLOs and ELOs as if it had been created with those in mind. The "Chemical, Biological, Radiological, Nuclear, or High Yield Explosive (CBRNE) Training Effectiveness Analysis" itself is Appendix F. Despite the findings of this TEA, DMRTI decided to use a CBRNE program developed by the Navy.

BDLS was taken completely out of our control and hands during its grant cycle year by the NDLSC and given to the AMA to put online and make SCORM compliant. As of the date of this report, the BDLS curriculum is still not available online.

KEY RESEARCH ACCOMPLISHMENTS

Proposal of the Feasibility of Combining Eight Military Unique Curricula Courses With the Eight Modules of BDLS

1. Introduction.

In February of 2004, the Center for Total Access (CTA) received funding for a research project to place the Basic Disaster Life Support (BDLS) course on-line and make it available to the US Army community. The funding came in at around 45% of the amount requested necessitating reassessing what could be done and economizing. At approximately the same time, the Army Medical Corps (COL Ney Gore of the AMEDDC&S being the point of contact on the project) received funding to place some of the Medical Unique Curriculum (MUC) on-line making these courses available to the US Army community. Their project was funded at about the same percentage as the BDLS project with the necessity of the same sort of economizing.

Conversations between COL Gore and the CTA indicated the possibility of the two groups working together to produce products combining aspects of each project and get more "bang for the buck." Specifically, the CTA was to evaluate eight MUC modules for inclusion of their material into the eight one-hour modules of BDLS.

2. Methods.

The eight of the 24 MUC courses and corresponding chapters of BDLS are as follows:

MUC	BDLS
Chemical Casualties: Introduction	All Hazards Course Overview
Chemical Casualties: Cyanide	Natural Disasters
Chemical Casualties: Nerve Agents	Traumatic & Explosive Events
Chemical Casualties: Pulmonary Agents	Nuclear & Radiological Events
Chemical Casualties: Vesicants	Biological Events
Biological Warfare and Terrorism	Chemical Events
Triage and Treatment of Radiation Casualties	Critical Incident Stress
Wounds of War	Public Health Systems

The content and focus of the eight MUC courses were compared with the corresponding BDLS modules, namely, the 3rd through 6th modules. The content of each corresponding course was laid out side by side in (Appendices D1-D4), allowing easy visibility of what each course contains and does not contain.

Appendix D5 provides a listing of various component sections side by side.

Appendix D6 compares the component listings of each MUC course with its corresponding BDLS module/section to identify what is presented in each course. The BDLS column identifies whether the same information as is in the MUC course is also in the BDLS course and in greater/lesser detail. In addition, there is a comments column stating whether the information in the MUC course should be incorporated or needed to be added to the BDLS course.

An evaluation was also made as to the intended audience (and its needs) for each course and how much those audiences overlap in their needs.

3. Results.

Military Unique Curriculum. It is quite clear that the intended audiences for the MUC courses are military physicians who will/may be facing combat situations where casualties may be generated by the traditional weapons of combat or by use of nuclear, biological, or chemical (NBC) agents. The courses stress an understanding of how each casualty generating agent reacts with the environment and with the soldier to produce its own variety of biological injury. The treatment (and options) of the injury in a military environment (usually a field environment) is stressed along with the problems of delay in treatment. Methods of intervening both before and after exposure are discussed. There is also a strong historical perspective presented.

Basic Disaster Life Support. The intended audience for BDLS are personnel who may be involved in dealing with a mass casualty situation of the all hazards variety (natural to man-made to terrorist), usually in the civilian United States setting. The audience is very broad and includes physicians, nurses, public health workers, law enforcement, administrators, emergency medical technicians, and other emergency care providers. The course details a new paradigm on how to address mass casualty disasters and provides guidance on how to organize and plan from detecting the situation to on-site management to casualty care to community response. It often assumes that the treating physician already knows how to treat a specific etiological agent and focuses more on pre-hospital care (in contrast, the MUC courses more comprehensively present the details of patient treatment), triage, and evacuation. Non-physician providers are provided with tools and understandings to properly plan for disasters in their communities.

The contents of the MUC courses for which a good argument for inclusion into BDLS can be made (found in Appendix D6) are as follows:

a. Chemical Casualties: Introduction
   No information needs to be included into BDLS

b. Chemical Casualties: Vesicants

1. It would be helpful to have information on the need for early decontamination when exposed to a vesicant agent; i.e., that decontamination within 2 minutes can prevent symptoms.
2. It would also be helpful to have information on the infectious phase which follows exposure to a vesicant agent. Most infections are nosocomial (come from patient himself or from the caregiver), and prophylaxis is usually not useful.
3. Death from mustard agents before 48 hours is rare and is usually from massive airway damage. It is uncommon 2-4 days from airway damage, tissue necrosis, and infection. It is most common 5+ days after exposure from sepsis, marrow suppression, and airway and other tissue damage.

c. Chemical Casualties: Nerve Agents

In patients exposed to nerve agents, recovery usually happens in 2-3 hours for those who maintain spontaneous breathing and are conscious. Weakness, CNS, and visual problems may continue for 3-6 weeks.

d. Chemical Casualties: Pulmonary Agents

Full protection from pulmonary agents is afforded by a mask with filter; it is an inhalation hazard only. Casualties do not need to be decontaminated.
The laboratory is not a lot of help with these patients. Pulmonary Function Testing may suggest airway damage, and an early chest x-ray may show hyperinflation followed by pulmonary edema.
Rest needs to be enforced for patients exposed to pulmonary agents. Even relatively minor exertion has lead to collapse and death in such patients.

e. Chemical Casualties: Cyanide

Many patients exposed to cyanide follow the progression of symptoms spelled out by the mnemonic: cyanide FEELS BAD:

Flushing (immediately)
Elevation of respiratory rate and depth
Erratic respirations
LOC (20-30 seconds)
Seizures/rigidity (30 sec)
Breathing cessation (1-2 min)
Arrhythmias
Death

f. Biological Warfare and Terrorism

Nothing was identified which should be added to BLDS.

g. Triage and Treatment of Radiation Casualties:

1. Medical consequences of radiation exposure may include performance decrements (early transient incapacitation, motor, cognitive, emesis/diarrhea), and acute effects (infection, bleeding, dehydration, delayed wound healing).
2. The various syndromes indicating level of radiation exposure: hematopoietic, gastrointestinal, cardiovascular/central nervous system.

h. Wounds of War
Nothing of significance was found that needed to be added to BDLS.

4. Discussion.
The MUC courses are aimed at military healthcare providers who may need to deal with these issues on a battlefield. The courses deal with the issues that such healthcare providers will have to deal with on a battlefield. It also provides information of a historical nature useful in understanding the historical context of the issues and agents.

The BDLS is aimed at a very different audience dealing with many of the same issues and agents but in a very different context. The context for BDLS is how to plan, organize, and manage a mass casualty situation at home.

Although there is a great deal of general overlap between the sets of courses, they are aimed and designed for two very different audiences. Although the overlap is real, much of the overlap is illusory. This is not to say that either set of courses are perfect, but rather to say that one must approach any merging of the two with great caution. Inclusion of much of the material of BDLS into the MUC courses would change the basic nature of the course and turn it into a super-BDLS. We already have a BDLS. Inclusion of much material from the MUC courses into BDLS would make a course which is already pregnant with essential information top heavy with good but superfluous information.

5. Recommendations.
The MUC courses should be left as currently constituted, but updated. Attempting to incorporate BDLS into those courses would alter them out of recognition without any great benefit.

The following information should be taken from a MUC course and added to BDLS:

a. Information about when to expect death from vesicant agents and from what causes. This may help hospital healthcare providers know what to expect.
b. Patients exposed to pulmonary agents do not need to be decontaminated, just given exposure to lots of fresh air.
c. Information on the usefulness of laboratory data in patients exposed to pulmonary agents. Pathologists will know this, but clinicians very well may not, and it may help guide them in knowing what to order.
d. The need for rest in patients exposed to pulmonary agents should be stressed. Pulmonologists should know this, but there is likely to be a shortage of this specialty compared to the need.
e. The mnemonic of cyanide "FEELS BAD" should be taught as it is a useful device to help remember what may happen with cyanide exposed patients.

f. The various syndromes of Acute Radiation Syndrome (ARS) should be added as they add a level of understanding on what is likely to be seen in patients exposed to radiation. It may also help in better guiding triage of such patients.

The other potential additions to BDLS identified in the results section do not add a great deal of new or very useful information. Often it is too late (decontaminate mustard within 2 minutes to avoid injury) or provides information a clinician most likely already has. Or it may simply be only moderately useful. The BDLS course is already packed with essential information, and we should not modify it lightly.

REPORTABLE OUTCOMES

Not applicable

CONCLUSIONS

The MUC courses are aimed at military healthcare providers who may need to deal with these combat related issues on a battlefield. It also provides information of a historical nature useful in understanding the context of the issues and agents.

The BDLS course is aimed at a civilian audience dealing with many of the same issues and agents but in a very different context. The context for BDLS is how to plan, organize, and manage a mass casualty situation within the civilian environment within the United States.

Although there is a great deal of general overlap between the two sets of courses, they are aimed and designed for two very different audiences. Although the overlap is real, much of the overlap is illusory. This is not to say that either set of courses are perfect, but rather to say that one must approach any merging of the two with great caution. Inclusion of much of the material of BDLS into the MUC courses would change the basic nature of the course and turn it into a super-BDLS. Inclusion of material from the MUC courses into BDLS would make a course which is already pregnant with essential information top heavy with good but superfluous information.

Despite the good impression we had of MUC after LTC Moore's initial assessment, it was not as good as it first appeared in the MUC-BDLS comparative analysis. We obtained the learning objectives (LOs) for the DoD-Health Affairs (HA) requirements for training in CBRNE which we then compared to the actual course content of each of eight (8) MUC courses covering the same subject material (i.e., chemical, biological, and radiological weapons, and wounds of war). Although the eight MUC courses were well constructed and covered important features of the material, they fell well short (25-30%) of meeting the required LOs provided by DoD-HA for CBRNE training.

Our assessment revealed that BDLS met DMRTI's TLOs and ELOs as if it had been created with those in mind. Despite this finding, DMRTI decided to use a Navy program instead which did not match the DoD-HA completely.

The AMA would not let the BDLS be altered. Since BDLS came under ownership and rights of the AMA, BDLS was taken out of our hands during our grant year cycle by the NDLSC and given to the AMA to put online and make SCORM compliant. The NDLSC and the AMA have still not made BDLS available online despite dealing with one non-profit agency and three for-profit companies since BDLS left our hands.

APPENDIX A

Basic Disaster Life Support (BDLS) Exam
Chapter by Chapter Questions

Chapter One - All Hazards Course Overview

1. Which of the following statement(s) (are) is **TRUE** concerning the course design of BDLS® and ADLS®?
   a. This course is a coordinated all hazards training program developed by a consortium of academic, state, and federal centers.
   b. BDLS® and ADLS® are two sequential courses designed by the NDLSEC.
   c. BDLS® is the introductory course, and is primarily didactic in nature and may be presented in lecture form or through distance learning.
   d. Only persons who have completed a BDLS® course are eligible to take ADLS®.
   e. All statements are true.

2. Choose the correct priority of patient treatment categories, from first priority to last.
   a. Immediate, Delayed, Minimal, Expectant, Dead
   b. Expectant, Minimal, Immediate, Delayed, Dead
   c. Minimal, Expectant, Dead, Delayed, Immediate
   d. Minimal, Immediate, Delayed, Expectant, Dead

3. Concerning the MASS triage model used in BDLS® and ADLS®, which of the following is false?
   a. MASS triage is a simple method to assist in the triage of large numbers of casualties in a mass casualty incident (MCI).
   b. The letters represent M – Move; A – Assess; S – Safety, S – Security.
   c. *"Id-me"* is a mnemonic for sorting patients during MCI MASS triage.
   d. The first step in utilizing "Move" of MASS triage is to say, "Everyone who can hear me and needs medical attention, please move over to (a designated area)."

4. The term "casualty" refers to a person who is ill, missing, or killed as the result of a mass casualty event.
   a. True
   b. False

5. Concerning the DISASTER paradigm, which of the following is false?
   a. The DISASTER paradigm organizes the provider's preparation and response to disaster management.
   b. The DISASTER paradigm topics are in order of occurrence.
   c. Scene safety is the primary need that must be addressed.
   d. The DISASTER paradigm's greatest value is to remind those involved of the key areas that must be addressed at any disaster scene.

6. In the Incident Command System, Medical Direction falls under the functions of:
   a. Communications
   b. Operations
   c. Transportation
   d. Logistics

7. In MASS Triage, patients who are not moving at all should be the very last to be assessed.
   a. True
   b. False

8. In the "ID-med" categories, a patient classified as "Immediate" might have all but:
   a. A sucking chest wound
   b. Altered mental status
   c. Anginal chest pain
   d. A controlled hemorrhage

9. Who or what do you protect first at a disaster scene?
   a. The public
   b. The patients
   c. The environment
   d. Yourself and your team members

10. Previous disasters have shown that EMS typically transports about 25% of all disaster victims.
    a. True
    b. False

Chapter Two – Natural and Man-made Disasters

1. What is the minimum height of water required to carry away most cars during a flash flood?

   a. 1 foot

   b. 2 feet

   c. 3 feet

   d. 4 feet

   e. 5 feet

2. Of these natural disasters, which causes the most fatalities in the US?

a. Earthquakes

b. Tornadoes

c. Wildfires

d. Flash floods

e. Volcanic eruptions

3. Overall, victims who survive the initial impact of an earthquake must be extricated and receive medical care within ___ hours or their mortality significantly increases.

a. 2 hours

b. 4 hours

c. 8 hours

d. 12 hours

e. 24 hours

4. A significant detection difference when considering natural disasters compared to others is that many natural disasters can be reliably monitored and tracked before they occur.

a. True

b. False

5. Management of extremity trauma is common after natural disasters. The clinical consequences and management of extremity trauma may include:

a. The development of a compartment syndrome in the injured extremity

b. Special on-scene teams to perform advanced procedures such as amputations and fasciotomies on severely injured extremities

c. The development of "crush syndrome" that can result in death

d. All of the above

6. Related to tornadoes, proper advance warning and shelter access are the overall most important factors in decreasing mortality and morbidity.

a. True

b. False

7. The significant number of deaths, injuries, and amount of property damage caused by tornadoes make them as difficult to manage as either an MCI or a significant recovery event.
   a. True
   b. False

8. According to the US Geological Survey, there are over ____ volcanoes in the US that may erupt at some time in the future.
   a. 10
   b. 20
   c. 30
   d. 40

9. The most common cause of deaths when managing wildfires is _____.
   a. "Burnovers"
   b. Aircraft accidents
   c. Manifestations of cardiac disease
   d. Vehicle accidents

10. A "no-close" wound policy is a valid management approach when caring for patients who have been injured in earthquakes, floods, and tornadoes.
   a. True
   b. False

Chapter Three – Traumatic and Explosive Events

1. You are alerted through emergency channels that there was a large explosion with multiple casualties at the local oil refinery. What type of injuries should you expect at the scene?
   a. Penetrating injuries
   b. Blunt trauma
   c. Primary blast injuries
   d. Flash burns
   e. All of the above

2. A man is thrown against a wall following an explosion and ruptures his spleen. This is an example of a:

a. Primary blast injury
b. Secondary blast injury
c. Tertiary blast injury
d. Non-penetrating ballistic injury

3. Which of the following is NOT a primary determinant of the explosive overpressure experienced by a victim:

a. Distance from the blast
b. Surrounding medium (air/water)
c. Nearby structures (walls/corners)
d. Size of explosive charge
e. All are primary determinants

4. In crush syndrome, severe hyperkalemia may occur due to massive muscle breakdown.

a. True
b. False

5. A form of barotrauma that is unique to high explosive detonations and causes damage to air-filled organs is called:

a. Primary blast injury
b. Secondary blast injury
c. Tertiary blast injury
d. Quaternary blast injury

6. The signs and symptoms of "blast lung" include all of the following except:

a. Wheezes
b. Hemoptysis
c. Deep respirations
d. Poor chest wall expansion
e. All of these

7. Up to _____% of all blast survivors have significant eye injuries.

a. 5%
b. 10%
c. 20%
d. 40%

8. Crushing or compressing forces involve three separate energy transfers, which are: a mass colliding with the patient, the patient colliding with objects in the surrounding environment, and internal organs colliding with their supporting structures.

a. True
b. False

9. All of the following are true statements about blast injury except:

a. Secondary blast injuries are responsible for the majority of casualties from an explosive event.

b. Tertiary blast injuries are a feature of high-energy explosions, and occur when the individual becomes the missile.

c. Quaternary injuries are all explosion related injuries due to primary, secondary, and tertiary mechanisms.

d. Primary blast injuries may have a subtle and delayed presentation.

10. Tympanic membrane rupture is the most common primary blast injury.

a. True

b. False

Chapter Four – Nuclear and Radiological Events

1. When treating burn victims from a nuclear explosion, ALL burn victims should be considered expectant so that resources can be transferred to other patients.

a. True

b. False

2. The agent DTPA has been shown to remove 90% of the soluble plutonium (even from bone, the major sink for plutonium in humans) from an exposed individual if given within one week of exposure.

a. True

b. False

3. Plutonium and the transuranics have not been shown to be highly toxic in humans.

a. True

b. False

4. A nuclear explosion will produce blunt trauma, penetrating trauma, blast injuries, and a very high number of radiation and thermal burns.

a. True

b. False

5. These types of radiation can pass through average walls.

a. Alpha and beta

b. Beta and gamma

c. Gamma and neutron

d. Alpha and gamma

6. Iodide tablets can be highly effective in preventing subsequent radiation-induced thyroid cancer if the patient is treated within _____.

a. Four hours

b. Eight hours

c. Two days

d. Four days

7. The initial phase of a weapons of mass destruction (WMD) attack is known as the crisis management phase, and the lead federal agency for this phase is the _____.

a. Environmental Protection Agency

b. Federal Emergency Management Agency

c. Department of Homeland Security

d. Federal Bureau of Investigation

8. Classification of both nuclear detonation and radiological contamination patients is significantly expedited by evaluation of lymphocyte counts.

a. True

b. False

9. Increased removal of tritium can be accomplished by simply increasing water intake to _____ a day.

a. one quart

b. two liters

c. three liters

d. four liters

10. Radioactive contamination does not pose the immediate health hazard that toxic chemical and contagious biological agents do, and decontamination is generally much easier to perform.

a. True

b. False

Chapter Five – Biological Events

1. Which of the following is a CDC Category A Bioterrorism Agent?
   a. Ricin
   b. Botulism
   c. Sarin
   d. Saxitoxin

2. Concerning a bioterrorism event, which of the following statements is TRUE?
   a. Detection of a bioterrorism event is likely to be difficult.
   b. Patients from a bioterrorism event are likely to present at the same time, from the same location with similar symptoms, immediately after the exposure.
   c. Bioterrorism is defined as "any use of weapons of mass destruction against a civilian population."
   d. All of the above

3. Persons exposed to an unidentified powder should wash with:
   a. 5% hypochlorite (commercial bleach)
   b. Any available hospital disinfectant
   c. Soap and water
   d. All of these

4. Nasal swabs are a poor test to rule out anthrax and should not be used as a clinical test.
   a. True
   b. False

5. This bacterium is a gram-negative rod and may show a characteristic "safety-pin" bipolar staining.
   a. *Bacillus anthracis*
   b. *Clostridium botulinum*
   c. *Yersinia pestis*
   d. *Francisella tularensis*

6. The toxin produced by the *Clostridium botulinum* is one of the most poisonous substances known.
   a. True
   b. False

7. Key diagnostic clues to help distinguish smallpox from chickenpox include all but:
   a. The prodrome of smallpox is much more severe than that seen in chickenpox
   b. Smallpox rash occurs in crops with lesions of different stages of maturity, while the chickenpox lesions are in the same stage of maturity.
   c. Chickenpox lesions are more oval in shape, while smallpox lesions are more rounded.
   d. Smallpox involves the palms and soles, while this is unusual in chickenpox.

8. Doxycycline is an effective treatment for all of these CDC Category A diseases except.
   a. Anthrax
   b. Plague
   c. Smallpox
   d. Tularemia

9. A patient infected with this organism may show a widened mediastinum.

   a. *Clostridium botulinum*

   b. *Bacillus anthracis*

   c. *Vibrio cholerae*

   d. *Variola major*

10. The National Disaster Medical System (NDMS) is a section within the U.S. Department of Homeland Security, Federal Emergency Management Agency, Response Division, Operations Branch, and has the responsibility for managing and coordinating the Federal medical response to major emergencies and Federally declared disasters.
   a. True
   b. False

Chapter Six – Chemical Events

1. The principal causes of death in nerve agent exposures are:
   a. Vomiting and diarrhea
   b. Hypertension and tachycardia
   c. Bronchorrhea and bronchospasm
   d. Bradycardia and hypotension
   e. Hyperthermia and rhabdomyolysis

2. Which of the following pharmaceutical agents is used in the management of severe nerve agent exposure?

a. Atropine
b. Benzodiazepines
c. Pralidoxime Chloride (2-PAM)
d. All of the above

3. Which of the following concerning the detection and treatment of cyanide victims is true?

a. Cyanide victims will ALWAYS present with bright red venous blood and a notable absence of cyanosis
b. Cyanide has the odor of bitter almonds and therefore smell is a reliable method of detection
c. The treatment of cyanide poisoning consist of creating methemoglobin and then transforming cyanide into thiocyanate
d. If cyanide antidote kits are not available, all patients should be considered expectant and given comfort care

4. Name two groups of nerve agents.

a. T-agents and C-agents
b. B-agents and Z-agents
c. G-agents and V-agents
d. D-agents and V-agents

5. Which of the following nerve agents is a persistent and non-volatile agent and therefore represents the greatest risk of secondary contamination of healthcare providers?

a. Tabun (GA)
b. Sarin (GB)
c. Soman (GD)
d. VX

6. Which of the following medications is used for the treatment of cyanide victims?

a. Sodium Nitrite
b. Amyl Nitrite
c. Sodium Thiosulfate
d. All of the above

7. All of these are muscarinic symptoms of a nerve agent except:

a. Mydriasis
b. Diarrhea
c. Emesis
d. Urination
e. Lacrimation

8. There is no specific antidote for phosgene or chlorine.
   a. True
   b. False

9. All of these irritant gases have been used as chemical warfare agents except for:
   a. Phosgene
   b. Diphosgene
   c. Pralidoxime
   d. Chlorine
   e. Chloropicrin

10. The nerve agents are considered to be the least dangerous of all chemical warfare agents.
   a. True
   b. False

Chapter Seven – Psychosocial Aspects of Terrorism & Disasters

1. Controlled studies support the use of group Critical Incident Stress Debriefing as a therapeutic intervention for treatment of acute stress disorder or for prevention of post-traumatic stress disorder.
   a. True
   b. False

2. All mental health licensed and unlicensed volunteers should be immediately dispatched to the scene of a mass casualty incident.
   a. True
   b. False

3. The assessment of the psychological consequences of terrorism can be accomplished through the use of the Haddon Matrix. The factors assessed are all but:
   a. Host
   b. Vector
   c. Agent
   d. Environment

4. "CAGE" is a mnemonic for questions that assesses patients for:
   a. Depression
   b. Insomnia
   c. Chronic PTSD
   d. Alcoholism and substance abuse

5. Responders should be monitored for dissociative symptoms of acute stress disorder as well as for impairment of functioning.

a. True
b. False

6. The psychosocial responses to terrorism screening acronym "SNAP" stands for:

a. Stimulated, Nervous, Anorexic, Panic
b. Shakes, Noncompliant, Acute, Paranoid
c. Startle, Numbness, Arousal, Persistence
d. Scared, Nauseated, Alarmed, Passive

7. Psychosocial disorders that commonly occur after a terrorist attack or natural disaster include all but:

a. Depression/bereavement
b. Acute stress disorder
c. Paranoid disorder
d. Post traumatic stress disorder

8. Community-wide psychosocial preparedness programs should always be led by a psychiatrist.

a. True
b. False

9. Psychological first aid includes all but:

a. Protecting survivors from further harm
b. Distributing prescription psychotropic agents
c. Mobilizing support for those who are most distressed
d. Providing information, reassurance and foster communication
e. Using effective risk communication techniques

10. Terrorism causes distress responses in a large proportion of the population, behavioral changes in another proportion, and psychiatric illness in yet a smaller segment.

a. True
b. False

Chapter Eight – The Public Health System

1. Mass casualty incidents place extraordinary burdens on communications systems, possibly resulting in insufficient notification of responding agencies and the decreased ability to communicate with the public.

a. True
b. False

2. If a public health official in a local or state health department is notified about, or otherwise becomes aware of, apparent incidents or threats of terrorism, they should immediately (first) contact:

a. The Centers for Disease Control (CDC)
b. Federal Department of Homeland Security (DHS)
c. Federal Bureau of Investigation (FBI)
d. State Health Department

3. Planning for disasters and other catastrophic emergencies should include:

a. Taking inventory of existing resources and assessing the ability to mobilize them.
b. Repair or reconstruction of damaged buildings and infrastructure.
c. Public health surveillance
d. Provision of religious services for victims of a disaster.
e. All of the above

4. Appropriate measures to prevent and control communicable disease after a disaster are:

a. Sanitation
b. Medical intervention
c. Public health surveillance
d. All of the above
e. A and B ONLY

5. New technologies for emergency communications include "reverse" 911, "enhanced" 911, and the Health Alert Network.

a. True
b. False

6. Once a disaster has been declared by municipal authorities, orders that may be issued include all of the following EXCEPT:

a. Banning the media from reporting on the event
b. Suspension of the sale or dispensing of alcoholic beverages
c. Control of ingress and egress to and from a disaster area
d. Establishing curfews

7. When a disaster occurs, the governor of a state must ask the president to declare a federal disaster to activate the provisions of the Stafford Act.

a. True
b. False

8. State Laws governing the "practice of medicine" usually contain a clause exempting volunteer emergency workers from licensing as defined in the law.

a. True
b. False

9. The "Good Samaritan Doctrine" is designed to encourage people to stop and render aid to those in need. When such aid is rendered, the doctrine covers all aid, both negligent acts and intentionally wrongful acts.

a. True
b. False

10. Public health surveillance provides information necessary to:

a. Identify contacts of cases of disease and assure that prevention measures are applied.

b. Identify and remove the source of transmission of disease

c. Determine the source and route of infection
d. All of the above are correct

APPENDIX B: FUNDED PERSONNEL AND PARTICIPANTS

LTC Richard Moore, MD	3rd MEDCOM Liaison Officer to CTA	Principal Investigator
COL Warren Whitlock, MD	Director, CTA	Co-Investigator
COL Ney Gore III, MD	Medical Corps Branch Specific Proponent Officer	Co-Investigator
Gay Thompson, RN, MPH	Clinical Nurse Coordinator	Co-Investigator
Jeanette Rasche, MS	Acting Deputy Director & Distance Learning Director, CTA	Co-Investigator
Richard Schwartz, MD	NDLSEC/AMA Lead Advisor, MCG Center for Operational Medicine	Co-Investigator
COL (ret) Chip Giddens	Administrator, MCG Center for Operational Medicine	Co-Investigator
Phillip Coule, MD	Lead BDLS Instructor, MCG Center for Operational Medicine	Co-Investigator

APPENDIX C: PRESENTATIONS, POSTERS, PUBLICATIONS

Basic Disaster Life Support
Registration Form
Medical College of Georgia/Fort Gordon

BDLS _____

Course Coordinator/Instructor Course _____

Last Name _____ **First Name** _____ **MI** _____

Agency/Company Affiliation: _____

Work Address _____

Work Email Address: _____

Work Phone # _____ **Work Fax #** _____

Home Address: _____

City _____ **State** _____ **Zip** _____

Phone # _____ **Fax #** _____

Home Email Address: _____

Degrees Held:

AD_____ BA/BS_____ Masters_____ Doctorate_____

Certifications/Licenses Held:

_____

_____

Profession:

Chiropractor

Dentist

Check what specialty best describes your current area of dental practice

Endodontics
Forensic Odontology
General Dentistry
Oral and Maxillofacial Radiology
Oral and Maxillofacial Pathology
Oral and Maxillofacial Surgery
Orthodontics
Pediatric Dentistry

Periodontics
Prosthodontics

First Responder
_____Police/Other Law Enforcement _____Firefighter
_____EMT-Basic _____EMT-Intermediate _____EMT-Paramedic

Laboratory Personnel
_____Medical technologist/Clinical laboratory technologist/Clinical laboratory scientist
_____Clinical laboratory technician

Mental/Spiritual Health Personnel
Check what specialty best describes your current area of practice
Clergy
Counselor
Psychiatrist
Psychologist
Social and Human Service Assistant
Social Worker

Nurse, Licensed Practical/Vocational
Check what specialty best describes your current area of nursing practice.
Administrative
Ambulatory Care/Clinic
Case Management
Critical Care
Emergency/Trauma
Family Practice
Geriatrics
Health Promotion
Home Health/Hospice
Infection Control
Informatics
Maternal/Child
Medical/Surgical
Nursing Education
Occupational Health
Pediatrics/Neonatal
Perioperative
Psychiatric/Mental Health
Public Health
Rehabilitation
School

Nurse, Registered
Check what specialty best describes your current area of nursing practice.
Administrative
Ambulatory Care/Clinic
Anesthesia
Case Management
Clinical Nurse Specialist
Critical Care
Emergency/Trauma
Family Practice
Geriatrics
Health Promotion

Home Health/Hospice
Infection Control
Informatics
Maternal/Child
Medical/Surgical
Nurse Midwife
Nurse Practitioner
Nursing Education
Occupational Health
Pediatrics/Neonatal
Perioperative
Psychiatric/Mental Health
Public Health
Rehabilitation
School

Occupational Therapist

Optometrist

Pharmacist
Check what best describes your current area of pharmacy practice.
Inpatient
Outpatient
Public Health

Physician
Check what specialty best describes your current area of medical practice.
Administrative
Allergy, Clinical Immunology
Anesthesiology
Cardiology
Critical Care Medicine
Dermatology
Emergency Medicine
Endocrinology
Family Medicine
Gastroenterology
Geriatrics
Hematology
Infectious Disease
Internal Medicine
Nephrology
Neurology
Nuclear Medicine
Obstetrics & Gynecology
Occupational Medicine
Oncology
Operational Medicine
Ophthalmology
Otorhinolaryngology
Pathology
Pediatrics
Pharmacology
Physiatry
Psychiatry

Public Health/Preventive Medicine
Pulmonology
Radiology, Diagnostic
Radiology, Therapeutic
Rheumatology
Surgery, General
Surgery, Neuro
Surgery, Orthopedic
Surgery, Plastic
Surgery, Thoracic
Surgery, Trauma
Surgery, Vascular
Toxicology
Urology

Physical Therapist

Physician Assistant
Check what medical specialty best describes your current area of practice.
Administrative
Allergy, Clinical Immunology
Anesthesiology
Cardiology
Critical Care Medicine
Dermatology
Emergency Medicine
Endocrinology
Family Medicine
Gastroenterology
Geriatrics
Hematology
Infectious Disease
Internal Medicine
Nephrology
Neurology
Nuclear Medicine
Obstetrics & Gynecology
Occupational Medicine
Oncology
Operational Medicine
Ophthalmology
Otorhinolaryngology
Pathology
Pediatrics
Pharmacology
Physiatry
Psychiatry
Public Health/Preventive Medicine
Pulmonology
Radiology, Diagnostic
Radiology, Therapeutic
Rheumatology
Surgery, General
Surgery, Neuro
Surgery, Orthopedic
Surgery, Plastic

Surgery, Thoracic
Surgery, Trauma
Surgery, Vascular
Toxicology
Urology

Podiatrist

Public Health _____
Check what specialty best describes your current area of practice.
Administration
Alcohol, Tobacco, and Other Drugs
Biostatistics
Chemical Hazards
Chiropractic Health Care
Community Health Planning and Policy Development
Disaster Preparedness
Environmental
Epidemiology
Food and Nutrition
Gerontological Health
Health Education and Health Promotion
HIV/AIDS
Injury Control and Emergency Health Services
International Health
Laboratory
Maternal and Child Health
Medical Care
Mental Health
Nursing
Occupational Health and Safety
Oral Health
Podiatric Health
Population, Family Planning & Reproductive Health
Planning
School Health Education
Social Work
Toxicology
Vision Care

Radiological Technologist

Respiratory Therapist

Veterinarian

Other Professions not listed here_____

APPENDIX D: SUPPORTING DOCUMENTATION

Table of Contents:

Feasibility of Combining Eight Military Unique Curricula Courses With the Eight Modules of BDLS

Appendix 1: Comparison of BDLS and MUC on Chemical Weapons
Appendix 2: Comparison of BDLS and MUC on Biological Weapons
Appendix 3: Comparison of BDLS and MUC on Nuclear & Radiological Events (Triage/Rx Radiation Casualties)
Appendix 4: Comparison of BDLS and MUC on Wounds of War
Appendix 5: BDLS Courses Structure 1
Appendix 5: BDLS Courses Structure 2
Appendix 5: BDLS Courses Structure 3
Appendix 6a: MUC vs BDLS
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Appendix 7a: MUC vs BDLS, Wounds of War
Appendix 7b: MUC vs BDLS, Radiation Casualties
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Appendix 7d: MUC vs BDLS, Chemical Casualties
Appendix 7e: MUC vs BDLS, Chemical Casualties Vesicants
Appendix 7f: Chemical Casualties Nerve Agents
Appendix 7g: Chemical Casualties Pulmonary Agents
Appendix 7h: Chemical Casualties Cyanide

See attachments for Appendix D for the above documents.

Appendix E: Defense Medical Readiness Training Institute Chemical, Biological, Radiological, Nuclear, and High Yield Explosive (CBRNE) Training: Standards of Proficiency and Metrics

See attachment

Appendix F: Chemical, Biological, Radiological, Nuclear, or High Yield Explosive (CBRNE) Training Effectiveness Analysis

See attachment

Appendix 1: Comparison of BDLS and MUC on Chemical Weapons

This appendix is a synopsis of the contents of the two courses (MUC 5 Chemical Casualties courses and Chapter 6 of BDLS)

MUC Courses	**BDLS Chapter 6**
Chemical Casualties: Introduction	
Chemical Casualties: Vesicants	Chemical Events
Chemical Casualties: Nerve Agents	
Chemical Casualties: Pulmonary Agents	
Chemical Casualties: Cyanide	
Introduction Course	
History of Chemical Warfare	This historical information was not provided in the BDLS courses
Athenians	
Greek Fire	
Cyanide in Crimean War	
US Civil War	
WWI	
Germans	
Chlorine	
Hundreds of Casualties	
Advent of mask PPE	
Mustard	
Advent of body PPE	
30% casualties	80% casualties from mustard vapor
3-5% mortality	
US enters war better Prepared	
Alarms	
Wpns/Trng	
PPE	
Between World Wars	
Brits in Afghanistan	
Russians in Turkistan	
Spanish/Italians/Japanese	
WWII	
Germans—Nerve Agents	
GA/GB	
Never used	
Post WWII	
Egyptians – Mustard in Yemen	
US – riot control agents Vietnam	

(Introduction Course cont.)

NVA in Laos/Cambodia
Russia in Afghanistan
Iraq against Iran &
Iraqi Kurds

BDLS Chapter 6 does *not* cover this information

Factors Influencing Employment

Persistency
Effectiveness
- Properties of the agent
- Winds
- Temperature
- Rain
- Temperature inversion

Routes of Absorption

Vapors, aerosols, gasses – inhaled
Droplets, particles – thru skin
Vapors – can penetrate skin
Wounds/abrasion
Contaminated food/water

Modes of Chemical Release

Point Source
- Single detonation source

Line Source
- Series of multiple time delayed explosions for a line of agent

High Velocity Projectile
- Bulk release into air stream of projectile

Piston Action
- Base release of piston devices

Aircraft
- Fixed/rotary wing aircraft
- Best mode is spray delivery
- Large areas
- Aircraft can be shot down

(Introduction Course cont.)

Terminology

BDLS Chapter 6 does *not* cover this information

LD50: kills 50% of exposed
Describe liquid agents
ID50: incapacitates 50% exposed
Ct: Concentration time
Measure of exposure to a vapor or aerosol *not* a liquid
CT in air *plus* exposure
Determines dose
LCT50: Lethal Concentration Time
CT it will take to kill 50%
Describe gases
ICT50: Incapacity & conc.time 50
CT to incapacitate 50%

Current Threat (countries)

Lists 17 countries possessing chemical agents

Current Threat (Iraq)

Lists the chemical threats from a potential adversary – Iraq

Current Threat (actual use)

Offensive chemical capabilities depend on:
Types of agents weaponized
Modes of delivery
Doctrine for use
Means of self-protection

Current Threat (agents)

Most likely to encounter
Vesicants
Nerve agents
Present but less likely
Cyanides
Pulmonary

(Introduction Course cont.)

BDLS Chapter 6 does *not* cover this information

Good for use due to rapid onset
low persistency,
ability to penetrate some PPE

Significant terrorist threat

US Arsenal

Cyanides Ac & CK
Nerve Agents: GA/GB/GD/VX
Lung toxicants Phosgene & diphosgene
Vesicants Mustard & Lewisite
Incapacitating agent BZ
Tear gases
Vomiting gas DM

Chemical Casualties: Vesicants Course

BLDS Chapter 6 – Vesicant section

Concern about military chemical agents as a weapon of potential use by terrorists, but industrial-chemical accident more likely to occur

2 major Vesicant agents
Mustard
Lewisite

Chemical agents may be categorized into … vesicating or blistering agents, …

WWI –
mustard produced most of the chemical casualties
Casualties/deaths similar for most major combatants (x. Russia)

Sulfur mustard used as a chemical agent in WWI

Nitrogen mustard a chemotherapy agent
Never used as a weapon

Mustard Advantages
Insidious
Affects skin, eyes, airway
Potent (low dose effect)
Persistent
Causes few deaths but ties up medical system

(Vesicant Course cont.)

Mustard physical properties
- Clear to brownish oily liquid
- Freezes at 57 F
- Can mix w/Lewisite to lower freezing point
- Odor: onion, garlic, mustard

Mustard Mechanism

Alkylating agent
Reacts Quickly (1-2 min)
Prevents DNA replication -- cell death
Not in tissue, blood, urine, or blister fluid
Weak cholinergic effect (GI, miosis)

Mustard Vapor Effects

If you can smell it, it is not at a concentration that can cause damage
Mask d/n provide *complete* protection
Concentrations for:
- Eye damage
- Lung damage
- Skin damage
- LCt50 unmasked
- LCt50 masked

(BLDS Chapter 6 – Vesicant section cont.)

Oily liquids

Odor of mustard, garlic, onion

Penetrates skin, rubber, gloves,
Persistent agent
Vapor exp. of greatest concern
WWI mustard casualties from vapor

Lewisite – organic arsenical with vesicant properties
Never used

Pathophysiology

Rapidly penetrates cells & forms a toxic intermediate ion
- Disrupts cell function
- Causes cell death

Warm, most areas most affected
Replicating cell most susceptible
Toxicity from depletion of cellular glutathione

Detection of vesicants based on clinical signs and symptoms (no lab tests)

(Vesicant Course cont.)

(BLDS Chapter 6 – Vesicant section cont.)

Mustard Liquid Effects

Eyes most sensitive
Low-dose vapor may cause only mild inflammation, but liquid can cause severe corneal damage, perforation, loss of the eye

Mustard damages skin, eye, respiratory tract, GI mucosa, hemopoietic system
Clinical effects dependant on whether exposure vapor or liquid

Vesication 10 µg
LD50 skin 7.0g/70 kg male

50% involvement – expectant mgt.

Mustard Time Course

No immediate clinical effects
Fixation/damage at 1-2 min.
Latent period 2-4 hours
Vesication 4-36 hours
More severe exposures shortens latent period
If decon < 2 mins – home free

Early symptoms – pruritis, burning and stinging pain over exp. skin

Mustard Clinical Presentation

Skin

Erythema 2-24 hrs then blisters
Initially erythema surrounded by small blisters
Small vesicles coalesce > bullae
Thin walled bullae w/yellowish fluid
If severe > coagulation necrosis

Initially burns appear superficial

More extensive contamination – Superficial bullae over 24 hrs

Severe exposure – full thickness burns, resemble scalded skin synd. or toxic epidermal necrolysis
Blister does *not* contain agent

Ocular symptoms within 4-8 hrs
details of ocular symptoms/sequelae

GI involvement – symptoms detailed

(Vesicant Course cont.)

Mustard Acute Respiratory Effects

Mild: Sneezing, sinus pain, hoarseness, cough (24-36 hr)
Moderate: Epistaxis, severe cough, dyspnea (12-24 hours)
Severe: Laryngospasm, aphonia, severe dyspnea, couth, pseudomembranous casts, hemorrhage (2-12 hr = lethal dose)

Mustard Acute Phase

Inflammation - necrosis
Upper airway: pain, hemorrhage
Larynx: stridor, hoarseness, obstruction
Tracheo/bronchial: bronchospasm pseudomembranes
Small Airways/Alveoli: hemorrhage, edema

Mustard – Infectious Phase

Nosocomial infections
Epithelial damage
- Colonization common
- Up to 50% pneumonia
- Prophylaxis NOT useful
- Careful surveillance a must

Mustard Septic Phase

Systemic Cytotoxicity
Marrow Suppression
- Immune compromise
- Pneumonia progressive

Gastrointestinal
- Loss of protective epithelium
- Gram negative sepsis

(BLDS Chapter 6 – Vesicant section cont.)

Inhalation
- Damages upper resp. system
- Lower resp. system/lungs rarely affected
- Lower resp. symptoms: Cough, dyspnea, resp. distress (if damaged)

Bone marrow may be suppressed
- Precursors of leukocytes die 3-5 Days post exposure
- Anemia & thrombocytopenia late

Exposure to high levels may cause cancer

(Vesicant Course cont.)

(BLDS Chapter 6 – Vesicant section cont.)

Mustard Death

Rare <48 hrs from massive airway damage
Uncommon 2-4 days, airway damage,
    Tissue necrosis, +/- infection
Most common: 5+ days: sepsis
    Marrow suppression
    Airway, other tissue damage

Mustard Triage

Minimal
    Burn <5% BSA non-critical area
Delayed
    Burns >5%<50% BSA from liquid
    Burns from vapor
    Moderate to severe eye involvement
    Airway problems starting >4 hrs
        post exposure

Vesicants - Triage

Immediate
    Airway problems if resources are
        Available
    BAS limited ventilatory support
Expectant
    Burns > 50% from liquid
    >50% burns represent 2 x LD_{50}
    Airway problems < 4 hrs post exp.

Mustard Triage II

> 50% BSA expectant
Evacuate:
    Widespread vesication of trunk,
        arms, thighs – not superficial
    Natal cleft (between buttocks)
    Axilla, elbows
    Knees, ankles
    Genitalia (vapor more common -
        Edema > erythema)
        not mild

(Vesicant Course cont.)

(BLDS Chapter 6 – Vesicant section cont.)

Mustard Decontamination

Most effective within 2 minutes
M258A1 kit
M291 kit
Bleach 5% for mask 0.5% for skin
Not in open visceral wounds
If bleach unavailable soap and water
(do not scrub), just water,
flour, dirt

Treatment after exp mustard/lewisite
requires immediate decon
Decon w/i 2 min of exp is ideal since these
agents rapidly become fixed & and
have irreversible effects
Been suggested to use 0.5% hypochlorite
solution or w/alkaline soap
Follow up with large amounts of low
pressure water and soap suing
gentle brush finishes decon

Victim may not attempt early decon due to
delay in onset of symptoms
Clothing should be removed immed. &
underlying skin washed w/soap
& water

Mustard Treatment

Erythema: decon, calamine, topical
steriods
Blisters: not urgent, protect small ones
pop the big' uns, then apply DSD
Denuded areas: irrigation w/saline or
dakins, topical abx, fluid balance
observe for infection, treat pain
Eye lesions:

Treatment is mainly supportive

Wound care is essential including liberal
use of analgesia, debridement,
irrigation, and topical antibiotics

Patient may initially be asymptomatic
effects often delayed
Hx of severe exposure? Consider use of
airway before obstruction occurs
Fluid losses less than seen w/thermal burn

Mustard – Eyes Have It

Saline irrigation w/i 2 min
Sterile petrolatum to prevent lid adhesions
Antibiotic ointment
Severe cases – atropine eye drops
Avoid topical anesthetics such as tetracaine
Patch but do not compress
Light protection – ophthal consult

Daily irrigation, topical antibiotic
solutions, topical corticosteroids,
and mydriatics may be needed

Ocular injury will require ophthalmologic
Consult

(Vesicant Course cont.)

Mustard Treatment - Systemic

Need usually after liquid exp.
    Similar to radiation sickness
Atropine 0.4 – 0.8 mg
Sodium thiosulfate (w/i 20 min of exp)
Sedatives/analgesics
Monitor fluids, electrolytes, nutrition, CBC

Lewisite Liquid CX

Oily, colorless, smells like geraniums
No automatic detectors available for field use
Heavier than air and water, freezes at 0 degrees
Can mix w/mustard to lower freezing pt.
Clinical presentation different from mustard

Lewisite Clinical Effects
Skin: immed. Pain, rapid vesication necrosis @ 5 min, more severe than mustard
Pulmonary: immed. Burning sensation cough, dyspnea, pulm. edema,

(BLDS Chapter 6 – Vesicant section cont.)

Lewisite
Colorless, oily liquid even in cold weather
Described as having the odor of geraniums

Mustard
Mustard a persistent agent, but becomes a vapor at high ambient temperatures
WWI 80% of mustard casualties from vapor

No antidotes avail. to treat toxicity from mustard agents
Under investigation include:
    Vitamin E
    Anti-inflammatory drugs
    Mustard scavengers
    Nitric oxide synthase inhibitors

Granulocyte colony-stimulating factor is usually recommended for patients with bone marrow suppression

(Vesicant Course cont.)

Lewisite Clinical Effects

ARDS – easily prevented w/mask
Systemic: leaky capillaries, hemolysis, hemoconcentration, shock

Lewisite Clinical Effects II

Eyes – involvement more rapid
Pain & blepharospasm on contact
Edema of conjunctiva and lids with closure of eye within an hour
Lid edema resolved in a few hours
Corneal injury varies with exposure
Susceptible to secondary infection
Mild exposure heals in a few days
Severe exposure results in blindness

Lewisite: Treatment

Immediate decon
BAL --
Ophthalmic: use w/i 2 min
Topical – before vesication - thin layer
vesicles – same as for mustard
parenteral - >5% BSA, cough with dyspnea, pulm. edema
Pain management - morphine

(BLDS Chapter 6 – Vesicant section cont.)

Acute exp to Lewisite liquid/vapor causes similar signs & symptoms as the mustards

BAL is a chelating agent used to reduce systemic effects from Lewisite exp.
Due to side effects, give only to those with signs of shock or pulm injury & in consult. w/poison control center
Dosing 3-5 mg/kg IM q 4 hr x 4
Side effects: pain at inj. site, N/V/HA burning sensation of lips, etc
Contraindications: renal dis, preg., use of medicinal iron
Alkalization of urine stabilizes complex and protects kidneys
Hemodialysis should be considered to remove the complex for renal insufficiency

Chemical Casualties: Nerve Agent Course

Of Chemical Agents – Nerve Agents
Most Toxic

Significant hazards as liquids/vapor
Developed by Germans prior to WWII
Chemist looking for a better insecticide

GA (TABUN) 1936
GB (SARIN) Tokyo subway attack
GD (SOMAN) 1944
GF

All non-persistent
Consistency of water
Evaporate a little slower

VX 1950's US – only persistent agent
Consistency of motor &
evaporates about as quickly

But G agents can be modified to increase persistency beyond VX
US now has GB (sarin) and VX

G – Agents:
Clear, colorless, tasteless
most odorless
all penetrate skin & normal clothing very well

When dispersed constitute
Both liquid/vapor hazard

Nerve Agent Toxicity

Agent	LCt50
GA	200
GB	100
GD	70
VX	50

BLDS Chapter 6 – Nerve Agent section

Chemical agents may be categorized into nerve agents, …

Nerve agents work in a manner similar to insecticides but 100-500 x potent

G – stands for Germans
GA – Tabun
GB – Sarin
GD – Soman
Tabun, Sarin, & Soman are volatile or non-persistent

V – stands for Venom

Highly viscous (consistency of motor oil)

All nerve agents rapidly penetrate skin and clothing

All are heavier than air and sink into low places
Volatile agents (GA/GB/GD) can cause injury by both dermal/inhalation

Persistent liquids (VX) more likely to be absorbed across the skin
VX lipophilic, more persistent, much more toxic

10 mg dose on skin LD 50 to unprotected individuals

(Nerve Agent Course cont.)

Nerve Agent Physiology

Inhibit acetylcholinesterase in tissue
Muscles continue to contract
Glands continue to secrete
Nerves continue to be stimulated

Excess acetylcholine acts on both
muscarinic & nicotinic sites
Muscarinic sites found in:
glands, smooth muscle, cranial
nerves – can be reversed by
ATROPINE
Nicotinic sites:
Skeletal muscles & some nerve-
nerve junctions—
ATROPINE DOES NOT WORK

Nerve agents clinical effects
CNS – LOC, seizures, apnea, death.
Small exposure irritability,
forgetfulness, sleep disturbances,
emotional instability, slowed
thinking, inability to concentrate

(BLDS Chapter 6 – Nerve Agent section cont.)

Nerve Agent Pathophysiology

Acetylcholine important neurotransmitter
neuromuscular endplate
parasympathetic nervous system
After it works broken down into acetate
and choline by acetylcholinesterase
Nerve agents bind to acetylcholinesesterase
blocking its action
Chemical details of how this happens

If bond becomes permanent, enzyme is
inactivated and new enzyme must be
synthesized for synapse to function
normally again

Neurotransmitter excess manifest in **both**
sympathetic & parasympathetic systems

Ganglionic, nicotinic excess result in
tachycardia, hypertension, and
mydriasis
May mislead clinician
Expects cholinergic (muscarinic)
findings such as bradycardia, miosis,
and polyrrhea

CHART of Signs/Symptoms of Nerve Agents
at both Muscarinic and Nicotinic
sites

Nerve Agent Detection

Primary detection method based on signs &
symptoms – essential correct dx
based on the signs/symptoms
Chemical agent confirmation using detection
or lab will take considerable time

More severely intoxicated patients will
present with vomiting & seizures

(Nerve Agent Course cont.)

<u>Nerve agents clinical effects (cont)</u>

Heart rate:
- decreased from Muscarinic effect
- increased from nicotinic effect

Skeletal muscles – fasciculations, twitching, paralysis

Inhaled agents result in symptoms within seconds

Thru skin slower, perhaps as long as 18 hrs

Eyes – miosis, injection, pain, "dim vision"

Nose -- rhinorrhea

Mouth -- salivation

Airways – bronchoconstriction, secretion, "tight chest" dyspnea

GI – secretions, vomiting, diarrhea, abdominal pains, cramps

(BLDS Chapter 6 – Nerve Agent section cont.)

CHART of Signs/Symptoms of Nerve Agents at both Muscarinic and Nicotinic sites

Depending on agent and amount of exposure, effects of nerve agent could be immediate or delayed

- Large inhaled exposure likely to be lethal immediately
- Small dermal exposure may have delayed effects and require a period of observation

Usually has a rapid onset with little or no warning

Clues of low-lying clouds
- Dead/dying animals/people
- Unexplained polyrrhea in multiple people

Majority of exposed patients will present with miosis (volatile agents [G])

Victims of VX exposure usually do *not* manifest miosis

More severely intoxicated will present with vomiting …

Muscarinic mnemonic DUMBELS
- **D** - diarrhea
- **U** - urination
- **M** – miosis
- **B** – bradycardia, bronchoconstriction Bronchospasm
- **E** – emesis
- **L** – lacrimation
- **S** – salivation, secretions, sweating

Nicotinic mnemonic **Days of Week**
- **M** – mydriasis
- **T** – tachycardia
- **W** – weakness
- t**H** – hypertension
- **F** - fasciculations

(Nerve Agent Course cont.)

Nerve Agent Vapor Exposure

Initial effects depend on the amount of exposure
- small – response is local
  - eyes – miosis, injection
  - nose - rhinorrhea
  - airways - SOB
- large – loss of consciousness secretions, twitching - seconds to minutes
  - seizures – seconds to minutes
  - apnea – several minutes dead in 5-10 min

Effects begin seconds to 1-2 min after exp.
Effects maximize w/i minutes
Not delayed in onset – will not start hrs later
Low concentrations – eyes, nose, airways
High concentrations – CNS

VX

Consistency of motor oil – no real vapor hazard
Evaporates slowly – like oil
Symptoms up to 18 hrs after exposure
LD50 10 mg

(BLDS Chapter 6 – Nerve Agent section cont.)

Bronchorrhea & bronchoconstriction principal causes of death in nerve agent poisoning
Resolution of pulmonary symptoms primary endpoint in treatment
Soman poisoning different & may require weeks of therapy
Routine toxicology screens do *not* ID nerve agents in serum or urine
Lab test for cholinesterases – testing for BuChE in serum and RBE-AchE in RBCs
- Comparison of the two tests and caveats

Treatment should be *clinically* based
Never withhold Rx from a symptomatic patient while awaiting lab results
Decreased cholinesterase activity w/o symptoms *not* a reason to treat

CHART of symptoms for
- Mild – tearing, runny nose, chest tightness
- Moderate – add N/V, mod. SOB, wheezing
- Severe – add severe SOB, seizure, cardiovascular collapse

If a chemical event occurs, the majority of victims arrive w/I a short period of time (hrs) after exposure (short incubation time) and involve, usually, only a few are hospitals

V – stands for Venom
- Highly viscous (consistency of motor oil)
- 10 mg dose on skin LD 50 to unprotected individuals

Depending on the agent, effects could be Immediate or delayed

(Nerve Agent Course cont.)

Nerve Agent – Skin Exposure

First effects with small exposures are local, around the droplet
- Sweating, fasciculation – min to hrs

First systemic effects if <LD50
- Onset 0.5 to 18 hr after contact
- GI – vomiting, diarrhea
- Can occur after decon
- If any question of exposure, then Observe for 18 hrs

Exposure to LD50 or greater
- Onset 1 – 30 min after contact
- First effect: LOC, seizure
- Sudden onset

Large – CNS/totally out of luck

Nerve Agent Management

Decontaminate
Ventilate
Acetylcholine blocking drug (Atropine)
Remove agent (oxime)

PROTECT YOURSELF

Decon – only helpful to victim if done within minutes of exposure
- physical removal
- decon solution – hypochlorite, M258A1, M291

Ventilation – high airway resistance initially resolves after atropine. Less of a need if pyridostigmine

(BLDS Chapter 6 – Nerve Agent section cont.)

Depending on the agent, effects could be Immediate or delayed

Volatile agent exposure will be symptomatic w/i first hour
- Pts not symptomatic at hospital eval. unlikely to become symptomatic

VX patients may not become symptomatic for up to 18 hrs

If exp. Hx uncertain, institute longer observation period

CHART of symptoms for
- Mild – tearing, runny nose, chest tightness
- Moderate – add N/V, mod. SOB, wheezing
- Severe – add severe SOB, seizure, cardiovascular collapse

Treatment based on initial signs/symptoms and modified when agent identified

Degree of symptomatology determines dose of antidote therapy

If evidence of skin contamination (gross liquid, + M8 or M9 paper, localized fasciculation, & sweating) pt must have wet decontamination. If no evidence of skin contamination, dry decon is an acceptable alternative

Resolution of pulmonary symptoms primary endpoint in treatment

Acute management of patients with nerve agent exposure involves the rapid establishment of a patent airway

(Nerve Agent Course cont.)

Nerve Agent Management (cont)

Block Excess Acetylcholine
- Drug of choice Atropine
- Blocks effects at Muscarinic receptor sites, not nicotinic
  - dries secretions, reduces smooth muscle contractions
  - does NOT significantly decrease skeletal muscle effects or miosis (unless dropped in the eye)

ATROPINE
2 mg starting dose
Usual dose in severe casualty 20 mg
Organophosphate exposures often need 1000 mg/day

(BLDS Chapter 6 – Nerve Agent section cont.)

Major cause of death is hypoxia from bronchoconstriction & bronchorrhea

With severe bronchoconstriction or secretions, it may be necessary to provide atropine before other interventions attempted

Bronchoconstriction creates airway resistance of 50-70 cm of H_2O

More than "pop off" valve on most bag devices allow for

Endotracheal intubation may not be successful until atropine is given

Do Not use succinylcholine to assist with intubation – the nerve agents prolong its paralytic effects

After giving atropine, carry out *aggressive* pulmonary toilet (incl suctioning)

These interventions can be life saving in victims even with severe systemic symptoms such as seizure & coma

Three pharmaceutical agents essential in the management of nerve agent exposure: Atropine, …

Atropine has both systemic and central effects to combat the effects of acetylcholine excess at muscarinic sites

Endpoint: clearing of bronchial secretions and decreased ventilatory resistance

Once the enzyme has been regenerated, it may improve breathing

Dosing begins with 1-2 mg – much more may be required

Typical dose in severe intoxication: 5-15 mg (much larger doses are required in organophosphate insecticide intoxication for which several grams of atropine may be needed in the first days of treatment

(Nerve Agent Course cont.)

Give until secretions are drying or dry and ventilation is easy

(BLDS Chapter 6 – Nerve Agent section cont.)

Lack of response to normal doses of atropine hallmark of organophosphate intoxication
Endpoint: clearing of bronchial secretions and decreased ventilatory resistance

Pts with severe muscarinic effects will require larger amounts of atropine
Atropine may be given IM, IV, ET
Heart rate and pupil diameter are **not** useful parameters for monitoring the response to Rx
Nebulized bronchodilators **not** as effective as atropine
Administer more atropine if ventilation remains difficult or secretions persist
Can still give atropine if pt is tachycardic
Atropine causes anticholinergic toxic syndrome when administered in excess of amount needed to reverse muscarinic effects
Blocking perspiration can put patient of risk of hyperthermia
Monitor these patients with a rectal probe and keep in cool environment

CHART on treatment protocols for mild, moderate, and severe exposure

<u>Nerve Agent Management (cont)</u>

REMOVE NERVE AGENT
Oximes remove nerve agent in absence of aging
Aging: process by which agent-enzyme bond becomes refractory to oxime reactivation
Aging important only with GD

2-PAM reactivates acetylcholinesterase
Nerve agent may be displaced by 2-PAM or become permanent (aging)
If bond becomes permanent, regeneration with antidote no longer possible
Aging occurs at different rates with different agents
Sarin – several hours
Soman – 2-6 minutes
VX – greater than 2 days
If enzyme regenerated, it resumes critical role in neurotransmission

(Nerve Agent Course cont.)

(BLDS Chapter 6 – Nerve Agent section cont.)

Nerve Agent – Aging & Pyridostigmine

Pre-treating with Pyridostigmine protects receptor sites from nerve agent
Administer before the attack and prevents aging (GD), and increases the therapeutic effectiveness of atropine/oxime
Less apnea more seizures
Good news – you have diazepam – don't have ventilators

Chart shows effectiveness of Pyridostigmine pre-treatment vs no pre-treatment or Rx with atropine/oxime

Nerve Agent Management (cont)

OXIMES
No Muscarinic effects
Help at nicotinic sites
Reduce skeletal muscle twitching, improve skeletal muscle strength
2 PAMCl, pralidoxime chloride, Protopam
1-2 grams SLOWLY IV (20-30 min)
Repeat 2-3 hourly intervals

Improvement in nicotinic symptoms such as fasciculations, muscle twitch, weakness
It may improve breathing (but won't treat muscarinic symptoms such as bronchorrhea and bronchoconstriction
2-Pam *always* given in conjunction w/Atropine – NEVER alone
Usually time to treat Sarin exposure if antidote available
Soman is the exception – aging time so short that there may not be time to treat w/2-PAM
2-PAM should be used *every* time nerve agent exposure is suspected
2-PAM given by slow IV infusion over 30 min
Main side-effect is hypertension from overly rapid infusion – rapidly responsive to phentolamine
Adult dose is 1 gm repeated every hour for a total up to 3 gms
Ped. Dose 15-25 mg/kg IV over 30 minutes

(Nerve Agent Course cont.)

Nerve Agent Management (cont)

Seizures
- brief if pyridostigmine is not used before attack
- with pyridostigmine pretreatment, may be prolonged – and cause CNS damage
- RX: diazepam

Look out for Cardiac arrhythmia's from agent & atropine

V-fib from atropine in hypoxic casualty

Small vapor exposure
- Miosis, rhinorrhea
- Observe; no therapy unless rhinorrhea is bad
- Atropine will not help miosis

Moderate vapor exposure
- Miosis, rhinorrhea, short of breath,
- MARK I
  - 1-2 depending on severity of dyspnea
  - Start with one – wait 5-8 min

(BLDS Chapter 6 – Nerve Agent section cont.)

Diazapam

Diazapam (or other benzodiazepines) should be used to treat seizures induced by nerve agents

Given IV or autoinjector
- IV more practical in hospital setting

Military data indicates diazepam should be given to patients manifesting severe symptoms even before seizures develop

If 3 MARK I kits are given (severe symptomatology) diazepam should be administered directly thereafter

Excepting benzodiazepines, conventional treatment for seizures (phenytoin) considered ineffective

Autoinjector Kits

Produced for rapid infusion

Known as MARK I kit – 2 injector pins
- 2 mg atropine
- 600 mg pralidoxime

Smaller – Atropine – IM
- Details on how to do it

Larger - Pralidoxime – IM
- Details on how to do it

Number of autoinjectors used should be noted on patient/chart

Not available to civilians at this time

CHART on treatment protocols for mild, moderate, and severe exposure

(Nerve Agent Course cont.)

(BLDS Chapter 6 – Nerve Agent section cont.)

Nerve Agent Management (cont)

Severe vapor exposure
- Unconscious, seizures, apnea, airway, GI,
- MARK I
  - Give 3 immediately with diazepam
  - Ventilate

CHART on treatment protocols for mild, moderate, and severe exposure

If 3 MARK I kits are given (severe symptomatology) diazepam should be administered directly thereafter

RECOVERY
- Spontaneous breathing, consciousness in 2-3 hr
- Weakness, CNS problems for 3-6 wks
- Visual problems 3-6 wks

Small liquid exposure
- Localized fasciculation and sweating
  - One MARK I & observe for 18 hrs

Moderate liquid exposure
- Vomiting & diarrhea
  - One MARK I, repeat in 10-15 minutes if effects worsen
- Observe 18 hrs

CHART on treatment protocols for mild, moderate, and severe exposure

Severe liquid exposure
Unconscious, seizures, etc…
- Three MARK I
- Diazepam
- Ventilation

CHART on treatment protocols for mild, moderate, and severe exposure

If 3 MARK I kits are given (severe symptomatology) diazepam should be administered directly thereafter

Triage

Immediate: not walking or talking but the heart is still beating esp if still spontaneously breathing and has not lost consciousness and not seized

Minimal: walking and talking

Delayed: recovering casualty

Expectant: not walking or talking and heart is not beating

This information in **Triage Chapter**

(Nerve Agent Course cont.)

(BLDS Chapter 6 – Nerve Agent section cont.)

Nerve Agent Management (cont)

RULE ONE – PROTECT YOURSELF
RULE TWO – LOC &/or severe signs in 2 or more systems – 3 MARK I & diazepam NOW
RULE THREE – when a casualty requires 3 MARK I at once ALWAYS give diazepam

Rule about protecting self in other BDLS chapters

If 3 MARK I kits are given (severe symptomatology) diazepam should be administered directly thereafter

Chemical Casualties: Pulmonary Agent Course

BLDS Chapter 6 – Pulmonary Agent section

Overview

Inhalation injury – organohalides, oxides of nitrogen, and others
Result – pulmonary edema after a latent period
Due to permeability defect at the alveolar-capillary membrane – clueless as to exact mechanism

Chemical agents may be categorized into the following groups: … pulmonary or choking agents, …

Over a billion pounds of phosgene produced
Not stockpiled as a weapon
PFIB – pyrolysis product of Teflon
Oxides of nitrogen – component of munitions
Smokes (HC) act like phosgene

These agents damage lung tissue and include phosgene (CG), diphosgene (DP), chlorine (Cl), and chloropicrin (PS)
Chlorine is a pulmonary irritant damaging upper and lower respiratory tract, and is a common inhalation exposure in occupational and environmental exposures

History

Phosgene is the prototype for this class
First synthesized in 1812
First used on battlefield at Verdun 1917 by Germany
Very popular – usually mixed with chlorine
Lots made in WWII but none used

Phosgene ($COCl_2$) the most dangerous because it directly damages the lungs
80% of all chemical casualties in WWI caused by phosgene

(Pulmonary Agent Course cont.)

(BLDS Chapter 6 – Pulmonary Agent section cont.)

Detection

Immediately Dangerous to Life or Health (ADLH) concentration of phosgene is 2 ppm

M256A1, M272, M8, M9, CAM, ACAM, M8A1 alarm and DAAMS don't detect it

MINICAMS, Monitor Plus, Draeger, ICAD, M18A2, M90, M93A1 Fox will detect it

There are a number of commercial chemical agent detectors available, but their use is limited to sites where chemicals are used to monitor accidental release or sabotage

Smells like new mown hay – lost quickly Due to accommodation

Eye irritation, coughing, sneezing, hoarseness are possible but not reliable

Comes as a liquid but forms a vapor quickly

4 times as dense as air so clings to the ground as a white cloud

Odor may not warn of phosgene exposure because toxic concentrations may be below the olfactory threshold

Phosgene a colorless, nonflammable gas with the odor of newly mown hay

Detection of a chemical agent is primarily an exercise in identification of toxidromes for specific chemical agents by the clinical picture exhibited by the patient

Irritant gas (e.g., phosgene, ammonia) – large number complaining of mucous membrane irritation and burning

Phosgene accumulates in low areas (i.e., trenches) because it is denser than air

Toxic levels may be present w/o detection of an odor

Chlorine is a greenish-yellow gas at room temperatures

Phosgene may have the appearance of a white cloud & have the odor of newly mown hay

Low concentrations – mild cough, chest tightness, and SOB

High exposures – noncardiogenic pulmonary edema within 2-6 hours after exposure

Death may ensue within 24-48 hrs

At time of exposure see coughing, choking, chest discomfort, N/V/HA, tearing

(Pulmonary Agent Course cont.)

(BLDS Chapter 6 – Pulmonary Agent section cont.)

Presence or absence of these symptoms do *not* aid in predicting the severity of the exp.
Some pts w/severe choking episodes fail to develop further lung injury
Others with only minor respiratory tract irritation have been know to develop fatal pulmonary edema
2-24 hr period when patient may be symptom-free
Pulmonary edema signaled by substernal pain, cough, rapid shallow breathing, frothy sputum and cyanosis

Protection

Mask affords full protection
Inhalation hazard only
Don't need to decon casualties

Toxicity

Most agents are inhaled
Reaction occurs in airway
No systemic absorption
Smell phosgene @ 1.5 mg/m^3
Irritation of mucus membranes @ 4 mg/m^3
LCt50 Phosgene is 3200 gm-min/m3
6000 for Chlorine
PFIB is 10 times as toxic as Phosgene

Toxic levels of phosgene may be present w/o detection of an odor

Mechanism of Action

Depending on solubility and reactivity of the agent, either central or peripheral airway affected
Reactive or highly soluble agents act on central airways
Less reactive agents (Phosgene & PFIB) start to react after they reach the alveoli
Central agents can act peripherally and peripheral agents centrally
Chlorine gas is between the two extremes

Chlorine after exposure the victim develops irritation to the conjunctivae, nose, pharynx, larynx, trachea, and bronchi resulting from inflammation and local edema
With large exposure to chlorine, alveoli fill with fluid resulting in pulmonary congestion and edema

(Pulmonary Agent Course cont.)

(BLDS Chapter 6 – Pulmonary Agent section cont.)

Chlorine moderately soluble in water & forms hypochlorous & hydrochloric acids which injure the cells
Elemental chlorine may oxidize cell components and generate free oxygen radicals further damaging cells

Phosgene

Relatively insoluble, but when dissolved forms HCl
Responsible for ocular, nasopharyngeal and central airway irritation when exposed to high concentrations
Acylation at alveoli accounts for the big bang! (i.e., pulmonary edema)
Initially pulmonary lymphatics handle the extra fluids, then become overwhelmed

Phosgene is directly toxic to the respiratory tract
Causes extensive damage to the alveolar-capillary membrane
In the alveoli, phosgene reacts with H_2O to form hydrochloric acid which injures the alveoli which may result in massive pulmonary edema
Phosgene with moderate concentration cause lacrimation (combines with H_2O to form HCl)

Clinical Effects

Variable latent period
Dependent on dose and exertion of casualty
First symptom may be complaint of respiratory distress with a normal PE
Whooping doses can result in enough laryngeal irritation to cause spasm and death

Low concentrations may cause mild cough, Chest tightness, and SOB
Presence or absence of the typical symptoms do *not* aid in predicting the severity of the exposure
Some patients with severe choking episodes fail to develop further lung injury
Other with only minor respiratory tract irritation have been known to develop fatal pulmonary edema
2-24 hr period where patient may be symptom-free
Pulmonary edema signaled by substernal pain, cough, rapid shallow breathing, frothy sputum and cyanosis

(Pulmonary Agent Course cont.)

(BLDS Chapter 6 – Pulmonary Agent section cont.)

Clinical Effects

Most prominent symptom after the latent period is dyspnea
Patient may dump up to a liter per hour of fluid into the lungs
Lungs aren't happy
Circulatory volume loss leads to hypotension
Sign of pulmonary edema < 4 hrs
Very, very bad

Hallmark of chlorine inhalation exposure – pulmonary edema with hypoxia
Cornea abrasion and burns may be present with chlorine exposure, but sever ocular injury rare
Tears buffer the acids formed

Lab Findings

Not a whole lot of help
Hct may increase with fluid shifts
PFT may suggest airway damage
Early CXR has hyperinflation followed by pulmonary edema

Management

Stop the exposure
ABC's
ENFORCE REST
Airway secretions are usually of epic proportion – suctioning and drainage
Bronchospasm esp. in asthmatics
Beta adrenergic bronchodilators\
Steroids
Steriods need to be given IV – *not* topically
Methylprednisolone 700-1000 mg IV on the first day then tapered
May not be such a good idea -- infection
No human data
Watch for and treat infections
Pulmonary Edema
Positive pressure
High Frequency Ventilation (HFV) helpful
Hypoxia
Oxygen
PEEP or CPAP
Intubation
HFV

Steriods have **not** been shown to be effective
Prophylactic antibiotics are *not* recommended

Patients with pulmonary edema require end-expiratory pressure either by mask or by endotracheal intubation

(Pulmonary Agent Course cont.)

A normal CXR may develop pulmonary edema up to 6 hours later

Hypotension
Don't be skimpy with crystalloid or colloid
Either one does just as good
Anti-shock trousers
Look out for hypotension especially when starting mechanical ventilation

(BLDS Chapter 6 – Pulmonary Agent section cont.)

Diuretics play a limited role

Patients exposed to phosgene or chlorine gas do *not* pose a risk of secondary contamination outside of the Hot Zone
Patients exposed to liquid phosgene, however, may contaminate other personnel from off-gassing vapor
No specific antidote for phosgene or chlorine
In cases of suspected ocular injury, the initial pH should be determine
Copious irrigation with normal saline should continue until the pH returns to 7.4
Topical anesthetics may help limit pain
Pulmonary symptoms may be delayed up to 4-6 hours after exposure, therefore, repeat assessments should be made
Patients with hyperactive airways may require aerosolized bronchodilator therapy

<u>Pulmonary Agents Triage</u>

Minimal: < 12 hrs post exposure asymptomatic – retriage q 2 hrs
Minimal > 12 hrs post exposure asymptomatic or resolving dyspnea
If asymptomatic after 24 hrs post exposure hit the door

Triage is a separate chapter of BLDS

(Pulmonary Agent Course cont.)

Triage – Delayed

< 12 hrs post exp. delayed patients are dyspneic without symptoms – retriage hours

> 12 hrs post exp. delayed patients are dyspneic and should be watched closely and retriaged q 2 hrs

Triage – Immediate

< 12 hrs – pulmonary edema alone and only if intensive pulmonary care is immediately available

> 12 hrs – Pulmonary edema if you can get him in an ICU within a few hours

Triage – Expectant

< 12 hrs – Pulmonary edema & cyanosis & hypotension

> 12 hrs – pulmonary edema & cyanosis & hypotension. Or

After you get started – persistent hypotension despite intensive care

Choking Agents Bottom Line

Treatment

- Early entry into emergency care system
- Trust you patient despite absence of SX
- Enforce rest
- Observe
- Evac those who need PPV, PEEP, fluid resuscitation

Return to Duty

Asymptomatic 24 hrs after exp.

Symptoms limited to eyes or upper airway irritation and is asymptomatic with normal PE 12 hrs later

Initial complaint was dyspnea but normal PE, CXR, or ABG @ 24 hrs

If initially abnormal but returns to normal baseline @ 48 hrs

(BLDS Chapter 6 – Pulmonary Agent section cont.)

Triage is a separate chapter of BLDS

Chemical Casualties Cyanide Course

History

Ancient Egypt & Rome
Crimean War
Napoleon III
WWI French & British
WWII Japan
Middle East

Cyanide AC CK-2

Biochemistry
- High affinity for ions of transitional metals
  - Iron especially ferric ion, cytochrome, heme in methemoglobin
- Interrupts cellular respiration in mitochondria
- Ability to react enzymatically with sulfanes

BLDS Chapter 6 – Cyanide section

Chemical agents may be categorized into the following groups … cyanides …

No history on cyanides in BLDS

Cyanide has a high affinity for ferric ion (Fe^{+3}) contained in the cytochrome oxidase, and binds to it

Binding inhibits the final step in the electron transport chain and substantially decreases the amount of ATP that can be produced

The mitochondria are unable to produce enough energy to keep the cell alive

BLDS chapter gives a **detailed** explanation of the electron transport chain and how and why it is poisoned by cyanide

The cells most dependent on O_2 such as the brain and the heart are the first to show the symptoms of cyanide toxicity

BLDS chapter also gives cyanide **pathophysiology** and how the liver is able to eliminate small amounts of it routinely

Cyanide poisoning often a factor in patients trapped in a confined space fire

Chart on Hydrogen Cyanide (HCN) and Cyanide salts KCH and NaCN giving:
- Synonyms
- Sources
- Physical properties
- NIOSH IDLH
- Warning Properties

(Cyanide Course cont.)

Cyanide AC

Highly water soluble
Very volatile: vapor and gas 94.1% as dense as air and explosive
Faint "musty" odor of bitter almond, peach pits or burning rope (ability to smell this absent in 40-50%)
Onset seconds with high concentrations
LCt_{50} 2500-5000 mg/min/m^3

(BLDS Chapter 6 – Cyanide section cont.)

HC is lighter than air & will dissipate when released into open spaces
Chart with physical properties and warning properties
Said to have a faint, bitter almond taste
20-40 of pop c/n detect HC due to the absence of a gene required to be able to smell the gas
Those who can smell it often do not describe its odor as bitter almonds
Rapid olfactory fatigue occurs making its warning properties almost non-existent

In warfare cyanide has had little success, but as a terrorist weapon in enclosed spaces it is of concern
Many sources of cyanide available to terrorists
Readily absorbed thru the skin and onset of symptoms begins within seconds to minutes after exposure
Children exposed to same level as adults will have higher exposure due to relatively larger pulmonary surface size
Exp. thru skin/mucous membranes adds to systemic toxicity
Symptoms to skin exp. may be immediate or delayed up to 60 min
HCN burns are caustic and can result in skin burns similar to mustard
Small amounts of cyanide eliminated routinely by the body (source: normal diet)
Eliminated using liver enzyme rhodanese
In toxic exp the dose of cyanide exceeds the body's supply of thiosulfate
It is the body's supply of thiosulfate, not rhodanese, which is the main rate-limiting step in detoxifying the cyanide

(Cyanide Course cont.)

(BLDS Chapter 6 – Cyanide section cont.)

Classic teaching concerning cyanide poisoning is that the cells are unable to use oxygen in the mitochondria and there fore the venous blood remains oxygenated and bright red in appearance – recently disputed with some studies shoeing a majority pf patients may present with cyanosis.

Cyanide AC-2

Lethal Doses of Cyanide for an Adult
Vapor/Gas:
200-300 mg/m3
Fatal within 5 min
150 mg/m3
Fatal after 30-60 min
Greater LCt50 with longer exposure

Cyanide CK

Chart on cyanide salts
Water solubility

Slightly water soluble
Very volatile
Vapor and gas HEAVIER than air
Results in ARDS

Pungent biting odor masked by irritation of eyes, nose and respiratory tract
Onset time: seconds w/high concentrations
LCT_{50}: 11,000 hg/min/m^3

Cyanide Detection

Chart on detector capabilities

M8 detector paper	No
M9 detector paper	No
CAM	No
Mw65A1 detector card	Yes (vapor)
M272 water testing kit	Yes (20 mg/L)

Detection devices for cyanide are limited, expensive, and lacking in clinical relevance
Common nerve agent detectors **are incapable** of detecting cyanide as AC or CK
Detectors have the capacity to detect AC and CK at the threshold limits show on the chart

(Cyanide Course cont.)

Cyanide Absorption
Ingestion (usually not in military setting)
Parenteral (wounds)
Percutaneous
Inhalation
Ocular

Cyanide Elimination

Unchanged CN – breath, sweat, urine
Thiocyanite excreted in urine
Iminothiocarboxylic acid from reaction with sulfhydryl groups

Cyanide – Clinical Presentation

Most susceptible organs are CNS & Heart
Most clinical effects are of CNS origin and nonspecific
After 15 sec following inhalation of high concentration of cyanide vapor > transient hyperpnea
15-30 seconds later convulsions
2-3 min later respiratory arrest
6-8 min later cardiac arrest

(BLDS Chapter 6 – Cyanide section cont.)

Cyanide does *not* have a well defined toxidromes
Victims of cyanide poisoning have very non-specific symptoms
Cyanide has almost no effects after brief exposure to very low concentrations
Patients may experience a variety of symptoms depending on the form of cyanide, the concentration and the route of exposure
Most likely scenarios are a release of cyanide gas into a confined space or cyanide salts placed into the water supply
CNS and CV systems most susceptible to cyanide poisoning
Extremely low levels – little or no symptoms at all

Hydrogen cyanide is highly toxic by all routes of exposure

CNS & CV systems most susceptible to cyanide poisoning
As exposure continues – cardiac arrhythmias, hypotension, drowsiness, tetany, seizures, hallucination, and LOC
CNS – excitement, dizziness, HA, weakness seizures, loss of consciousness
CV – hypertension (early & transient) tachycardia (early & transient) ventricular arrhythmias, bradycardia (late), Intractable hypotension (late), fatal arrhythmia
Respiratory – SOB, tachypnea, chest tightness

(Cyanide Course cont.)

Cyanide – Clinical Presentation

Lower concentration
First effects may not occur until several min
Initial hyperpnea followed by anxiety, agitation, vertigo, weakness, nausea with or without vomiting, muscle trembling
Later LOC, decreased respirations, seizure, apnea, dysrhythmias, cardiac arrest

(BLDS Chapter 6 – Cyanide section cont.)

Extremely low levels – little or no symptoms at all (body is able to metabolize it)
Moderate level exposure – nonspecific – excitement, dizziness, N/V, HA, weakness
As exposure continues – cardiac arrhythmias, hypotension, drowsiness, tetany, seizures, hallucination, and LOC
CNS – excitement, dizziness, HA, weakness seizures, loss of consciousness
CV – hypertension (early & transient) tachycardia (early & transient) ventricular arrhythmias, bradycardia (late), Intractable hypotension (late), fatal arrhythmia
Respiratory – SOB, tachypnea, chest tightness

Severe cyanide poisoning – experience intense air hunger, SOB, chest tightness
Pulmonary –
- Increased respiratory rate & depth of respirations
- As progress, respiration may be come slow and gasping (cyanosis often absent)
- Pulmonary edema may occur due to local irritant effects of HCN in the alveoli

Dermal Signs/Symptoms:
- Localized irritation
- Ocular irritation and swelling

(Cyanide Course cont.)

(BLDS Chapter 6 – Cyanide section cont.)

Cyanide – Physical Findings

Few and nonspecific
Characteristic (not always seen)
- Acyanotic respiratory distress
- Cherry red skin

Not all cyanide casualties have read the book – will not follow the instruction on how classic exposures will present

Most significant clue to cyanide poisoning is the bright red venous blood and the absence of cyanosis in a patient in obvious respiratory failure (this is questioned by latest studies which show many [if not most] will present cyanotic)

Cyanide – Progression of Signs:
Cyanide **FEELS BAD**

Mneumonic:

Flushing (immediately)
Elevation of respiratory rate and depth
Erratic respirations
LOC (20-30 seconds)
Seizures/rigidity (30 sec)
Breathing cessation (1-2 min)
Arrhythmias
Death

CNS – excitement, dizziness, HA, weakness seizures, loss of consciousness
CV – hypertension (early & transient) tachycardia (early & transient) ventricular arrhythmias, bradycardia (late), Intractable hypotension (late), fatal arrhythmia
Respiratory – SOB, tachypnea, chest tightness

Differential Diagnosis

Cyanide or nerve agent exposure can cause sudden LOC followed by seizures and apnea
Nerve agent casualties will have miosis, copious oral and nasal secretions and muscle fasciculations
Cyanide casualties will have normal sized or dilated pupils, few secretions and muscle twitching but no fasciculations

CNS – excitement, dizziness, HA, weakness seizures, loss of consciousness
Respiratory – SOB, tachypnea, chest tightness

Diagnosis of cyanide poisoning is primarily a clinical one based on the rapid onset of CNS toxicity and cardiorespiratory collapse

(Cyanide Course cont.)

Cyanide – Lab Findings

Bright red venous blood
Metabolic acidosis w/anion gap > 30
CN in blood, urine, gastric aspirate & tissues
Whole blood specimen of choice: use lavender (EDTA) or gray (oxalate, fluoride) tube and process immediately
Toxic > 0.2 μg/ml
Fatal > 3.0 μg/ml

Cyanide Treatment

Protect yourself
General supportive therapy
Specific antidotal

(BLDS Chapter 6 – Cyanide section cont.)

Laboratory testing is *not* useful for guiding clinical therapy in the acute phase
Routine ancillary tests may include CBC, blood glucose, electrolytes, EKG, serum lactate levels, ABG, pulse oximetry, and CXR

After the acute treatment of methemoglobin levels may be monitored
Usual methods of measuring methemoglobin levels are unreliable in cases of cyanide poisoning and may seriously underestimate the level of inactive hemoglobin
Survivors of a serious exposure should be evaluated for ischemic damage to the brain and heart
Patients who have serious poisoning may be at risk of CNS sequelae such as Parkinson-like syndromes, and should thus be followed long term

Symptomatic patients should immediately receive good supportive care with 100% O_2 and antidotes as needed

(Cyanide Course cont.)

Cyanide – General Supportive Treatment

Terminate exposure
- Remove patient from area of involvement
- Remove agent – decon (soap and water) gastric lavage with activated charcoal, 5% sodium thiosulfate, 0.1% potassium permanganate or 1.5% hydrogen peroxide (ingestions)

ABC (no unprotected mouth to mouth)
Correct metabolic acidosis
Observe for 24-48 hrs

Specific Treatment -- Cyanide

Displace CN from cytochrome a_3
- metHb formers (nitrites)

Sodium Nitrite 10 ml, 3% Soln over 3 min IV
Will increase metHgb (keep <40%) and may cause hypotension
Enzymatic conversion of CN to thiocyanate
Administer a sulfane (sodium thiosulfate) as a sulfur donor 12.5 g over 10 min immediately after Sodium Nitrite administration

(BLDS Chapter 6 – Cyanide section cont.)

Speed is critical in treating the cyanide poisoning victim
Treatment should be given simultaneously with decontamination
Patients who are able should assist with their own decon by removing clothing while flushing exposed skin and hair with plain water for 2-3 minutes, then wash with mild soap, rinse thoroughly, and double bag contaminated clothing
Dry decon should be considered for gas exposures only
Consideration must be given to prevent hypothermia, especially in the elderly and children
For eye and mucous membrane exposures, flush the eyes with plain water or saline for 5 minutes and remove contact lenses
For cases of ingestion, do *not* induce emesis
If the patient has a gag reflex, administer activated charcoal (60-90 gm for adult and 25-50 gm for children
If the patient is symptomatic IMMEDIATELY institute therapy with the contents of the cyanide antidote kit

Hydrogen cyanide readily penetrates rubbers and barrier fabrics – butyl rubber gloves provide good skin protection for a short time

Treatment of cyanide poisoning is 2-fold:
- Displace the cyanide from the cytochrome oxidase
- Provide a sulfide ion donor to metabolize the cyanide into thiosulfate
- The enzyme responsible for the metabolism of cyanide into thiosulfate is rhodanese
- The supply of a sulfur donor and *not* the rhodanese is the rate-limiting step

(Cyanide Course cont.)

(BLDS Chapter 6 – Cyanide section cont.)

Cyanide that can not be metabolized into non-toxic forms accumulate and have a high affinity for the ferric ion (Fe^{3+}) of the cytochrome oxidase of the electron transport chain

The removal of the cyanide from the cytochrome oxidase is the priority in treatment

Hemoglobin molecules contain a ferrous (Fe^{2+}) ion in each molecule

Sodium thiosulfate is then administered to provide the sulfur donor group needed for rhondanese to convert the cyanide into thiosulfate where it can be excreted by the kidneys

<u>Specific Treatment -- Cyanide</u>

Lilly Cyanide Antidote Kit: amyl nitrite, sodium nitrite, sodium thiosulfate

In field no amyl nitrite

Amyl nitrite is an oxidizer that changes the Fe^{2+} ferrous ion into Fe^{3+}

This change in hemoglobin to this oxidized state is referred to as methemoglobin

Methemoglobin looses its ability to bind O_2 and water becomes bound to the O_2 binding sites, however, the cyanide is attracted to and binds to the ferric ion in RBCs

Thus the cyanide is displaced from the cytochrome oxidase in the mitochondria

The administration of sodium nitrite further produces and maintains the methemoglobin state

Amyl nitrite

Amyl nitrite perle should be broken into a gauze pad and held under the nose, over the bag-valve-mask intake, or under the lip of the face mask

Vapors are **inhaled for 30 seconds out of every minute**

(Cyanide Course cont.)

Specific Treatment -- Cyanide

Germans use DMAP, rapid methemoglobin former but causes muscle necrosis at IM injection site

British use Kelocyanor (Cobalt edentate) may cause severe side effects

_(BLDS Chapter 6 – Cyanide section cont.)

Use a new perle every 3 minutes if the sodium nitrite infusions are delayed

Amy nitrite oxidizes the ferrous iron of hemoglobin to methemoglobin

Methemoglobin levels should not exceed 20%

Sodium Nitrite

Methemoglobin is created effectively by amyl nitrite because it may be administered rapidly via inhalation

Once IV access is obtained, sodium nitrite should be administered in order to continue to produce methemoglobinemia

Typical adult dose is 10 ml of a 3% solution (300 mg) infused over absolutely no less than 5 *minutes*

Average pediatric dose is 0.12 to 0.33 mg/kg up to 10 ml infused slowly

Major side effect of sodium nitrite is hypotension

Infusion rate should be slowed if hypotension develops

Sodium Thiosulfate

Once IV access established, **sodium thiosulfate** should be administered

Usual dose is **50 ml of a 25% solution** (12.5 gm) infused over 10-20 minutes

Average **pediatric dose is 1.65 ml/kg of a 25% solution**

It may be necessary to repeat treatment with sodium thiosulfate

In other countries, hydroxycobolamine (Vitamin B12a) has also been used for the treatment of cyanide poisoning

Hydrooxycobolamine reacts with cyanide to form cyanocobolamine

Cyanocobolamine is water soluble & non-toxic & excreted by the kidneys

(Cyanide Course cont.)

Triage

Immediate: casualty presents within minutes of exposure with seizures, recent apnea but circulation intact
Minimal: mild effects noted
Delayed: recovering from mild effects or successful therapy. Evacuation not necessary
Expectant: circulatory failure
In general a casualty that survives long enough to reach you will need little care

Return to Duty

Full recovery is relatively fast
Casualties with mild to moderate effects can return to duty within hours
Those with severe effects can return to duty within a day

(BLDS Chapter 6 – Cyanide section cont.)

BDLS has a triage chapter

Chemical Casualties Course

Material NOT in MUC courses

SYNOPSIS

Details of Nerve Agent—
Acetylcholine pathophysiology

Incapacitating Agent (BZ)
Uses, physical description, actions
Clinical diagnosis of BZ
Diagnosis of BZ

Incident Command (IC)
Reasons for a unified IC
Response to a chemical event requires cooperation from the list of agencies
Why paramount to notify hospital early

Chemical Casualties Course

Material NOT in MUC courses

SYNOPSIS

Incident Command (IC)
What to expect at a nerve agent release
Typical response/set-up time
Health care facilities needed
Need for rapid IC establishment
Where IC should be located
How to set-up hot/warm/cold zones

Scene Safety and Security
Why additional safeguards necessary
Duties of a Safety Officer
How and why of patient decon
How to protect against vapor agents
Levels of PPE
Who should wear PPE

Chemical Casualties Course

Material NOT in MUC courses

SYNOPSIS

Scene Safety and Security (cont)
- How to decon
- Where to decon
- How to secure hospital entrances
- How ingested agents pose a threat to healthcare workers

Assess Hazards
- How to assess hazard initially
- How to assess ongoing threat
- Procedures to protect against ongoing threat
- Role of Safety Officer

Support
- Where to get support from
  - Poison control center
  - Healthcare workers employed outside hospital
  - Managing hospital resources when casualties exceed capabilities
- How list of essential pharmaceuticals is very helpful
- Need for additional food service support
- Need for additional housekeeping
- Need for additional temporary storage
- Need for additional Safety Officers

Material NOT in MUC courses

SYNOPSIS

Triage/Treatment
- Rules which deal with chemical agents physical properties
- Rules for PPE at incident site

Treatment of BZ
- Supportive measures
- Medications for reversal of effects
- Caveats

Evacuation
- Need for isolating site
- How responders should ID selves
- What to expect from victims
- Why routes must be keep open
- Who should wear PPE

Recovery
- What must be decon'ed
- What must be returned to victims
- Coordination with various agencies
- Need for psychological response

Appendix 2: Comparison of BDLS and MUC on Biological Weapons

This appendix is a synopsis of the contents of the two courses (MUC Biological Warfare and Terrorism Casualties courses and Chapter 5 of BDLS)

Bio Warfare Course

Biological Warfare – Definition

The intentional use of microorganisms or toxins derived from living organisms to produce death or disease in humans, animals, or plants.

Biological Warfare History

14th Century: plague at Kaffa
18th Century: smallpox blankets
1943: USA program established
1953: US Defensive program established
1969: US Offensive program disestablished
1979: Sverdlovsk Anthrax incident
SE Asia: Yellow Rain
London, Virginia: Ricin

BDLS Chapter 5 –

Bioterrorism is the intentional use of a pathogen or geological product to cause harm, influence the conduct of government, or to intimidate or coerce a civilian population. Relatively "small" event can produce widespread changes in a population's beliefs, behaviors, and practices.

Goals of the medical community are to diagnose the disease, prove treatment, and prevent the transmission of the disease person to person

Goal of PH authorities is to detect and control the outbreak of illness. They focus on identifying and treating "exposed" persons (persons whom may have had contact with the pathogen but who do not yet have signs or symptoms of disease), and preventing the spread of disease.

Environmental surety, or the restoration of the environment to a condition in which it no longer poses a health threat, will be the goal of those responsible for environmental health.

BDLS does not contain this history

(MUC Bio Warfare Crs – cont)

BDLS Chapter 5 – Biological Event (cont)

Sverdlovsk Incident

April-May 1979 – 66 Anthrax fatalities
1988 – Soviets present data:
96 cases
79 gastrointestinal
May 1992 – Yeltsin admits
"military developments"

BDLS does not have this history

BW Agreements

1925 Geneva Protocol
1969 Nixon renounces BW
1972 Biological Weapons Convention
1975 Geneva Conventions Ratified

BDLS does not have this material

Biological Weapons Policy

No use under any circumstance
Research limited to defensive measures
We possess NO weaponized biologicals
Previous weapons stocks destroyed
Destruction supervised:
USDA
Dept of HEW
DNR or AR, CO, MD

BDLS does not have this material

Destroyed US Biological Warfare Agents

Lethal
B.anthracis
Botulinum toxins
F.tularensis
Incapacitating
Brucella suis
VEE virus
SEB
Q fever agent
Anticrop
Wheat stem rust
Rye stem rust
Rice blast

BDLS does not have this material

(MUC Bio Warfare Crs – cont)

Soviet BW Priorities

List of agents which received a score
of 15 or more on scale based on
on stability in the atmosphere,
liability, infectivity, etc
Includes Smallpox, plaque, anthrax,
botulism, tularemia, typhus, etc

BW Agents as Threats

Strategic – win a war, alter course of
global politics
Few agents have necessary
characteristics
Tactical – take the hill, etc
Relatively few agents (7-8)
Terrorist – virtually anything makes a
good weapon

Terrorist Activity

Rajneeshees in Oregon
B'nai B'rth package in DC

Aum Shrinrikyo

Aum Shrinrikyo – access to bio/chem.
weapons

Advantages of BW

Are Biologicals the Ultimate Weapon?

Agents easy to procure
Inexpensive to produce
Can disseminate at great distance
Agent clouds invisible
Detection quite difficult
First sign is illness
Overwhelms medical capabilities
Simple threat creates panic
Perpetrators escape before effects
Ideal terrorist weapon

BDLS Chapter 5 – Biological Event (cont)

BDLS does not have this material

BDLS does not have this material

BDLS does not have this material

BDLS does not have this material

Ways in which a bioterrorist event may be detected:
Covert – unannounced release into
environment
Heralded by the receipt of an
object (i.e. package/letter)
with
a threat
Witnessed or announced
Covert release –
Difficult to recognize early on
Pt often reports to ER with non-
specific prodrome difficult to
distinguish

Could us an aerosol dispersion device
(MUC Bio Warfare Crs – cont)

BDLS Chapter 5 – Biological Event (cont)

Cost Comparison

Cost (km^2) to produce mass casualties

Agents	$$
BW Agents	1
Nerve Agents	600
Nuclear Weapons	800
Conventional	2000

BDLS does not have this material

Put yourself in the role of a terrorist

Acquisition of Etiologic Agents

Multiple Culture Collections
Universities
Commercial Supply Houses
Foreign Laboratories
Field Samples or Clinical Specimens

BDLS does not have this material

Larry Wayne Harris Story

Obtained plague and anthrax agents thru mail order

BDLS does not have this material

Dispersal

The Ag Pilatus Porter is a commercial crop dusting device which produces a product perfect for reaching the human lower respiratory tract

BDLS does not have this material

Hypothetical Dissemination

A **graph** which shows various bio agents, and how many people 50 kg of agent aerially dispersed on a 2 km front upwind of a city of 500,000. Anthrax by far produces the most KIA

BDLS does not have this material

Anthrax vaccine removes US troops from the best bio-weapon

(MUC Bio Warfare Crs – cont)

BDLS Chapter 5 – Biological Event (cont)

Microspray

If so easy, why not see more commonly?

BDLS does not have this material

Terrorists have yet to put together all of the pieces of the puzzle
We are, but we don't like to publicize that

Bioterrorist Attacks
Data as of 12 Feb 99

Chart listing terrorism, crimes, actions of nations vs. alleged incidents and confirmed incidents.
Total of 165 alleged and 100 confirmed

BDLS does not have this material

Illicit Use of Bio Agents

Of the 100 attacks, 50 evaluated
17 acquired and used as intended
13 acquired only
7 Interests
13 Threat/Hoax

BDLS does not have this material

Disease Employed in Bioterrorism

Anthrax	Giardia
S.typhi	Schistosomiasis
S.typhimurium	Ascaris suum
Shigella	HIV
Cholera	Yellow Fever
Plague	Botulism
Y.enterocolitica	Ricin
Tetrodotoxin	Snake venom

BDLS does not have this material

Bioterrorism

Confirmed Usage Situations
Chart of specific usages
from 1915 to 1997

BDLS does not have this material

(MUC Bio Warfare Crs – cont)	weapons BDLS Chapter 5 – Biological Event (cont)
Meterology	
Example of attempted usage thwarted by adverse weather conditions	BDLS does not have this material
Illicit Use of Biological – Casualties	
Bioterrorism 751 casualties, 0 deaths Biocrimes 235 casualties, 9 deaths Assignation 4 casualties, 1 death Total 990 casualties, 10 deaths	BDLS does not have this material
Response Timelines	
We can intervene in 3 possible timelines Pre-exposure: immunization (active); Drug prophylaxis; Training Incubation Period (minutes -- 3 weeks): Diagnosis (class or agent specific); Passive Immunization (immune serum); Pre-treatment (drugs) Overt Disease: Diagnosis; Treatment; Communication	BDLS does not have this material
Keeping Memory intact	
USAMRIID Blue Book and web-site	BDLS does not have this material
Biological Events Course	Biological Events Course
Material NOT in MUC course	Material NOT in MUC course
SYNOPSIS	SYNOPSIS
DETECTION Characteristic which make various Agents better as potential	Category A – B – C agents and their characteristics

List of Category A (likely use)
Biological Events Course

Material NOT in MUC course

SYNOPSIS

List of Category B agents (2nd priority)

List of Category C agents (emerging possibilities)

How diseases may be disseminated
- Person-to-person spread
- Contact
- Airborne
- Droplet

Specific Organisms

Anthrax
- General
- Clinical Features
- Diagnosis
- Treatment
- Prophylaxis
- Isolation

Botulism
- General
- Clinical Features
- Diagnosis
- Treatment
- Prophylaxis
- Isolation

Plague
- General
- Clinical Features
- Diagnosis
- Treatment
- Prophylaxis
- Isolation

Material NOT in MUC course

SYNOPSIS

Smallpox
- General
- Clinical Features
- Diagnosis
- Treatment
- Prophylaxis
- Isolation

Tularemia
- General
- Clinical Features
- Diagnosis
- Treatment
- Prophylaxis
- Isolation

Viral hemorrhagic fevers
- General
- Clinical Features
- Diagnosis
- Treatment
- Prophylaxis
- Isolation

Ways in which a bioterrorist event may be detected:

Covert:
- Laboratory diagnostics tests
- Increase in syndromes
- ERs overloaded
- Unexplained deaths
- Notifiable diseases
  - Automated systems for syndromes
- Specialized DX tests

What happens with the receipt of a suspicious package

Biological Events Course

Material NOT in MUC course

SYNOPSIS

What happens with a witnessed or announced release

INCIDENT COMMAND (IC)
- Usually lack of a "scene"
- What a unified command is

Lead role of law enforcement

Unified command of law enforcement and Public Health

Special powers under public health emergency

SCENE SAFETY AND SECURITY
- Management of scene
- Workers exposed to contagious pts
- Safety and security issues if there is a scene – suspicious package or overt release
- Coordination on-site investigation and assessment of threat credibility
- Decontamination of persons initially exposed on the scene
- Protection of response workers

Safety and security issues at site of medical care
- Ingress/egress of pts at hospitals
- Security of medical treatment facilities

Infection control issues for victims
- Standard precautions
- Airborne precautions
- Droplet precautions
- Contact precautions

Material NOT in MUC course

SYNOPSIS

Chart of Routes of person-to-person spread/appropriate precautions category

Antibiotic prophylaxis/vaccination of hospital staff

ASSESS HAZARDS
- Laboratory diagnosis of ill persons suspected of having disease caused by bioterrorist agents
- How Category A agents identified by a medical lab
- **Chart** of characteristics of Level A-D labs

Epidemiologic assessment of persons who have been exposed

Environmental assessment if there is a "scene"

SUPPORT
- Procedures and organization for obtaining additional emergency response support
- Types of support available
- National Pharmaceutical Stockpile (NPS)
- Issues related to coordinating & obtaining additional local hospital capacity
- Issues related to obtaining additional health care providers

TRIAGE/TREATMENT
- Medication distribution for pt treatment
- Quarantine

Biological Events Course

Material NOT in MUC course

SYNOPSIS

EVACUATION
- Use existing protocols
- Form a Medical Command Center
- What Fed offices to use

- Large number of patients
- Prophylaxis
- Special facility requirements for Smallpox

RECOVERY
- Law Enforcement role
- Public Health role
- Mental Health role
- Environmental Health role

Instructions form making an 0.5% solution of hypochlorite

CDC Interim recommendation for the selection and use of protective clothing and respirators against biological agents

Chart of Infection Control Precautions by category

Appendix 3: Comparison of BDLS and MUC on Nuclear & Radiological Events (Triage/Rx Radiation Casualties)

This appendix is a synopsis of the contents of the two courses (MUC Triage and Treatment of Radiation Casualties courses and Chapter 4 of BDLS)

Triage/Rx Radiation Casualties Course	BDLS Chapter 4 –
Probability of Radiation Casualties	
Strategic Nuclear War unlikely Terrorist use more likely	This information was not provided in the BDLS course Chapter 4
Nuclear Detonation	
Pictorial representation of the blast effect from a nuclear detonation Substantial blast component Significant thermal component Burns and impair vision Exposure to radiation Gamma rays and neutrons Induced ground radiation or fallout Electromagnetic pulse (EMP) Effect on sensitive electronic equipment Causes a fireball	Conventional blast effects from pressure change, but over a tremendous area. Shock wave causes destruction of buildings, eardrum damage, and massive movement of air containing debris and radioactive materials Thermal effects include massive fires and huge numbers of burned patients, flash blindness (temporary), and retinal burns (permanent blindness) over a huge area Gamma and neutron radiation can cause injury even through walls and harm living tissue. Immediate exposure is form the initial radiation burst, and delayed exposure from materials the neutrons have induced to become radioactive. Fallout will also contain radioactive materials causing delayed exposure. Wind direction can indicate where the problem is likely to be concentrated
	Radiological exposures can result from the deliberate or accidental release of radionuclides into the air, water, food supplies, or on surfaces that people contact. The resulting health hazards can be similar to those experienced by following early and delayed fallout

(MUC Triage/Rx Rad Casualties – cont)

BDLS Chapter 4 – Nuclear/Rad Event - cont

Commensurate with the time honored radiation protection maxim of time, distance, and shielding, the best immediate action is to decrease the length of exposure, increase the distance of the victims from the exposure, and put appropriate shielding in between the patient and the radiation exposure source.

If a radiological source becomes located in the vicinity of a population, the primary is from lack of detection. Then people can be removed relatively quickly and further exposure averted.

1 Megaton Air Burst at 11 sec

Schematic representation of a thermal nuclear weapon at 11 sec post detonation

This information was not provided in the BDLS course Chapter 4

It shows shock wave. Blast or shock present in all explosions

Talks about the fusing of the primary and reflected wave fronts to form a Mach stem and gives results of the pressure

Overpressure and Injury

Defines the static or peak over-pressure which exert a tremendous crushing force on objects

This information was not provided in the BDLS course Chapter 4

Patients with only over-pressure injuries comprise a small part of the overall patient load

Expected Injuries from Blast Effects

Static Overpressure

- Ear drum rupture
- Lung damage

Dynamic Overpressure

- Impact
- Penetration by projectiles

This information was not provided in the BDLS course Chapter 4

(MUC Triage/Rx Rad Casualties – cont)

Medical Effects – Thermal Energy

Flash burns
Flame burns
Eye injury
- Burns
- Flash blindness
- Loss of night vision

Retinal burns uncommon

Radiation

Gamma – penetrate deeply into tissues
X-ray – penetrate deeply into tissues
Beta – electrons from the nucleus
- Penetrate several cm of skin
- Dermal radiation hazard

Neutron – Uncharged from nucleus
- Shielded by plastics & water
- Produce recoil protons

Alpha – do not penetrate skin
- Hazard only if inhaled /ingested

BDLS Chapter 4 – Nuclear/Rad Event - cont

Thermal effects include massive fires and huge numbers of burned patients, flash blindness (temporary), and retinal burns (permanent blindness) over a huge area

The primary hazard from late fallout (small particles which settle to the ground slowly) is from inhalation or ingestion of the particles. Of particular importance is the inhalation of radioiodine materials, which can exist both as particles and as a gas, since immediate treatment (i.e., 4 hrs) with iodide tablets can be highly effective in preventing subsequent radiation-induced thyroid cancer.

Usually there will be few immediate health effects, unless the radiation source is especially intense. The danger for human exposure will be primarily from the ingestion or inhalation of radioactive particles.

Gamma and neutron radiation have the highest penetrating power (through walls)

Beta radiation is less (most will not pass all of the way through the body)

Alpha particles will not penetrate a piece of paper

Gamma and beta can be a health hazard from a distance due to penetrating power

Alpha particles are not dangerous outside the body (i.e., on clothing), but are dangerous if inhaled or ingested

(MUC Triage/Rx Rad Casualties – cont)

BDLS Chapter 4 – Nuclear/Rad Event - cont

Medical Consequences of Nuclear Weapons

Performance Decrement
- Early transient incapacitation
  - Motor
  - Cognitive
  - Emesis/Diarrhea

Acute Effects
- Infection
- Bleeding
- Dehydration
- Delayed Wound Healing

Delayed Effects
- Cancer
- Genetic Effects

Radiation exposure can and does cause cancer with known latency periods of 6-20 years

Today's larger weapons may cause even greater rates of cancer with even shorter latency periods

Acute Radiation Syndrome

DEFINITION: a combination of clinical syndromes occurring in stages during a period of hours to weeks after exposure, as injury to various tissues and organs is expressed

This information was not provided in the BDLS course Chapter 4

Acute Radiation Syndrome

Hematopoietic
- Cardiovascular
  - Gastrointestinal
    - CNS

This information was not provided in the BDLS course Chapter 4

graph

Acute Radiation Syndromes

Chart of Dose Ranges for the Various syndromes

This information was not provided in the BDLS course Chapter 4

Acute Radiation Syndrome -- Stages

Initial or prodromal
Latent period
Manifest illness
Recovery stage

This information was not provided in the BDLS course Chapter 4

(MUC Triage/Rx Rad Casualties – cont)	BDLS Chapter 4 – Nuclear/Rad Event - cont
Phases of ARS	
Graphic of the ARS syndrome – time-line	This information was not provided in the BDLS course Chapter 4
Factors that Alter Response to Radiation Damage	
Total Dose Dose rate Portion of the body exposed Uniformity of exposure Age of the victim State of health Availability of treatment	This information was not provided in the BDLS course Chapter 4
	Rapid decline in blood lymphocytes correlates will with triage category as do granulocytes. Platelets useful in distinguishing between lower exposed groups, but less utility in distinguishing between higher exposed.
Hematopoietic Syndrome	
100 to 800 rads	This information was not provided in the BDLS course Chapter 4
Hematological Response to 100 rads	
Graph of response of blood elements to 100 rads showing response over 60 days	This information was not provided in the BDLS course Chapter 4
Hematological Response to 300 rads	
Graph of response of blood elements to 300 rads showing response over 60 days Much deeper drop in numbers	This information was not provided in the BDLS course Chapter 4
Systemic Effects	
Immunodysfunction Increased infectious complications Hemorrhage Anemia Impaired wound healing	Rapid decline in blood lymphocytes correlates will with triage category as do granulocytes. Platelets useful in distinguishing between lower exposed groups, but less utility in distinguishing between higher exposed

(MUC Triage/Rx Rad Casualties – cont)	BDLS Chapter 4 – Nuclear/Rad Event - cont
Gastrointestinal Syndrome	
800 to 3000 rads	This information was not provided in the BDLS course Chapter 4
Systemic Effect of GI Syndrome	
Malabsorption Malnutrition Paralytic Ileus Vomiting Abdominal Distension Fluid and Electrolyte Shifts Dehydration Acute renal Failure Cardiovascular GI Bleeding Anemia Sepsis	This information was not provided in the BDLS course Chapter 4
CV/CNS Syndrome	This information was not provided in the BDLS course Chapter 4
3000 rads and above	Above 450 rads, all patients are expectant
Cardiovascular / CNS Symptoms	
Vomiting and diarrhea within minutes Confusion and disorientation Severe hypotension Edema Hyperpyrexia Fatal within 24-48 hours	This information was not provided in the BDLS course Chapter 4
Summary of Acute Radiation Syndrome	
Chart summarizes the progressively poor prognosis of outcomes *if no treatment* is instituted based on increasing uniformity of whole body radiation dose and range.	This information was not provided in the BDLS course Chapter 4

(MUC Triage/Rx Rad Casualties – cont)	BDLS Chapter 4 – Nuclear/Rad Event - cont
<u>Venn diagram</u>	
Show the overlapping consequences for most all combined injuries and is worse than that for radiation or trauma alone	This information was not provided in the BDLS course Chapter 4
<u>Burns and Radiation</u>	
Combined effects of Simultaneous Whole-Body Irradiation and Burns on Rats If a 250 rad radiation dose is added to a burn that is usually 50% fatal, fatality rises to 90%	This information was not provided in the BDLS course Chapter 4
<u>Wounds and Radiation</u>	
Suggestion that wounds stimulate the immune response providing protection when wounding occurs before or at the time of radiation. This effect is not seen when wounding occurs after radiation	This information was not provided in the BDLS course Chapter 4
Graph – shows the effect on mortality of combined effects	This information was not provided in the BDLS course Chapter 4
Associated trauma complicates the clinical management and increases mortality. The surgical repair window is shortened when the patient has been exposed to radiation	
<u>Principles of Mass Casualty Care</u>	
All mass casualty care is based on three basic principles: Triage Evacuation Standard Procedures	This information was not provided in the BDLS course Chapter 4

(MUC Triage/Rx Rad Casualties – cont)

Triage

By conventional injuries – Assess first
- Trauma
- Burns

By radiation injury
Prodromal symptoms
Hematologic picture

Nuclear Casualty Management

No life threatening hazard exists for radiation casualties who can ultimately survive

So…treat conventional injuries --- First

BDLS Chapter 4 – Nuclear/Rad Event - cont

Conventional trauma treatment takes precedence over all other priorities, the ATLS protocols should be followed
Generally, patients with very low or undetectable lymphocyte counts, prodromal onset of less than 30 minutes, and a very severe (i.e. >60% of the body) burns are likely to be in the expectant category

Usually triage system can be used, adding radiation dose (if known) and onset of symptoms to aid in classification
Radiation dose less than 150 rad, onset of prodromal symptoms in less than 3 hrs
150-450 rads, onset of symptoms could decrease to as little as one hour, and all categories but immediate will simply become expectant
Above 450 rads, all patients are expectant

Conventional trauma treatment takes precedence over all other priorities, the ATLS protocols should be followed
Presence of trauma dictates the immediate need for medical care
Burn victims must be categorized as to the extent of burns, survival prospect, and resources

Time of onset from nuclear detonation to prodromal symptoms (vomiting could be psychogenic)
As always, the immediate availability of personnel dictates triage priority outcome

(MUC Triage/Rx Rad Casualties – cont)

BDLS Chapter 4 – Nuclear/Rad Event - cont

First Actions

Standard medical emergency procedures
- Ventilation
- Perfusion
- Stop hemorrhage

Decontamination after stabilization

Radiation injury NOT acutely life threatening

Nuclear & radiological medical treatment is similar to other conventional trauma treatment approaches. Life threatening complications, ABCs/shock, must be addressed before other issues, even radiological concerns

Patient Decontamination

Establish check point
Survey upon entering
Remove clothing
Wash exposed body areas
Periodically change clothing of personnel doing decontamination

Patient decon and site surveys covered in other chapters of BDLS

Decontamination Procedures

Remove patient's clothing
Wash patient with soap and water

Patient decon and site surveys covered in other chapters of BDLS

Decontamination

Soap and water
- Scrub brush
- Q-tips

Dry removal
Bleach
Waterless cleaners

Patient decon and site surveys covered in other chapters of BDLS

Wound Decontamination

Translocation and absorption
Unremoved contaminants
Beta-Gamma emitting contaminant hazards
Treatment and surgical considerations
- Aggressiveness of decon depends on a variety of factors including type of radionuclei present, its activity, associated projected dose

Patient decon and site surveys covered in other chapters of BDLS

(MUC Triage/Rx Rad Casualties – cont)

BDLS Chapter 4 – Nuclear/Rad Event - cont

Estimates of Radiation Injury

Ideal
- Biologic Dosimetry

Available
- Signs and symptoms
- Dosimetry

Patients with delayed presentation of symptoms; many, perhaps most, patients will be in this group at initial evaluation

The shorter the delay, the more severe the symptoms will be expected to be

Real danger of missing the potential exposure severity with an examination of only the symptoms at hand

Follow examinations *necessary* over the next hours/days to establish true nature and extent of exposure

Essential to establish the time when patients were potentially exposed

Essential to establish the potential for ingestion or inhalation of radioactive materials

Intense public fear of radiation, expect considerable panic and even exaggeration of symptoms in a typical population

All claims must be considered and balanced with the likelihood of being in tandem with an expected radiation exposure

Triage of Radiation Injuries

Chart of symptoms. Evaluating the presence or absence of and severity of symptoms can provide a generalized scheme for determining radiation exposure was unlikely, probable, or severe

Usual triage system can be sued, adding radiation dose (if known) and onset of symptoms to aid in classification

Fatal Radiation

Nausea and vomiting within hours
Prompt explosive boldly diarrhea

Above 450 rads, all patients are expectant

Chart – changes of peripheral blood lymphocyte counts and degree of radiation injury over 2 days

Circulating lymphocytes are extremely radiosensitive

Decline in lymphocyte count (when possible, use more than one value to determine a trend)

(MUC Triage/Rx Rad Casualties – cont)

Lymphocyte Counts

Lymphocytes are relatively useful and reasonably reproducible biological dosimeters

Little Exposure
1.5 x 10^9/liter in 24 hrs

Severe Exposure
1.0 x 10^9/liter in 24 hrs
0.5 x 10^9/liter in 48 hrs

Be aware, burns and mechanical trauma *also* decrease the lymphocyte count

Primary Determinant of Survival

Management of infection
Stop bleeding

Management of Radiation Casualties

Requires an estimate of radiation dose and determining the severity of trauma and burns
Then the triage officer assigns the patient to the appropriate category and treats accordingly

BDLS Chapter 4 – Nuclear/Rad Event - cont

Decline in lymphocyte count (when possible, use more than one value to determine a trend)

Usual triage system can be used, adding radiation dose and onset of symptoms to aid in classification
Radiation dose less than 150 rad, onset of prodromal symptoms in less than 3 hours
150-450 rads, onset of symptoms could decrease to as little as one hour, and all categories but immediate will simply become expectant
Above 450 rads, all patients are expectant

(MUC Triage/Rx Rad Casualties – cont)	BDLS Chapter 4 – Nuclear/Rad Event - cont
<u>Treatment Options for Radiation Injuries</u>	Nuclear & radiological medical treatment is similar to other conventional trauma treatment approaches. Life threatening complications, ABCs/shock, must be addressed before other issues, even radiological concerns
Replace fluid and electrolytes Platelet transfusions Manage sources of infection Use combinations of antibiotics for mixed infections	High infection rates dictates liberal use of anti-microbials Standard burn treatments can be used
<u>Reasons for Infection</u>	
Oropharyngeal respiratory tree colonization Wound contamination Intestine colonization Artificial invasive devices Profound immunosuppression Pathogens in environment Patient's neutropenia and febrile state are indications to begin broad-spectrum antibiotic therapy	High infection rates dictates liberal use of anti-microbials
<u>Prevent Sepsis After Irradiation</u>	
Wound debridement Topical antimicrobials and dressings Environmental control of nosocomials Minimal use of invasive and indwelling devices Fluid and electrolyte resuscitation Nutritional support Selective, gut decontamination hGM-CSF Early administration of immuno/hematopoietic modulators -- experimental	High infection rates dictates liberal use of anti-microbials Standard burn treatments can be used
<u>Surgery in Combined Injuries</u>	
Special attention to the timing of surgery in the radiated patient must be paid	This information was not provided in the BDLS course Chapter 4

(MUC Triage/Rx Rad Casualties – cont)

BDLS Chapter 4 – Nuclear/Rad Event - cont

Timing of Surgical Management of Combined Injuries

Chart when to do initial, preparative and reconstructive surgery for ROUTINE TRAUMA vs. RADIATION PLUS TRAUMA

This information was not provided in the BDLS course Chapter 4

Because of the delayed wound healing, granulocytopenia and thrombocytopenia associated with the radiation exposure, most life threatening and reconstructive surgeries must be performed in 36-48 hours after exposure.

After that, **no surgeries** should be performed for the next 50-60 days, since surgery during this time places the patient at risk for infection and death

Care of Radiation Injuries

Chart with a flow-sheet structure showing Radiation exposure & contamination and then trauma is included:

- Evaluation/Triage
- Operative Care & Hematologic And Immuno. support
- Other injuries
- Reconstruction, etc

Determine radiation alone or a combined inj

Exposed to > 5000 rads? palliative care

Sub-lethal dose – supportive Rx

- Blood transfusion, fluid replacement, nutritional support, Abx, lab tests, UA, lymphocyte counts q 12 hrs

Pts w/combined inj. immediate treatment of life-threatening traumatic injuries

Convention inj. precedence over rad exp

Operative repair of trauma within 36-48 hrs

Nuclear & radiological medical treatment is similar to other conventional trauma treatment approaches. Life threatening complications, ABCs/shock, must be addressed before other issues, even radiological concerns

Conventional trauma treatment takes precedence over all other priorities, the ATLS protocols should be followed

Remember, radioactive contamination does *not* hold the immediate health hazard that … contagious … agents hold

(MUC Triage/Rx Rad Casualties – cont)

Principles of Patient Management

Treat conventional injuries first, since radiation injuries will not be immediately life threatening
Evaluate the extent of trauma and initiate resuscitation procedures
Begin corrective procedures such as surgery and fluids, based on the triage assessment of conventional injuries
Prevent infection until immunocompetence is regained
Take steps to reduce the foci of infections from colonizing artificial devices or damaged tissues
If infection is suspected, use empiric therapy with broad spectrum antibiotics to complement these physical interventions
Take steps to improve immunocompetence and well-being of the patient

BDLS Chapter 4 – Nuclear/Rad Event - cont

Nuclear & radiological medical treatment is similar to other conventional trauma treatment approaches. Life threatening complications, ABCs/shock, must be addressed before other issues, even radiological concerns
Conventional trauma treatment takes precedence over all other priorities, the ATLS protocols should be followed
Remember, radioactive contamination does *not* hold the immediate health hazard that … contagious … agents hold
High infection rates dictates liberal use of anti-microbials
Use Mafenide acetate cream to treat burns
Standard burn treatments can be used

Nuclear & Radiological Events Course (BLDS)

Material NOT in MUC course

SYNOPSIS

Law enforcement personnel will need to understand the unique challenges in dealing with the intense public fear of radiation, which will significantly impact on the apprehension of perpetrators as well as maintaining public order.

Nuclear & Radiological Events Course (BLDS)

Material NOT in MUC course

SYNOPSIS

Public Health officials will learn of the potential for an overwhelming impact on public services, such as radiological monitoring of patients and the environment, dealing with the likelihood of a large number of "worried well", transportation difficulties inherent in mass casualty management, and the sheer magnitude of nuclear attacks in general.

Nuclear & Radiological Events Course (BLDS)

Material NOT in MUC course

SYNOPSIS

INCIDENT COMMAND

Local responsibilities in the crisis phase and how long that is likely to last
Who to coordinate with during and after the crisis phase

SCENE SAFETY AND SECURITY

Likelihood of huge demand for health services and how to manage the demand
How many real patients there are likely to be
Need for security
How to organize to meet the demands
Legal issues
Security and safety of security and healthcare workers

ASSESS HAZARDS

What the hazards are and how to address them

SEPARATION OF RADIATION INJURIES AND WORRIED WELL

How to identify those who are at risk
How to identify the "worried well"
How to organize and equip to meet the need to separate out the two

HEALTH HISTORY CONSIDERATIONS

How to use history to separate out the potential victims from the "worried well"
Salient questions

Material NOT in MUC course

SYNOPSIS

RADIATION SURVEY

Expectations and limitations of a radiation survey
Types of radiation possible/probable
How to perform a basic radiation survey on patients

SUPPORT

What Federal Agencies need to be notified and what their areas of responsibilities are

Treatment of radiation/thermal burn patients in large-scale events

Causes of burn deaths

Need for rapid pharmaceutical intervention with iodide tables

EVACUATION

Need for an organized, large scale, evacuation – transportation system

Health care providers should not "write off" burn victims as a group, and they should not just transfer all resources to other patients

RECOVERY

Strategies to enhance elimination of radionuclide body burdens
Pharmaceutical strategies for Radionuclide elimination
Unsubstantiated fear of radiation-induced birth defects

Appendix 4: Comparison of BDLS and MUC on Wounds of War

This appendix is a synopsis of the contents of the two courses (MUC 5 Wounds of War courses and Chapter 3 of BDLS)

MUC Course	BDLS Chapter 3 –
Introduction	
What wounds are typical in warfare? How are they different from civil trauma? How are they managed differently? Definitive treatment usually delayed High index of suspicion for occult complications Treatment must be tailored to available resources	This historical information was not provided in the BDLS course
Purpose	
Just as a good general must know the enemy and the terrain A military doctor must understand the would of war, and the environment in which they occur	This historical information was not provided in the BDLS course
War Wounds ARE Different	
Compared to the civilian scenario The causes of wounds are different in frequency and type The environment is different The wounds are usually older when treated Intensity/energy of injury is often greater – frequently poly-trauma	This historical information was not provided in the BDLS course
General Types of Injury	
Penetrating injuries prevail in combat Multiple fragment wounds Blast injury Crush injury Injuries of mobilization Burns (flash burns) Chemical, Nuclear, & Biological Psychological	Blunt trauma – caused by a crushing & shearing mechanism. Often from a rapid deceleration A mass collides with a patient Patient impacting objects Internal organs impacting support Structures Penetrating trauma – injuries produced

(MUC Wounds of War Crs – cont)

BDLS Chapter 3 Traumatic Events (cont)

when missile transmits its energy as it passes through organs
High velocity – > speed of sound, usually produce greater damage
Low velocity – < speed of sound, usually produce less injury, unless strikes a bone or deforms or tumbles
Stab or impaling wounds from crushing force of sharp object disrupting tissue
Can also see ocular injuries, flash burns, traumatic amputation, toxic or particulate inhalations, CO or CN poisoning, radiation exposure

Blunt Ballistic Injury – when the body is hit by rubber bullets, beanbag shotgun shells, or protective vest hit by standard bullets. All from a transfer of kinetic energy.
Casualties present with erythema, ecchymosis, & tenderness to palpation over the impact area. SQ emphysema, crepitus, or bony step-offs are variably present

War Environment

Never clean, often contaminated with human waste or chemicals
Crowded living quarters
Military Clothing and Equipment man contribute to injuries
Roads often unpaved or damaged
Terrain unknown to participants
Heavy equipment

This information was not provided in the BDLS course

War Patients -- Positive

Healthy prior to deployment
Younger age adult
Vaccinated

This information was not provided in the BDLS course

(MUC Wounds of War Crs – cont)

BDLS Chapter 3 Traumatic Events (cont)

War Patients -- Negative

Physically stressed condition
- Exposure to harsh environment
- Fatigue (jet lag)
- Short rations occasionally

Concomitant diseases of troop movement
Psychologically stressed
Personal hygiene limited

This information was not provided in the BDLS course

Treatment Timing

Evacuation is slower due to:
- High numbers of casualties at one location
- Weather and road conditions poor
- Medical vehicles in short supply
- Enemy activity or threat may delay access

Number of casualties frequently exceeds medical capabilities, necessitating triage of casualties & slowing care delivery
Frequent need for intermittent travel to higher levels of care, complicating wound management
Urgency to restore function, at least to a status of walking wounded
- Free acute care beds
- To facilitate evacuation
- Conserve the fighting force

This information was not provided in the BDLS course

Ballistics of Projectiles
(Wounding Factors)

Wounding potential
- Energy potential (1/2 velocity x mass)
- Energy transfer
  - Determined by tissue density (energy transfer)
  - Position of energy exchange
  - Compartment / Capsules

This information was not provided in the BDLS course

(MUC Wounds of War Crs – cont)

BDLS Chapter 3 Traumatic Events (cont)

Ballistics of Projectiles
(Wounding Factors)

Other properties of the projectile
- Stability in flight
- Fragmentation in tissues
- Shape

This information was not provided in the BDLS course

Energy Factors

Kinetic energy in a projectile represents the majority of the wounding potential

Contributed in proportions:
- Energy = ½ mass x velocity^2

Velocity accounts for majority of energy but may be effected by multiple factors
- Distance traveled prior to striking
- Substances penetrated or ricochet
- Design of bullet / weapon

Mass must contribute some and can be substantial = weight of the projectile

This information was not provided in the BDLS course

Blast Injuries

Primary blast injury = pressure wave

Secondary injury = ordinance fragments or secondary missiles

Tertiary effects = gaseous discharge may hurl a victim into other objects

The supersonic overpressure is emitted from the explosion and proceeds concentrically in a wave or series of pressure disturbances, which is biphasic with both positive and negative and it dissipates with the inverse of the distance. The pressure wave precedes the actual effect of the blast and the gaseous discharge

Explosive events – rapid conversion of explosive into a gas with energy release

Severity governed by:

Size of the explosive charge – larger charge, larger overpressure

(MUC Wounds of War Crs – cont)

BDLS Chapter 3 Traumatic Events (cont)

Dissipation of Blast Pressure

Graphic showing the dissipation of The last pressure

Distance from the blast – inversely proportional to cube of distance from blast. Modified by absorbing surfaces such as walls or other people.

Supersonic Overpressure

Two components of a pressure wave – increasing either potentiates
- magnitude
- duration

Effect is distance dependent
- Lethal radius is 3x in water
- Increased at reflecting surface

Injury is seen almost exclusively in air filled structures

Surrounding medium (air or water) – water denser, propagates force farther.

Blast wave magnified many times when reflected off a solid surface such as a wall, corners, body armor, etc.

Blast waves passing through the body cause more damage at air-fluid interfaces

Mechanics of Blast Injuries

Graphic showing:
- Primary—pressure wave
- Secondary – fragments & flying debris
- Tertiary—impact on hard surfaces

Injuries can be primary, secondary, or tertiary

Primary – direct damage to organs, especially air-filled organs. Disrupts pulmonary (hemorrhage, hemothorax, pneumothorax, traumatic emphysema, fistulae), GI (mostly to large bowel, rupture hemorrhage), auditory (tympanic membrane rupture, difficulty hearing), Systemic air embolism from lung damage (symptoms seen where air embolism ends up).

Secondary – other objects accelerated penetrate the body. Majority of injuries. Includes such things as glass, shrapnel.

Tertiary – the body itself becomes the missile and impacts something else. Often see when body impacts a wall and causes skull fractures, head injuries, long-bone fractures.

(MUC Wounds of War Crs – cont)

BDLS Chapter 3 Traumatic Events (cont)

Pathophysiology of Blast Injury

Secondary & Tertiary blast effects
- Similar to physical trauma from other causes
- May be penetrating or blunt
- Often multiple in pattern or combination

Some weapons cause almost pure blast injury
- Fuel-air explosives
- Underwater explosions

Possible injuries include:
- Rupture tympanic membrane
- Pulmonary contusion
- Pneumothorax/hemothorax
- Large lung blebs
- Arterial air emboli
- Intestinal hematoma/hemorrage
- Bowel rupture

Secondary – other objects accelerated penetrate the body. Majority of injuries. Includes such things as glass, shrapnel.

Tertiary – the body itself becomes the missile and impacts something else. Often see when body impacts a wall and causes skull fractures, head injuries, long-bone fractures.

Signs and symptoms
- Blood in external ear
- Petechial hemorrhage - hypopharynx larynx
- Mental dysfunction
- Shortness of breath / tachypnea
- Chest pain & tightness
- Hyper resonant chest
- Rigid/tender abd., rectal bleeding

Beware of late manifestations – Respiratory condition can progress for 24-48 hrs
- Avoid positive pressure ventilation if possible, due to greater risk of air embolism
- Bowel rupture may occur up to several days later

Note: a ruptured tympanic membrane serves as a warning marker for substantial exposure to a blast pressure wave

This information was not provided in this BDLS course chapter

(MUC Wounds of War Crs – cont)

BDLS Chapter 3 Traumatic Events (cont)

Mines

- Severe world-wide problem
  - Millions from former and on-going wars
  - No maps of mine fields
  - Terrorist use is quite common
  - Still being produced and laid today
  - Removal slow, difficult, & expensive
  - "Weapon of mass destruction in slow motion"
- Now are high tech and cheap
  - Plastic – avoid usual detection methods
  - Sown by helicopters
- Indiscriminate in whom they injure
  - 15,000 victims per year (probably more)
  - 80% civilian
  - 30% children
- Patterns of injury depend on multiple factors
  - Type of mine
  - Position of victim
  - Characteristics of the environment
- Most wounds cause extensive and complex soft tissue and body injury
- Surgery is complex and challenging
  - Aggressive, serial debridement
  - Amputation, external fixation
  - Save all non-involved tissue to maximize stump length
  - Be wary of trunk/perineal involvement
  - Complex, reconstruction frequent

This information was not provided in this BDLS course

(MUC Wounds of War Crs – cont)

BDLS Chapter 3 Traumatic Events (cont)

Crush Injury

Primary causes:
- Bunker and building collapse
- Vehicles rolling over, pinned victim
- Machinery falling on personnel

Pathology:
- Limbs with prolonged ischemia
- Ruptured internal organs

Crush impedes vascular perfusion leading to tissue ischemia & rhabdomyolysis

Crush Injury -- Simple

Signs and symptoms
- May be subtle
- Erythema may only occur at the margins of crushed area
- Adjacent skin may blister with time
- Swelling, potentially severe – frequent muscle compartment syndromes

Signs of shock

Late – Anorexia and mental disturbances

This information was not provided in this BDLS course

Crush Injury -- Complications

Shock

Lactic acidosis

Myoglobinuria

Renal failure

Hyperkalemia

Coagulopathies

Crush Syndrome really is a reperfusion injury – blood flow is restored and trapped released tissue toxins can circulate. May cause Acute Renal Failure and DIC

Unexploded Ordinance

Embedded in casualty w/o exploding

Typical munitions – rockets, grenades, mortar rounds

Factors influencing detonation
- Must travel distance prior to arming (50-70 m)
- Fuses triggered by different stimuli
  - impact
  - electromagnetic
  - laser

Notify Explosive Ordinance Disposal
- Available to civilian community
- Work w/them on formulating plan

At the scene, pay attention to the possibility of secondary, unexploded devices

(MUC Wounds of War Crs – cont)

BDLS Chapter 3 Traumatic Events (cont)

Unexploded Ordinance

Operative management
- Precautions for you and staff
  - Sand bag operative area
  - Flack vests
  - Eye protection
- Avoid triggering stimuli
  - electromagnetic
    - no defibrillators, monitors, bovie, blood warmers
    - no ultrasound, or CT
    - if transport by helicopter, ground victim to plane
    - metal to metal
- Plain x-ray safe – helps ID type of munition

This information was not provided in this BDLS course

Phosgene-like Combustion Products

Perfluoroisobutylene (PFIB)
- Toxic combustion product of teflon
- Found in military/armored vehicles

Similar toxicity as Phosgene
Contact with most tissue releases hydrochloric acid

Immediate – signs of pulmonary edema, ICU available
Delayed – dyspnea w/o pulmonary edema, re-triage q 2 hrs
Minimal -- asymptomatic
Expectant – pulmonary edema, cyanosis, and hypotension

Hazards from toxic gases from the cause of the explosion or released by the explosion
There may be chemical agents around from the explosion or released by the explosion

This information was not provided in this BDLS course for phosgene-like agents (see triage for pulmonary agents in chem..agent course).
Symptoms vs triage category given for basic trauma

White Phosphorous

Incendiary agent used in anti-personnel weapons
Fragments can be driven deep into tissues
Ignites in presence of air (oxygen)
Suspect casualties involved in explosions

Hazards from toxic gases from the cause of the explosion or released by the explosion
There may be chemical agents around from the explosion or released by the explosion

(MUC Wounds of War Crs – cont)

BDLS Chapter 3 Traumatic Events (cont)

White Phosphorous (cont)

Immediate management
- Remove all clothing
- Thorough irrigation with water or saline
- Remove easily identified particles
- cover wound in saline or water soaked dressing
- Keep moist during transport

This information was not provided in this BDLS course

Definitive management
- Surgical debridement of fragments
- Look for the smoking wound
- Rinse in 0.5% Copper Sulfate soln
  - Forms cupric phosphide – a blue black film
  - Prevents further oxidation
- Immerse fragments in water to avoid ignition

This information was not provided in this BDLS course

Goals of Early Open Wound Management

Control hemorrhage
Prevent infection and gangrene
Provide good drainage
Avoid deep hematoma formation
Preserve maximum function
Prepare the wound for delayed closure 4-10 days after injury

Control external hemorrhage with direct pressure; avoid tourniquet, if possible. Assess hemodynamic status by evaluating:
- Vital signs in conjunction with clinical signs of perfusion
  - Level of consciousness
  - Skin color and temperature
  - Peripheral pulses
  - Capillary refill
- If shocky, in not from pneumothorax/ hypoxia, assumed to be the result of hemorrhage
- Hypovolemic shock characterized by cool clammy skin, pallor, and thready pulses
- Rapid resuscitation begins with 2 large-bore IV lines/administer 2L crystalloid solution

If not rapidly improved, consider rapid transfusion with packed RBCs

(MUC Wounds of War Crs – cont)

BDLS Chapter 3 Traumatic Events (cont)

Victims of non-penetrating ballistic injury should be closely observed (esp. those with abdomen injuries). Use plain film x-rays or CT to detect internal injuries with a delayed presentation

Penetrating Injury. Control hemorrhage and cover wound; avoid tourniquet, if possible.

- Impaled objects should **not** be removed, should be stabilized manually or with bulky dressings.
- Any penetrating abdominal or thoracic wound in a hemodynamically unstable patient requires emergent operative intervention.
- Adequate debridement is mandatory, and deep wounds should not be closed acutely (delayed primary closure at 5 days is more appropriate).
- Superficial appearance can be quite deceptive.
- All penetrating wounds to the chest or abdomen should be adequately explored.
- Tetanus prophylaxis and broad-spectrum antibiotics should be given.

Blast Injury. A high index of suspicion for occult primary blast injury should be maintained, and the evidence of exposure to overpressure should be determined.

- Treatment of pulmonary PBI focuses on correcting the effects of barotraumas and supporting gas exchange.
  - Acute pulmonary insufficiency can have a delayed onset.
  - In those with mild to moderate respiratory distress, placement of a simple oral or nasal airway may suffice.
  - Oxygenation should be supported via facemask or rebreather.
  - Activity should be minimized

(MUC Wounds of War Crs – cont)

BDLS Chapter 3 Traumatic Events (cont)

Casualties with asymmetrically decreased breath sound should be managed with needle thorcostomy (a large bore angiocather inserted into the pleural space through the second intercostals space at the midclavicular line) or chest tube placement to decompress the potential pneumothoraces.

Maintain effective circulation

Hypotension in the blast victim may be due to blood loss from secondary blast injury, GI hemorrhage, or solid organ injury, hemodynamic sequelae of air embolism, or due to blast-mediated vagal reflex.

Shock commonly will result from GI blast injury causing acute abdominal hemorrhage.

Rapid administration of large fluid boluses may be detrimental to injured organs. Repeated assessments for physiologic endpoints after smaller boluses may be more appropriate.

Initial treatment for tympanic membrane rupture consists of removing debris from the auditory canal and irrigating the canal with antiseptic solution.

Antibiotics or eardrops are generally not indicated.

Most perforations involving less than 1/3 of TM surface will heal spontaneously

Patients with larger perforation should be referred to ENT for further management

Systemic Air Embolism. Management begins with giving supplemental oxygen

A prime goal is to keep airway pressure less than vascular pressure to minimize further rise of AE.

In the ventilated patient, airway pressures should be kept as low as possible while still maintaining adequate oxygenation and ventilation. Overzealous bagging must be avoided.

<u>Zones of Tissue Injury</u>

Wound management can affect the salvage of tissue (and function)

(MUC Wounds of War Crs – cont)

BDLS Chapter 3 Traumatic Events (cont)

Closure of Open War Wounds
(Very seldom meet suitable criteria)

This information was not provided in this BDLS course

Less than 4 hours
Completely free of all foreign material
Hemorrhage under complete control
All devitalized tissue removed
No joint or bone involved
No crush injury to surrounding tissue
Will be able to monitor closely
[Face and Scalp are relative exceptions]

Techniques for Debridement

This information was not provided in this BDLS course

Skin
- Open widely for exposure
- Remove minimum amount

Fascia – incise generously
Muscle
- Remove devascularized fibers
- Check: Circulation, Contractility, Consistency (Turgor), and Color

Major Vessels – spare
Major nerves – spare
Bone
- Remove small loose fragments
- Retain fragments attached to soft tissue

Spare organs of special sense/consult early
Irrigate copiously
Dress open to encourage free drainage

Injuries Associated w/Troop Movement and Exercise

This information was not provided in this BDLS course

Foot and hand crush injuries
Motor vehicle accidents
Exposure – heat, cold, sun, & water
Stress injuries of bone and tendon
Sports injuries (make-shift facilities)
Electrocution (radio antennas)
Radiation (microwave)

(MUC Wounds of War Crs – cont)

Summary

First – treat the patient, then the wound (never the presumed weapon)
Be aware of the injury circumstances
- Increased suspicion for associated occult injury
- Monitor appropriately to detect problems early
- Presume that open wounds are badly contaminated

Primary wound closure is rarely indicated

Where to get More Information

Emergency War Surgery, NATO Handbook

Medical Department of the Army, Surgery in WWII

Current literature from large trauma centers dealing with city gun violence – but beware of the environmental differences

BDLS Chapter 3 Traumatic Events (cont)

This information was not provided in this BDLS course

This information was not provided in this BDLS course

BDLS Traumatic & Explosive Events Crs

Material NOT in MUC course

SYNOPSIS

Additional Scene Safety concerns including:
- Structural damage yet may fall
- Persons may be trapped under Fallen debris
- Sharp objects potentially causing Additional lacerations
- There may be bio-agents related to or released by the explosion
- Power lines may be down

BDLS Traumatic & Explosive Events Crs

Material NOT in MUC course

SYNOPSIS

- Fires may still be burning
- There could be snipers around

CONCEPTS OF MASS TRIAGE

- Problem of sheer volume
- Proper triage may reduce number needing treatment
- Chaotic phase is from incident until Arrival of Incident Command Team

BDLS Traumatic & Explosive Events Crs

Material NOT in MUC course

SYNOPSIS

M – MOVE Asking those who can move
to move to a collecting area
Or move an arm or leg
Those unable to move
become 1st Priority

A – ASSESS Unable to move –
first priority
Non-ambulatory able to move –
second priority
Ambulatory –
third priority

S – SORT Use military triage system

All non-moving patients assigned as
"immediate" or "expectant"
Non-ambulatory patients assigned as
"immediate" or "delayed"
Ambulatory patients assigned as "delayed"
or "minimal"

Criteria for:
Immediate/Delayed/Minimal/Expectant

S – SEND

How to meld need and available resources

Helpful to set up Disaster Casualty Zones
to help identify types of patients to
be seen and the type of triage
category

Material NOT in MUC course

SYNOPSIS

Treatment Rapid but thorough primary
evaluation using the ABCDE
system

A: Airway
B: Breathing
C: Circulation
D: Disability
E: Exposure, Elimination,
Environmental Control

Treatment of Crush and Blast Injuries

Treatment of Traumatic Asphyxia

Appendix 5

BDLS Courses Structure

TRAUMATIC AND EXPLOSIVE EVENTS

Basic Science and specific injury patterns in disaster scale traumatic & explosive events

Clinical Entities

Scene Safety Concerns

Concepts of MASS triage & Disaster casualty zones

- M – MOVE
- A – ASSESS
- S – SORT
  - Immediate
  - Delayed
  - Minimal
  - Expectant
- S – SEND

Disaster Casualty Zones

- Fatal Casualty Zone
- Penumbral Casualty Zone
- Minimal Casualty Zone

Management of Blast/Crush Injuries

- A: Airway
- B: Breathing
- C: Circulation
- D: Disability
- E: Exposure, Elimination Environmental Control

Treatment Crush Injury/Syndrome

- Traumatic Asphyxia
- Blunt Ballistic Injury
- Penetrating Injury
- Blast Injury
- Systemic Air Embolism

NUCLEAR AND RADIOLOGICAL EVENTS

Detection
- Nuclear Weapon Detonation

Incident Command

Scene Safety & Security

Assess Hazards

Separate Rad. Injuries from Worried Well

Use of Health History

Radiation survey
- Basic Radiation Survey Technique for Patients

Support
- Notification of Federal Agencies

Triage and Treatment

- Triage Priorities for Combined Injuries
- Hemodynamic parameters and prodromal onset as triage predictors
- Patient Categories Based on USSR Chernobyl Classification
- Treatment of radiation/thermal burn patients in large-scale events
- Rapid pharmaceutical intervention with iodide tablets

Evacuation

- Do NOT write-off burn victims as a group

Recovery
- Radiation-induced Cancer Strategies to eliminate radionuclide body burden
- Pharmaceutical Strategies for Radionuclide Elimination
- Unsubstantiated fear of radiation-induced

birth defects

Appendix 5
BDLS Courses Structure

BIOLOGICAL EVENTS

Detect
- Category A Diseases/Agents
- Category B Diseases/Agents
- Category C Diseases/Agents

Person to Person Spread

Specific Organisms: Anthrax/ Botulism/Plague/Smallpox/ Tularemia/Viral hemor.Fevers
- General – Clinical Features – Diagnosis – Treatment – Prophylaxis – Isolation

Types of Releases
- Covert – Package – Announced

Incident Command
- No scene
- Lead Role of Law Enforcement
- Unified Command LE & PH
- Special Powers under PH Emergency

Scene Safety & Security
- Management of the Scene
- Workers exposed to contagious patients
- If there is a scene: package or overt release
- Coordinated on-site investigation & assessment of threat credibility
- Decon of persons initially exposed at scene
- Protection of response workers
- Issues at site of medical care
- Ingress/egress of patients at hospitals
- Security of MTF
- Infection control issues for victims
- Precautions by category

Assess Hazards
- Lab diagnosis of ill persons suspected of exposure
- Epidemiologic assessment of persons exposed
- Environmental assessment of scene

Support
- Procedures/org. to obtain add. Emergency support
- Types of support available
- National Pharmaceutical Stockpile (NPS)
- Coord/Obtain add. local hospital capacity
- Obtaining additional healthcare providers

Triage/Treatment
- Medication distribution for patient treatment
- Quarantine

Evacuation
- Large number of patients
- Prophylaxis
- Special facilities requirements for smallpox

Recovery
- Law Enforcement
- Public Health
- Mental Health
- Environmental Health

CHEMICAL EVENTS

Nerve Agents
- Varieties & characteristics

Pathophysiology

Cyanide
Characteristics & Properties
Pathophysiology

Vesicants
Varieties & characteristics
Pathophysiology

Pulmonary or Choking Agents
Varieties & characteristics
Pathophysiology of Phosgene
Pathophysiology of Chlorine

Incapacitating Agents –
types/characteristics

Detection
Nerve Agent detection
Cyanide detection
Vesicant detection
Phosgene detection
Chlorine detection
BZ detection & clinical
diagnosis

Incident Command –
Issues/Needs

Scene Safety and Security
Decon/PPE

Assess Hazards
Ongoing-threats

Support – what will be needed

Triage/Treatment
Hot – Warm – Cold Zones

Nerve Agent Treatment
Guidelines
Atropine/2-PAM/Valium/Kits
Cyanide Treatment
Amyl nitrite/Na Nitrite/
Na Thiosulfate

Ancillary testing
Vesicant exposure
Pulmonary agents
BZ

Evacuation

Recovery

Appendix 5

MUC Courses Structure

CHEMICAL CASUALTIES
PULMONARY AGENTS

Overview
- Organohalides
- Phosgene
- PFIB

Phosgene
- History
- Detection
- Protection
- Toxicity
- Mechanism of Action
- Clinical Presentation
- Clinical Effects
- Lab Findings
- Management

Triage
- Delayed
- Immediate
- Expectant

Bottom Line

Return to Duty

CHEMICAL CASUALTIES
CYANIDE

History

Biochemistry AC CK-2

Physical Properties AC

Lethal Dose AC

Physical Properties CK

Cyanide
- Detection
- Absorption
- Elimination
- Clinical
  - Presentation
- Physical
  - Findings

Progression of Signs:
- Cyanide
  - FEELS BAD

Differential Diagnosis

Lab Findings

Cyanide Treatment
- General
  - Supportive
  - Treatment

Specific Treatment

Triage

Return to Duty

Appendix 6a

MUC vs BDLS
(Compare with Appendix 4)

Wounds of War MUC	Comments	BDLS – Traumatic Explosive Events
Introduction	Not needed in BDLS	Not in BDLS
Purpose	Not needed in BDLS	Not in BDLS
War Wounds ARE different	Not needed in BDLS	Not in BDLS
General Types of Injury		Similar in two courses
War Environment	Not needed in BDLS	Not in BDLS
War Patients – Positive – Negative	Not needed in BDLS Not needed in BDLS	Not in BDLS Not in BDLS
Treatment Timing problems with	Not needed in BDLS	Not in BDLS
Ballistics of Projectiles	Not needed in BDLS	Not in BDLS
Energy Factors	Not needed in BDLS	Not in BDLS
Blast Injuries – dissipation of pressure – Supersonic Overpressure – Mechanics -- Pathophysiology Blast effect Sign's/symptoms	Great deal of overlap No need to add MUC information	Present in BDLS—less detail Present in BDLS Present in BDLS Present in BDLS—more details Present in BDLS Present in BDLS Somewhat present in BDLS
Mines	Not needed in BDLS	Not in BDLS
Crush Injury – Simple – Complications	Much overlap Probably not needed Nothing needs to be added	Clinical Basics present Not in BDLS Present in BDLS
Unexploded Ordinance	Nothing additional needed	"Pay attention to 2o devices"
Phosgene-like Combustion Products – PFIB sim.Phosgene Sx's→ triage	Nothing needs to be added	Possibility of toxic gas Triage in Chem. Section
White Phosphorous	Not needed in BDLS	Not in BDLS
Goals of Early Open Wound Management	Not needed in BDLS	Present – much more detailed
Closure of Open War Wounds	Not needed in BDLS	Not in BDLS
Techniques for Debridement	Not needed in BDLS	Not in BDLS
Injuries Associated w/Troop Movement and exercises	Not needed in BDLS	Not in BDLS

Appendix 6b

MUC vs BDLS
(compare with Appendix 3)

Triage & Treatment of Radiation Casualties MUC	Comments	BDLS – Nuclear & Radiological Events
Prob. Of Radiation Casualties	Not needed in BDLS	Not in BDLS
Nuclear Detonation	Nothing to add to BDLS	Present in BDLS Has additional info on decreasing exp. & how to move population
1 Megaton Air Burst Repres.	Not needed in BDLS	Not in BDLS
Overpressure & Injury	**Not needed in BDLS**	**Not in BDLS**
Expected injuries	Not needed in BDLS	Not in BDLS
Medical Effects -- Thermal		
Details of Thermal burns	Nothing to add to BDLS	Less detail, but there
Types of Radiation	**Not needed in BDLS**	**Present BDLS, more detail**
Medical Consequences		
Performance decrement/ Acute/Delayed	Might want to add to BDLS	Delayed cancer
Acute Radiation Syndrome	May need if have Thermo-	Not in BLDS
Dose Ranges-Stages-Phases	Nuclear Explosion	
Factors that alter Response	**Nothing to add to BDLS**	**Partly covered in BDLS**
Hematopoietic Syndrome	May need if have Thermo-	Present but less detail
GI Syndrome	Nuclear Explosion	Not in BDLS
CV/CNS Syndrome	Ditto	Not in BDLS
Burns & Radiation	Ditto	Not in BDLS
Wounds & Radiation	**Ditto**	**Not in BDLS**
Principles of Mass Casualty Care	Nothing to add to BLDS	Not in this BDLS Chapter
Triage – Evac - SOP	Nothing to add to BDLS	Triage/Evac Covered
Triage	Nothing to add to BDLS	Roughly equivalent
Nuclear Casualty Management	Nothing to add to BDLS	Roughly equivalent
Pt. decon.—details	**Nothing to add to BDLS**	**Decon in other chapters**
Wound decon	Nothing to add to BDLS	Not in BDLS
Estimate Radiation Injuries	Nothing to add to BDLS	Less, but adequate
Bio – signs/sx – dosimetry		
Fatal Radiation dose	Nothing to add to BDLS	Present/Lymphocyte count
Sx – lymphocyte count		
Lymphocyte Counts –	**Nothing to add to BDLS**	**Roughly equivalent**
Severity of exposure		
Primary Determ of Survival	Nothing to add to BDLS	Roughly equivalent
Mgt infection/stop bleeding	Nothing to add to BDLS	
Managing Radiation Casualty	Nothing to add to BDLS	Present in BDLS
Treatment Options	Nothing to add to BDLS	Present in BDLS
Reasons for infections	**Nothing to add to BDLS**	**Less detail, use Abx liberally**
Preventing Sepsis	Nothing to add to BDLS	Less detail, use Abx liberally
Surgery timing in Combined Inj	Not needed in BDLS	Not in BDLS
Care of Radiation Injuries	Nothing to add to BDLS	Present in BDLS
Principles of Pt. Management	Nothing to add to BDLS	Present in BDLS, less detail

BDLS Course **also** has information on:

Law Enforcement/Public Health officials

Scene Safety and Security

Assessing Hazards

Separating the injured from the "worried well"

Using the Health History to do that

Radiation surveys

Evacuation

Recovery

Appendix 6c

MUC vs BDLS
(compare with Appendix 2)

Biological Warfare & Terrorism MUC	Comments	BDLS – Biological Events
Definition – basic	Nothing to add to BDLS	Same – more details on roles of community groups
History	Not needed in BDLS	Not in BDLS
Sverdlovsk	Not needed in BDLS	Not in BDLS
BW Agreements	Not needed in BDLS	Not in BDLS
Policy	Not needed in BDLS	Not in BDLS
Destroyed US BioAgents	Not needed in BDLS	Not in BDLS
Soviet Priorities	Not needed in BDLS	Not in BDLS
BW as threats – strategic/ tactical/terrorist	Not needed in BDLS	Not in BDLS
Example Terrorist Actions	Nothing to add to BDLS	Not in BDLS
Advantages of BW	Not needed in BDLS	Minimally covered
Cost Comparison	Not needed in BDLS	Not in BDLS
Acquisition of Etio. Agents	Not needed in BDLS	Not in BLDS
Dispersal	Not needed in BDLS	Not in BDLS
Hypothetical Dissem. Example	Not needed in BDLS	Not in BDLS
Bioterrorist Attacks	Not needed in BDLS	Not in BDLS
Illicit Use	Not needed in BDLS	Not in BDLS
Disease Employed by BioTer	Not needed in BDLS	Not in BDLS
Response Timelines Pre—Incubation—Overt Dz	Not needed in BDLS	Not in BDLS
Additional Sections in BDLS on:		
Detection		
Category A-B-C agents	Managing hospital/ community response	Evacuation
Specific Agents general/clinical features/Dx/ Rx/prophylaxis/isolation	What support is needed And how to get it	Recovery
Managing the scene	Triage/Treatment	

Appendix 6d

MUC vs BDLS
(compare with Appendix 1)

Chemical Casualties Introduction MUC	Comments	BDLS – Chemical Events
History	Not needed in BDLS	Not in BDLS
Factors Influencing Use	Not needed in BDLS	Not in BDLS
Routes of Absorption	Not needed in BDLS	Not in BDLS
Modes of Release	Not needed in BDLS	Not in BDLS
Terminology	Not needed in BDLS	Not in BDLS
Current Threat	Not needed in BDLS	Not in BDLS
US Arsenal	Not needed in BDLS	Not in BDLS

Appendix 6e

MUC vs BDLS
(compare with Appendix 1)

Chemical Casualties Vesicants MUC	Comments	BDLS – Chemical Events (Vesicants)
Two major agents	Nothing to add to BDLS	Same as in MUC
Mustard Casualties WWI	Nothing to add to BDLS	Similar, less detail
Mustard – Advantages	Not needed in BDLS	Not in BDLS
-- Physical Characteristics	Nothing to add to BDLS	Same as in MUC
-- Mechanism.	Nothing to add to BDLS	Pathophysiology—Same
-- Vapor Effects	Nothing to add to BDLS	Not in BDLS in detail
-- Liquid Effects	Nothing to add to BDLS	Present, not as detailed
-- Time Course	Nothing to add to BDLS May want to add to BDLS about early decon	Early Symptoms
-- Clinical Presentation		
Skin	Nothing to add to BDLS	Present in BDLS
Respiratory Tract	Nothing to add to BDLS	Present in BDLS
Infectious Phase	May want to add to BDLS	Not Present in BDLS
Septic Phases	Nothing to add to BDLS	Present in BDLS
-- Death	May want to add to BDLS	Not in BDLS
Triage – Basic Disease Problems/Sx's	Nothing to add to BDLS	Triage in another chapter of BDLS
Mustard Decon	Nothing to add to BDLS	Same in BDLS
Mustard Treatment—Details	Nothing to add to BDLS	Present, not as detailed
Eyes	Nothing to add to BDLS	Present in BDLS
Systemic	Nothing to add to BLDS	Present in BDLS
Lewisite		
-- Properties	Nothing to add to BDLS	Same in BDLS
-- Clinical Effects	Nothing to add to BDLS	Present, less detail, but adeq.
-- Treatment – BAL	Nothing to add to BDLS	Has section on investigational antidotes

Appendix 6f

MUC vs BDLS
(compare with Appendix 1)

Chemical Casualties Nerve Agents MUC	Comments	BDLS – Chemical Events (Nerve Agents)
Nomenclature	Nothing to add to BDLS	Same in BDLS
Physical Properties	Nothing to add to BDLS	Close to same in BDLS
Relative Toxicity	Nothing to add to BDLS	Less in BDLS, but present
Physiology	Nothing to add to BDLS	Present in BDLS, more detail
Clinical Effects	Nothing to add to BDLS	Present in BDLS, more detail
Vapor Exposure	Nothing to add to BDLS	Present in BDLS, more detail
VX – Physical Properties	Nothing to add to BDLS	Present in BDLS, more detail
Nerve Agent – Skin Exposure	Nothing to add to BDLS	Present in BDLS, more detail
More on specific Sx's	Nothing to add to BDLS	Present in BDLS, more detail
-- Management	Not necessary in BDLS	Present in BDLS, more detail
Protect Yourself		
Decon -- Detection	Nothing to add to BDLS	Present in BDLS, more detail
		More detail on Pt. manage.
Atropine	Nothing to add to BDLS	Present in BDLS, more detail
2-PAM	Nothing to add to BDLS	Present in BDLS, more detail
-- Aging & Pyridostigmine	Not necessary in BDLS	Not in BDLS
Seizures and Diazapam	Nothing to add to BDLS	Present in BDLS, more detail
		Autoinjector kits
Various Levels of Exposure	Nothing to add to BDLS	Present in BDLS
Recovery	Might want to add to BDLS	Not in BDLS
Triage – IMDE	Nothing to add to BDLS	In Triage Section

Appendix 6

MUC vs BDLS
(compare with Appendix 1)

Chemical Casualties Pulmonary Agents MUC	Comments	BDLS – Chemical Events Pulmonary Agents)
Overview – Agents	Nothing to add to BDLS	Brief Synopsis
Phosgene		
-- History	Nothing to add to BDLS	Less, but adeq. in BDLS
-- Detection	Nothing to add to BDLS	Present in BDLS, more detail
-- Protection	May want to add to BDLS	Not in BDLS
-- Toxicity	Nothing to add to BDLS	Present, synopsis adeq.
-- Mechanism of Action	Nothing to add to BDLS	Present in BDLS Has Chlorine mech. also
-- Clinical Effects	Nothing to add to BDLS	Present BDLS, more detail
-- Lab findings	May want to add to BDLS	Not in BDLS
-- Management		
Need for Pt. rest	May want to add to BDLS	Not in BDLS
Steroids	Nothing to add to BDLS	Present in BDLS
Pulm. edema	Nothing to add to BDLS	Present in BDLS Has section on phosgene in pts potentially dangerous to HCW
Triage	Nothing to add to BDLS	In Triage section of BDLS
Return to Duty	Not needed in BDLS	Not in BDLS

Appendix 6h

MUC vs BDLS
(Compare with Appendix 1)

Chemical Casualties Cyanide MUC	Comments	BDLS – Chemical Events (Cyanide)
History		
Bio Chem	Not needed in BDLS	Not in BDLS
AC Physical Properties	Nothing to add to BDLS	Present in BDLS, more detail
CK Physical Properties	Nothing to add to BDLS	Present in BDLS, more detail
	Not needed in BDLS	Not in BDLS Chart in BDLS on physical properties
Cyanide		
-- Detection	Nothing to add to BDLS	Present in BDLS, more detail
-- Absorption	Nothing to add to BDLS	Present in BDLS, more detail
-- Elimination	Nothing to add to BDLS	Present in BDLS, more detail
-- Clinical Presentation	Nothing to add to BDLS	Present in BDLS, more detail
-- Physical Findings	Nothing to add to BDLS	Present in BDLS, more detail
Progression of Signs		Present in BDLS, less detail
Mneumonic: FEELS BAD	May want to add to BDLS	Not in BDLS
Differential Diagnosis		
Lab findings	Nothing to add to BDLS	Present in BDLS
Treatment	Nothing to add to BDLS	Present in BDLS
-- General		
-- Supportive	Nothing to add to BDLS	Present in BDLS
-- Specific Treatment	Nothing to add to BDLS	Present in BDLS, more detail
Triage	Nothing to add to BLDS	Present in BDLS, more detail
Return to Duty	Nothing to add to BDLS	In Triage section of BDLS
	No need in BDLS	Not in BDLS

Appendix 7a

MUC vs BDLS
(compare with Appendix 4)

Wounds of War MUC	Comments	BDLS – Traumatic Explosive Events
Introduction*	Needed in MUC	Not in BDLS
Purpose*	Needed in MUC	Not in BDLS
War Wounds ARE different*	Needed in MUC	Not in BDLS
General Types of Injury	Not needed in MUC	Similar in two courses
War Environment	Needed in MUC	Not in BDLS
War Patients – Positive – Negative	Needed in MUC Needed in MUC	Not in BDLS Not in BDLS
Treatment Timing problems with	Needed in MUC	Not in BDLS
Ballistics of Projectiles	Needed in MUC	Not in BDLS
Energy Factors	Needed in MUC	Not in BDLS
Blast Injuries – dissipation of pressure – Supersonic Overpressure – Mechanics -- Pathophysiology Blast effect Sign's/symptoms	 Not needed in MUC Not needed in MUC Not needed in MUC Needed in MUC Needed in MUC Needed in MUC	Present in BDLS—less detail Present in BDLS Present in BDLS Present in BDLS—more details Somewhat present in BDLS Somewhat present in BDLS Somewhat present in BDLS
Mines	Needed in MUC	Not in BDLS
Crush Injury – Simple – Complications	Needed in MUC Needed in MUC Needed in MUC	Clinical Basics present Not in BDLS Somewhat present in BDLS
Unexploded Ordinance	Needed in MUC	"Pay attention to 2° devices"
Phosgene-like Combustion Products – PFIB sim.Phosgene Sx's→ triage	Needed in MUC Needed in MUC	Possibility of toxic gas Triage in Chem. Section
White Phosphorous	Needed in BDLS	Not in BDLS
Goals of Early Open Wound Management	Maintain parts on preserving Max func. & delayed closure 4-10 days later	Present – much more detailed Except on maintaining func. & delayed closure
Closure of Open War Wounds	Needed in BDLS	Not in BDLS
Techniques for Debridement	Needed in BDLS	Not in BDLS
Injuries Associated w/Troop Movement and exercises	Needed in BDLS	Not in BDLS

Appendix 7b

MUC vs BDLS
(Compare with Appendix 3)

Triage & Treatment of Radiation Casualties MUC	Comments	BDLS – Nuclear & Radiological Events
Prob. Of Radiation Casualties	Needed in MUC	Not in BDLS
Nuclear Detonation	Leave in MUC info on EMP	Mostly present in BDLS
1 Megaton Air Burst Repre.	Needed in MUC	Not in BDLS
Overpressure & Injury	**Needed in MUC**	**Not in BDLS**
Expected injuries	Needed in MUC	Not in BDLS
Medical Effects – Thermal		
Details of Thermal burns	Not needed in MUC	Less detail, but there
Types of Radiation	**Not needed in MUC**	**Present BDLS, more detail**
Medical Consequences		
Performance decrement/ Acute/Delayed	Needed in MUC	Delayed cancer
Acute Radiation Syndrome	Not needed in MUC	Now added to BDLS
Dose Ranges-Stages-Phases		
Factors that alter Response	**Needed in MUC**	**Partly covered in BDLS**
Hematopoietic Syndrome	Not needed in MUC	Now added to BDLS
GI Syndrome	Not needed in MUC	Now added to BDLS
CV/CNS Syndrome	Not needed in MUC	Now added to BDLS
Venn Diagram	Needed in MUC	Not in BDLS
Burns & Radiation	Needed in MUC	Not in BDLS
Wounds & Radiation	**Needed in MUC**	**Not in BDLS**
Management graph	Needed in MUC	Not in BDLS
Principles of Mass Casualty Care Triage – Evac -- SOP	Needed in MUC	Not in BDLS
Triage	Needed in MUC	Not in BDLS in this format
Nuclear Casualty Management	**Not needed in MUC**	**Roughly equivalent**
Pt. decon.—details	Not needed in MUC	Decon in other chapters
Wound decon	Needed in MUC	Not in BDLS
Estimate Radiation Injuries	Not needed in MUC	Present in BDLS
Bio – signs/sx – dosimetry		Less, but adequate
Fatal Radiation dose	Not needed in MUC	Present/Lymphocyte count
Sx – lymphocyte count		
Lymphocyte Counts –	**Needed in MUC**	**Mentioned somewhat**
Severity of exposure		
Primary Determ. of Survival	Needed in MUC	Only mentioned
Mtg infection/stop bleeding		
Managing Radiation Casualty	Not needed in MUC	Present in BDLS
Treatment Options	Not needed in MUC	Present in BDLS
Reasons for infections	**Needed in MUC**	**Less detail, use Abx liberally**
Preventing Sepsis	Needed in MUC	Marginally present
Surgery timing in Combined Inj	Needed in MUC	Not in BDLS
Care of Radiation Injuries	Not needed in MUC	Present in BDLS
Principles of Pt. Management	Maintain part on artif.devic	Mostly present in BDLS

Appendix 7c

MUC vs BDLS
(compare with Appendix 2)

Biological Warfare & Terrorism MUC	Comments	BDLS – Biological Events
Definition – basic	Not needed in MUC	Same – more details on roles of community groups
History	Needed in MUC	Not in BDLS
Sverdlovsk	Needed in MUC	Not in BDLS
BW Agreements	Needed in MUC	Not in BDLS
Policy	Needed in MUC	Not in BDLS
Destroyed US BioAgents	Needed in MUC	Not in BDLS
Soviet Priorities	Needed in MUC	Not in BDLS
BW as threats – strategic/ tactical/terrorist	Needed in MUC	Not in BDLS
Example Terrorist Actions	Needed in MUC	Not in BDLS
Advantages of BW	Needed in MUC	Minimally covered
Cost Comparison	Needed in MUC	Not in BDLS
Acquisition of Etio. Agents	Needed in MUC	Not in BLDS
Dispersal	Needed in MUC	Not in BDLS
Hypothetical Dissem. Example	Needed in MUC	Not in BDLS
Bioterrorist Attacks	Needed in MUC	Not in BDLS
Illicit Use	Needed in MUC	Not in BDLS
Disease Employed by BioTer	Needed in MUC	Not in BDLS
Response Timelines Pre—Incubation—Overt Dz	Needed in MUC	Not in BDLS
Blue Book Reminder	Needed in MUC	Not in BDLS

Appendix 7d

MUC vs BDLS
(Compare with Appendix 1)

Chemical Casualties Introduction MUC	Comments	BDLS – Chemical Events
History	Needed in MUC	Not in BDLS
Factors Influencing Use	Needed in MUC	Not in BDLS
Routes of Absorption	Needed in MUC	Not in BDLS
Modes of Release	Needed in MUC	Not in BDLS
Terminology	Needed in MUC	Not in BDLS
Current Threat	Needed in MUC	Not in BDLS
US Arsenal	Needed in MUC	Not in BDLS

Appendix 7e

MUC vs BDLS
(compare with Appendix 1)

Chemical Casualties Vesicants MUC	Comments	BDLS – Chemical Events (Vesicants)
Two major agents	Needed in MUC	Same as in MUC, less Lewisite
Mustard Casualties WWI	Needed in MUC	Similar, less detail
Mustard – Advantages	Needed in MUC	Not in BDLS
-- Physical Characteristics	Needed in MUC	Much same as in MUC
-- Mechanism.	Not needed in MUC	Pathophysiology—Same
-- Vapor Effects	Needed in MUC	Not in BDLS in detail
-- Liquid Effects	Not needed in MUC	Present, not as detailed
-- Time Course	Needed in MUC	Early Symptoms
-- Clinical Presentation		
Skin	Not needed in MUC	Present in BDLS
Respiratory Tract	Needed in MUC	Present in BDLS, less detail
Acute Phase	Needed in MUC	Not present in BDLS
Infectious Phase	Needed in MUC	Not present in BDLS
Septic Phases	Needed in MUC	Minimally present in BDLS
-- Death	Not needed in MUC	Now added to BDLS
Triage – Basic Disease Problems/Sx's	Needed in MUC	Not in BDLS
Mustard Decon	Needed in MUC	Similar in BDLS
Mustard Treatment—Details	Needed in MUC	Present, not as detailed
Eyes	Not needed in MUC	Present in BDLS
Systemic	Needed in MUC	Similar in BDLS
Lewisite		
-- Properties	Needed in MUC	Somewhat similar in BDLS
-- Clinical Effects	Needed in MUC	Present, less detail, but adeq.
-- Treatment – BAL	Needed in MUC	Has section on investigational antidotes

Appendix 7f

MUC vs BDLS
(compare with Appendix 1)

Chemical Casualties Nerve Agents MUC	Comments	BDLS – Chemical Events (Nerve Agents)
Nomenclature	In MUC keep part on most toxic, & what US has	Mostly same in BDLS
Physical Properties	Needed in MUC	Similar in BDLS
Relative Toxicity	Needed in MUC	Less in BDLS, but present
Physiology	Not needed in MUC	Present in BDLS, more detail
Clinical Effects	Not needed in MUC	Present in BDLS, more detail
Vapor Exposure	Not needed in MUC	Present in BDLS, more detail
VX – Physical Properties	In MUC, keep part on slow Evaporation, 18 hrs to sxs, LD50 is 10 mg	Present in BDLS, more detail except is a couple areas
Nerve Agent – Skin Exposure More on specific Sx's	Needed in MUC	Present in BDLS, more detail but minus correl. w/LD50
-- Management	Needed in MUC	Present in BDLS, more detail
Protect Yourself	Needed in MUC	but missing MUC details
Decon -- Detection	Needed in MUC	Present in BDLS, more detail More detail on Pt. manage. less on MUC specifics
Atropine	Not needed in MUC	Present in BDLS, more detail
2-PAM	Not needed in MUC	Present in BDLS, more detail
-- Aging & Pyridostigmine	Needed in MUC	Not in BDLS
Seizures and Diazapam	Not needed in MUC	Present in BDLS, more detail
		Autoinjector kits
Various Levels of Exposure	Needed in MUC	Somewhat present in BDLS
Recovery	Needed in MUC	Not in BDLS
Triage – IMDE	Not needed in MUC	In Triage Section
Slide#29, Rules	Needed in MUC	

Appendix 7g

MUC vs BDLS
(Compare with Appendix 1)

Chemical Casualties Pulmonary Agents MUC	Comments	BDLS – Chemical Events Pulmonary Agents)
Overview – Agents	Needed in MUC	Brief Synopsis
Phosgene		
-- History	Needed in MUC	Less, but adeq. in BDLS
-- Detection	In MUC keep portion on alarms and monitors	Present in BDLS, more detail
-- Protection	Not needed in MUC	Now present in BDLS
-- Toxicity	Needed in MUC	Not in BDLS
-- Mechanism of Action	Needed in MUC	Present, synopsis adeq.
Chlorine	Needed in MUC	Chlorine mech. not adeq.
Phosgene	Not needed in MUC	Present in BDLS
-- Clinical Effects	Needed in MUC	Present BDLS, synop.
-- Lab findings	Not needed in MUC	Now present in BDLS
-- Management	Needed in MUC	
Need for Pt. rest	Keep in MUC	Now present in BDLS
Steroids	Needed in MUC	Present in BDLS
Pulm. edema	Needed in MUC	Present in BDLS
		Has section on phosgene in pts potentially dangerous to HCW
Triage	Keep in MUC	In Triage section of BDLS
Return to Duty	Needed in MUC	Not in BDLS

Appendix 7h

MUC vs BDLS
(compare with Appendix 1)

Chemical Casualties Cyanide MUC	Comments	BDLS – Chemical Events (Cyanide)
History	Needed in MUC	Not in BDLS
Bio Chem	Not needed in MUC	Present in BDLS, more detail
AC Physical Properties	In MUC, keep LCt50 info	Present in BDLS, more detail
CK Physical Properties	Needed in MUC except keep the LCT50 info	Not in BDLS Chart in BDLS on physical properties
Cyanide		
-- Detection	Not needed in MUC	Present in BDLS, more detail
-- Absorption	Not needed in MUC	Present in BDLS, more detail
-- Elimination	Needed in MUC	Somewhat present in BDLS
-- Clinical Presentation	Not needed in MUC	Present in BDLS, more detail
-- Physical Findings	Not needed in MUC	Present in BDLS, more detail
Progression of Signs		Present in BDLS, less detail
Mneumonic: FEELS BAD	Not needed in MUC	Now present in BDLS
Differential Diagnosis	Needed in MUC	Present in BDLS, less detail
Lab findings	Not needed in MUC	Present in BDLS
Treatment		
-- General	Needed in MUC	Present in BDLS, diff. emphasis
-- Supportive	In MUC, keep the portions on removing the agent	Present in BDLS, more detail
-- Specific Treatment	Not needed in MUC except state no amyl nitrite in field & German/British agents	Present in BDLS, more detail
Triage	Not needed in MUC	In Triage section of BDLS
Return to Duty	Needed in MUC	Not in BDLS

THE ASSISTANT SECRETARY OF DEFENSE

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WASHINGTON, DC 20301-1200

HEALTH AFFAIRS

JAN 9 2004

MEMORANDUM FOR ASSISTANT SECRETARY OF THE ARMY (M&RA)
ASSISTANT SECRETARY OF THE NAVY (M&RA)
ASSISTANT SECRETARY OF THE AIR FORCE (M&RA)

SUBJECT: Chemical, Biological, Radiological, Nuclear, and (High Yield) Explosives Training for Military Medical Personnel

In response to the General Accounting Office Report 02-38, Chemical and Biological Defense, "Department of Defense (DoD) Needs to Clarify Expectations for Medical Readiness," the Defense Medical Readiness Training Institute (DMRTI) was tasked by the Deputy Assistant Secretary of Defense (Force Health Protection & Readiness) to review the Services current Chemical, Biological, Radiological, Nuclear and (High Yield) Explosives (CBRNE) medical training and develop the attached standardized Tri-Service CBRNE Training Program.

The DMRTI tasking included the following:

- Evaluating joint and Service-specific CBRNE training,
- Identifying and validating CBRNE training requirements,
- Coordinating the development and validation of joint medical CBRNE Standards of Proficiency,
- Facilitating value-added CBRNE training initiatives, and
- Facilitating the Tri-Service CBRNE Training Committee that consists of subject matter experts assigned to various DoD and governmental agencies.

The Force Health Protection Council (FHPC) endorsed the proposed Tri-Service CBRNE Training Program on October 30, 2003. The program consists of the attached Standards of Proficiency that are necessary to support standardized medical CBRNE readiness training for all military medical personnel, including civil service and contract personnel.

Beginning in Fiscal Year 2004, Standards of Proficiency training will be required for all medical personnel (Active, Reserve, Civil Service and Contract) throughout the Department of Defense. Training shall meet the Enabling Learning Objectives and Terminal Learning Objectives cited in the Tri-Service CBRNE Program. There must be a grading and evaluation component for all courses and training programs used in obtaining the proficiency standards. Incremental increases in training goals will be implemented for the first three years. These goals will be:

- Year 1 – 50%
- Year 2 – 75%
- Year 3 – Full Implementation

CBRNE Standards of Proficiency Reports will be submitted by the Services to DMRTI on a quarterly basis beginning June 2004. The reports will be consolidated and forwarded to the FHPC. The FHPC will monitor the Services compliance with medical training objectives and completion of training.

During the implementation period, reporting requirements will be expanded incrementally. During Fiscal Year 2004, the minimum reporting requirement will be for Active Duty Medical Corps. The Tri-Service CBRNE Training Committee will determine incorporation of the remaining groups into the reporting requirements to meet the full implementation over the next three years.

It is critical that Military Medicine act quickly to implement the CBRNE standards of proficiency and ensure that personnel complete the required CBRNE training to enable them to appropriately respond to a CBRNE incident.

My point of contact is Colonel Al Moloff, (210) 221-2109, almoloff@DMRTI.Army.mil or Colonel Ray Cunningham, (703) 578-8445, edward.cunningham@ha.osd.mil.

William Winkenwerder, Jr., MD

Attachment:
As stated

cc:
SG, Army
SG, Navy
SG, Air Force
Medical Officer, Marine Corps

Defense Medical Readiness Training Institute

Chemical, Biological, Radiological, Nuclear, and (High Yield) Explosives (CBRNE) Training - Standards of Proficiency and Metrics

[1] 01 October 2003

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Appendix 1 – Standards of Proficiency Terminal and Enabling Objectives

Appendix 2 – CBRNE Emergency Preparedness and Response Course

Appendix 3 – Training Continuum Matrix

Appendix 4 – CBRNE Standards of Proficiency Report

Acronyms

BSC	Biomedical Sciences Corps
CBRE	Chemical, Biological, Radiological, Environmental Casualties Course
CBRNE	Chemical, Biological, Radiological, Nuclear, High-Yield Explosives
CCS	Clinical Care Specialists
COT	Commissioned Officers Training
DMRTI	Defense Medical Readiness Training Institute
EMPRC	Emergency Medical Preparedness and Response Course
FCBC	Field Management of Chemical and Biological Casualties Course
FEMA	Federal Emergency Management Agency
HCS	Health Care Scientists
HP	Healthcare Provider
ICS	Incident Command System
MCBC	Medical Management of Chemical and Biological Casualties Course
MEIR	Medical Effects of Ionizing Radiation
MMBC	Medical Management of Biological, Chemical Course
OBC	Officer Basic Course

Definitions

Administrative Staff: Medical personnel assigned in administrative support of medical operations such as records clerk, admissions clerk, supply officer, personnel manager, and resource manager.

Executive Medicine/Staff: Staff assigned to senior management positions, such as department head, directorates, Deputy Commander (Executive Officer), and Commander (Commanding Officer), and support staff.

Force Protection: Actions taken to prevent or mitigate hostile actions against DoD personnel, dependants, employees, resources, facilities and critical information. Force protection does not include actions to defeat the enemy or protect against accidents, weather or disease.

Incident Commander: The individual response for the command of all functions at the field or on-scene response level related to the management of the emergency.

Independent Duty Medical Technician/Corpsmen: Senior enlisted medical personnel that have received advanced training to enable them to serve in an isolated assignment as a medical representative.

Military Medical Personnel: Personnel assigned to all units in support of all aspects of the health services support mission, and/or support of operational health services throughout all military operations. Including DoD civil service and contract personnel.

"Non-medical personnel": Personnel assigned to military facilities/command in support of medical operations such as security, supply, cooks, clerical, and facility maintenance personnel.

Operators/Responders: Personnel assigned as incident responders, emergency operators/managers, security personnel, general medics/corpsmen and non-medical clinicians/technicians/ technologists.

1

Purpose

Purpose

This document provides guidelines and the methodology for implementing the Tri-Service CBRNE Training Program. The program consists of core content capable of being executed at multiple sites. This document specifies: approved Standards of Proficiency that are necessary to support Medical CBRNE readiness; who needs training, the frequency of training; the recommended Tri-Service program (with alternative existing courses); metrics to measure compliance; and reporting requirements.

Definition

"Medical CBRNE readiness is the capability of military medical personnel to effectively sustain the war fighter and homeland security in the event of a CBRNE incident. Policy and doctrine defines an integrated (multi-service) program with clear requirements for responsibility, accountability and sustainability across the continuum of operations, and to establish a standard of interoperable health service support. Program success is dependent upon the availability of dedicated resources to meet present and future strategic goals."

2

CBRNE Training Program

Target Audience

Basic
Military, DoD Civilian and Contract employees (non-medical/non-security)

Operators/Responders
General Medics/Corpsmen - All military medical/dental/veterinary personnel except those that have completed training to work independently as indicated below:

Army – Special Forces Medics
Navy – Independent Duty Corpsman, Special Forces
Air Force – Independent Duty Medics, Special Forces

Medical Specialist Corps/Medical Service Corps-Health Care Science (HCS) and Clinical Care Science (CCS)/Biomedical Sciences Corps

Medical Service Corps – Administrative

Military (non-medical), DoD Civilian, and Contract Personnel – Security

Clinical
Medical Corps (DoD & Contract Providers)
Dental Corps (DoD & Contract Dentists)
Veterinary Corps (DoD & Contract Veterinarians)
Nurse Corps (DoD & Contract Nurses)
Physician Assistants (DoD & Contract Physician Assistants)
Independent Duty Medics/Corpsman

Army – Special Forces Medics
Navy – Independent Duty Corpsman, Special Forces
Air Force – Independent Duty Medics, Special Forces

Administrative/Executive/Commander
As assigned to Executive Medicine/Staff positions

Standards of Proficiency

Standards of Proficiency were developed to meet the requirements of the majority of medical personnel and may not apply equally to all medical personnel. Some of the standards of proficiency may fall outside the scope of an audience member based on whether the corresponding setting is an operational or fixed facility. Other standards of proficiency may apply to specific personnel based on duty assignment/job description.

Training levels of the Standards of Proficiency have a specific purpose and audience in mind and are organized into three categories. The three training levels are initial, sustainment, and advanced.

(1) Initial: Addresses training requirements for all military medical personnel, including military, DoD civilian, and contract personnel. The initial training level should be completed in accordance with DODI 1322.24, which mandates service-specific requirements and training be completed by medical personnel during the first 12 months of assignment.

(2) Sustainment: Sustainment training is the training required to maintain or enhance the proficiency of individual and unit/platform skills. This is a level of subject and task knowledge applicable to all military medical personnel. Sustainment standards of proficiency shall be a part of mandatory medical readiness training. Training must be completed once every three years.

(3) Advanced: Advanced level is specific training designed for a service specific determined target audience that requires an expert knowledge level. Training will be completed one time or as defined by the service.

Each of the training levels have distinct Standards of Proficiency based on the specific actions. Upon completion of the training, personnel should have the knowledge to enable them to perform critical tasks needed to meet real-world requirements.

Initial Level - Standards of Proficiency

Recognition
Detection
Force Protection
Decontamination
Incident Response

Sustainment Level - Standards of Proficiency

Event Recognition
Triage Management
Diagnosis & Treatment
Force Protection & First Aid
Decontamination
Security
Isolation & Containment
Extraction/Evacuation and Environmental Assessment
Command, Control, & Communication
Detection, Identification and Surveillance

Advanced Level – Standards of Proficiency

Detection/Identification/Surveillance

Security
Diagnosis & Treatment
Command, Control, & Communication

Terminal and enabling objectives convey the desired outcome or results of a learning experience to meet the Standards of Proficiency (Appendix 1). They correspond closely to real-world performance or work requirements. The relationship between objectives and other components of training experiences, such as practice activities and evaluation, should be consistent. To be in full compliance, all terminal and enabling objectives must be met with the exception of Force Protection. Standards of Proficiency relating to Personal Protection Equipment (PPE) and Individual Protection Equipment (IPE) will be dependent on the service's requirements based on unit mission and threat level. However, all active and reserve military personnel must receive PPE training.

Tri-Service Curriculum

Initial and Sustainment Level

CBRNE Emergency Preparedness and Response Course Matrix (Appendix 2) has been endorsed by the Deputy Assistant Secretary of Defense/ Force Health Protection and Readiness (DASD/FHP&R) as the gold standard for initial and sustainment medical CBRNE training. Many military, government, and civilian courses/programs are currently available that provide CBRNE training, however, it may require personnel to attend several courses to complete all requirements. Appendix (3) provides the level of training, targeted audience, Standards of Proficiency, and courses that can be initially utilized in meeting the Standards of Proficiency. The courses have been cross-walked with the Standards of Proficiency and have been determined to meet the minimum level of compliance. All courses will be re-validated, within the third year of program implementation, by a group of subject matter experts selected by DMRTI and the Tri-Service CBRNE Training Committee. The validation process will ensure that the established courses or proposed courses, that may be recommend, meet an approved full level of compliance.

CBRNE Emergency Preparedness and Response Course Matrix is applicable to all branches of the service and meets the training requirements of DoDI 2000.18, enclosure 5, dated 4 Dec 2002. The course is designed in a web-delivered format. Attendees will register on-line and take the course most appropriate for their roles and responsibilities in their medical treatment facility. For example, medical officers could complete the clinician course and meet both the initial and sustainment level requirements. For those remote users who do not have web access there will be a CD-ROM version available that will be distributed to their training managers.

The CBRNE Emergency Preparedness and Response Course Matrix consist of four courses and eleven modules. Attendees in the Operator/Responder course, Clinician course and Executive/ Commander Course will have the opportunity to test out of the modules by taking a pretest. If they achieve a score of 80% or greater they will get credit for the module. For those who enroll in the module, there will be a posttest. A score of 70% or greater is required to get credit for the module. For those who enroll in the Basic course, there will be a posttest only. A score of 70% or greater is required to get credit for the module.

Advanced Level

The emphasis for this component is on developing plans, guidelines, processes, and/or procedures to be prepared for an effective response to CBRNE-related incident. This level requires in-depth performance-based or application-orientated training for personnel identified by their Services to complete specialized CBRNE training. The identified personnel will play a critical role in the response to a CBRNE incident.

DMRTI will facilitate a Tri-Service CBRNE Training Committee that will validate or recommend modifications to existing courses, develop new course curriculum, and alternative training methods. The committee will consists of subject matter experts from various DoD agencies.

3

Metrics

Responsibilities

Defense Medical Readiness Training Institute (DMRTI)

DMRTI facilitates joint training activities by; evaluating joint medical readiness training, coordinating development of medical readiness competencies, developing, coordinating, evaluation and facilitating value-added joint medical readiness training initiatives and exercises, ensuring active and reserve medical readiness training meet the same standard, and conducting and/or facilitating joint medical readiness programs.

DASD/FHP&R has designed DMRTI as the executive agent for medical CBRNE training. This includes evaluating joint and service-specific CBRNE training, identify and validate CBRNE training requirements, coordinating the development and validation of joint medical CBRNE Standards of Proficiency, facilitating value-added CBRNE training initiatives, and facilitating the Tri-Service CBRNE Training Committee. The committee will validate courses, develop new curriculum, and review new training initiatives recommended by the Services. Members of the Tri-Service CBRNE Training

Committee will consist of subject matter experts assigned to various DoD and governmental agencies.

Military Departments

The services have the responsibility of issuing policy and establishing procedures to ensure both Active and Reserve components comply with the full implementation of the CBRNE training program. This includes ensuring that all military medical personnel complete initial and sustainment CBRNE training requirement appropriate for their specialty. Services must identify military medical personnel to complete advanced CBRNE training, provide the number of personnel selected for advanced training by specialty to DMRTI, and ensure that the personnel receive the required training.

Initial Level

Medical personnel must complete the initial training level within 12 months of first assignment.

Training requirements: Within 12 months of first assignment.
Audience: Military medical and DoD Civilian & Contract personnel.
Goal: 100% completion of all standards of proficiency.
Course(s): Service Orientation Programs, Service specific courses, Tri-Service CBRNE Program, or other courses provided by other governmental and non-governmental agencies.

Sustainment Level

The sustainment standards of proficiency must be included as required medical readiness training.
Training requirements: Every three years.
Audience: Military medical and DoD Civilian & Contract personnel.
Goal: 100% completion of all standards of proficiency.
Course(s): Tri-Service CBRNE Program, service specific courses or other courses provided by other governmental and non-governmental agencies.

Advanced Level

Advanced level is specific training designed for a determined target audience that requires an expertise knowledge level.
Training requirements: One time or defined by assignment.

Audience: Service determined audience required to have an advanced level of knowledge.
Goal: 100% completion of all standards of proficiency.
Course(s): Service specific courses or other courses provided by other governmental and non-governmental agencies.

4

CBRNE Training Program Implementation

Beginning in FY 04, Standards of Proficiency will be required to be trained to all medical personnel (Active, Reserve, Civil Service and Contract) throughout the Department of Defense. Training shall meet the Enabling Learning Objectives (ELO) and Terminal Learning Objectives (TLO) cited in the Tri-Service CBRNE Program. There must be a grading and evaluation component for all courses and training programs used in obtaining the proficiency standards. Incremental increases in training goals will be implemented for the first three years. These goals will be:

Year 1 – 50%

Year 2 – 75%

Year 3 – Full Implementation

Reporting Requirements

CBRNE Standards of Proficiency Reports must be submitted by the Services to DMRTI on a quarterly basis beginning June 04. The reports will be consolidated and forwarded to DASD/FHP&R. DASD/FHP&R will monitor the Services compliance with medical training objectives and completion.

The training status must be reported utilizing the CBRNE Standards of Proficiency Report, Appendix 4. The report breaks down the data in the training levels, target audiences, and Standards of Proficiency. Services are required to provide number of personnel by target audiences utilizing prior fiscal year end strength numbers for initial and sustainment training levels. Number of personnel for advanced training will be compiled by the Services and entered onto the report. The percentages indicate the number of personnel remaining on board that have completed the required training.

During the implementation period, reporting requirements will be expanded incrementally. During FY 04, the initial training of Active Duty Medical Corps will be

CBRNE Warfare & Terrorism	
TLO 1.1	**Identify historical and current threats of CBRNE Terrorism**
ELO 1.11	Identify the historical evolution of chemical, biological, radiological agents and high yield explosives and identify notable historic events that involved these types of materials.
ELO 1.12	Identify the medical aspects of actual terrorism events involving CBRNE agents and the ramifications relating to the military – civilian interface in responding to a terrorist attack.
ELO 1.13	List countries identified as having the capability of utilizing CBRNE agents.
ELO 1.14	Summarize geopolitical events that have caused increased threat of CBRNE warfare.
TLO 1.2	**Identify possible CBRNE weapons substances and their associated hazards and risks.**
ELO 1.21	List aspects of chemical, biological, and radiological agents and high yield explosives that make them suitable for use by terrorists and identify areas of highest threat for acts of terrorism.
TLO 1.3	**Identify possible dissemination devices and likely locations for use of CBRNE agents.**
ELO 1.31	Recognize the likely locations for the release of CBRNE weapons and the potential outcomes.
ELO 1.32	Recognize likely conditions (weather, wind, temperature) for deployment of chemical threat agents.
TLO 1.4	**Describe potential outcomes of a WMD by a terrorist.**
ELO 1.41	Identify the public health aspects of a CBRNE terrorist event.
ELO 1.42	Identify the possible outcomes related to community infrastructure such as communication, transportation, and public utilities.
TLO 1.5	**List indicators of possible criminal or terrorist activity.**
ELO 1.51	Identify possible indicators or trends of criminal or terrorist CBRNE attack.
ELO 1.52	Recognize commonly encountered hazardous materials and the terrorist risk they pose.
Recognition	
TLO 1.6	**Identify types of CBRNE agents and recognize the indicators of a**
	CBRNE incident or event.
ELO 1.61	React to a Chemical or Biological Hazard or Attack.
1	List biological agents identified as most probable threats in a CBRNE incident.

2	List chemical agents identified as most probable threats in a CBRNE incident.
3	List toxic industrial chemicals/materials that can potentially be used in a CBRNE incident.
ELO 1.62	React to a Nuclear Hazard or Attack.
ELO 1.63	React to a Radiological Hazard or Attack.
1	Identify types, properties, and units of ionizing radiation.
2	List the possible sources of ionizing radiation as well as the different methods of measurement of ionizing radiation.
3	Identify the characteristics of nuclear blasts and the common types of injuries associated with each type of blast.
ELO 1.64	React to a High-Yield Explosive Hazard or Attack.
ELO 1.65	Identify signs and symptoms due to the exposure to various Biological Agents.
ELO 1.66	Identify signs and symptoms due to the exposure to various Chemical Agents,
	including Toxic Industrial Chemicals/Materials.
ELO 1.67	Identify signs and symptoms due to the exposure to various Radiological Agents.
ELO 1.68	Identify signs and symptoms due to the exposure to High-Yield Explosives.
ELO 1.69	Identify criteria for recognizing suspicious incidents.
ELO 1.70	Identify epidemiological indicators suggesting a CBRNE event.
ELO 1.71	Identify shape, color, and purpose of standard NBC contamination markers and the situations requiring their use.
ELO 1.72	Identify NBC alarms and the situations requiring their use.

Detection, Identification, and Monitoring	
TLO 2.1	**Identify detection and survey equipment for detecting, identifying, and monitoring hazards from CBRNE release.**
ELO 2.11	Identify different equipment and methods used in the detection, identification and monitoring of chemical, biological and radiological agents.
ELO 2.12	Identify the safety precautions of the different types of detection and monitoring equipment.
ELO 2.13	Identify the limitations of the different types of detection and monitoring equipment.

	Contamination Avoidance
TLO 3.1	**Identify individual and/or unit measures that should be taken to avoid or minimize:** **1) NBC munitions attacks 2) CBR Hazards** **3) Thermal radiation 4) Spread of Disease** **4) Toxic Industrial Chemicals/Materials (TICS/TIMS)**
	Personal/Collective Protection
TLO 3.2	**Identify items included for use as Personnel Protective Equipment.**
TLO 3.3	**Identify the proper personal protective clothing for a given CBRNE incident.**
ELO 3.31	Identify the purpose, advantages, and limitations of the following protective clothing at CBRNE incidents: 1) Street clothing or work uniforms 2) Chemical-protective clothing
TLO 3.4	**Identify the respiratory protection required for a given CBRNE incident.**
ELO 3.41	Identify the purpose, advantages, and limitations of the following respiratory protection at CBRNE incidents: 1) positive pressure self-contained breathing apparatus 2) positive pressure airline respirators 3) air purifying respirators 4) powered air purifying respirator
ELO 3.42	Identify the required physical capabilities and limitations of personnel working in positive pressure self-contained breathing apparatus.
TLO 3.5	**Protect Yourself from CBRNE Injury/Contamination with Personal Protective Equipment (PPE) utilized by military personnel.**
ELO 3.51	Protect Yourself from Chemical/Biological Contamination using your
	assigned Mask.
1	Correctly don the field protective mask in simulated CBRNE environment within 9 seconds without hood and 15 seconds with hood.
2	Inspect, disassemble, clean, and replace worn or unserviceable parts of the field protective mask using prescribed replacement parts, procedures, and cleaning material/solutions.
ELO 3.52	State the proper use and wear of MOPP gear.
ELO 3.53	Correctly don appropriate levels of MOPP, 1 through 4 within 8 minutes and correctly identify various stages of MOPP levels 1,2, 3, and 4.
ELO 3.54	List the safety precautions and risks an individual may encounter while operating at different levels of Mission Oriented Protective Posture.

ELO 3.56	Implement correct work/rest cycles for personnel operating in MOPP.
ELO 3.57	Identify correct use and application of Skin Exposure Reduction Paste Against Chemical Warfare Agents (SERPACWA).
TLO 3.6	**Protect Yourself from CBRNE Injury/Contamination with Individual Protective Equipment (IPE) in accordance with OSHA regulations.**
ELO 3.61	State the levels of protection (A, B, C, and D) in accordance with OSHA regulations.
ELO 3.62	Identify when levels A through D should be used in accordance with OSHA regulations.
TLO 3.7	**Demonstrate the use of PPE/IPE in protecting against spread of contamination.**
TLO 3.8	**Demonstrate removal and disposal procedures of contaminated PPE/IPE.**
TLO 3.9	**Demonstrate how to initiate actions to self protect and protect others and safeguard property in a CBRNE incident.**
	Self And Buddy Aid
TLO 3.10	**Demonstrate the correct procedures for implementing self aid and buddy aid for a CBRNE incident.**
ELO 3.101	Identify indicators, application procedures and safety requirements of 2 -PAM Chloride, Atropine and Anti-Convulsant medication (i.e. Convulsant Antidote Nerve Agent (CANA)).
ELO 3.102	Identify the correct use for Pyridostigmine Bromide (NAPP - Nerve Agent Pyridostigmine Pretreatment) tabs.
ELO 3.103	Demonstrate the procedures for self decontamination.

Decontamination (Individual/Patient)	
TLO 4.1	**Demonstrate basic decontamination procedures, as determined by the type of CBRNE incident.**
ELO 4.11	Determine the difference between exposure and contamination.
ELO 4.12	Identify the purpose of decontamination.
ELO 4.13	Demonstrate patient decontamination in a hospital setting.
ELO 4.14	Demonstrate patient decontamination in a field environment.
ELO 4.15	Identify the uses of portable decontamination stations.
ELO 4.16	List the decontaminants that can be utilized in decontamination.
ELO 4.17	Demonstrate decontamination procedures for self, buddy, and equipment.
ELO 4.18	State the importance of controlling decon run-off.
TLO 4.2	**Compare and Contrast Contamination Control Measures.**
ELO 4.21	State the importance of establishing contamination control measures.
ELO 4.22	Demonstrate the basic steps in establishing contamination control measures.
TLO 4.3	**Demonstrate safe patient transport following a CBRNE incident.**
ELO 4.31	Identify the procedures to ensure safe patient transport.
ELO 4.32	Identify equipment necessary to ensure safe patient transport.
ELO 4.33	Identify the procedures for transporting a contaminated patient.

Disaster and Emergency Management	
TLO 5.1	**Identify CBRNE response plans and standard operating procedures and our roles.**
ELO 5.11	Identify the four stages of Disaster and Emergency Management (Mitigation, Preparedness, Response Operations, and Recovery Operations).
ELO 5.12	Summarize the functions and responsibilities of the HEICS (Hospital Emergency Incident Command System).
ELO 5.13	Summarize the functions and responsibilities of the ICS (Incident Command (Management) System) and UCS (Unified Command System).
ELO 5.14	Identify the local, regional, and federal resources available during a disaster and have knowledge of their response plans.
ELO 5.15	Identify the capacity of the existing healthcare system and resources.
TLO 5.2	**Determine your role as it relates to components of an emergency response plan.**
ELO 5.21	Describe your duties/role as it relates to a medical treatment facility.
ELO 5.22	Describe your duties/role as it relates to operations (field) requirements.
Incident Response	
TLO 5.3	**Recognize the elements of self and scene safety as related to a CBRNE event.**
TLO 5.4	**Identify proper notification procedures to communicate a CBRNE event.**
ELO 5.41	Identify response assets within your command.
ELO 5.42	Identify how to accurately describe a CBRNE event.
TLO 5.5	**Recognize your role in establishing crime scene and evidence preservation.**
ELO 5.51	Identify procedures to minimize disturbance of the potential crime scene.
ELO 5.52	Identify procedures for protecting individuals and potential evidence.

	Chemical Agents
TLO 6.1	**Identify the various types, indicators, signs and symptoms for exposure to chemical warfare agents**
ELO 6.11	Identify the types of Nerve Agents and the signs and symptoms for each agent.
1	List the classic nerve agents with their NATO codes. Indicate which are primarily a vapor hazard or a liquid hazard.
2	List the routes of exposure for nerve agents.
3	Recognize the signs and symptoms for nerve agent vapor exposure.
4	Recognize the signs and symptoms for liquid nerve agent exposure.
ELO 6.12	Identify types of Blister Agents (Vesicants) and the signs and symptoms for each agent.
1	List vesicants identified as the most probable threats in CBRNE warfare or vesicants.
2	Recognize the clinical signs and symptoms associated with different types of . vesicants.
ELO 6.13	Identify types of Pulmonary (Choking) Agents and the signs and symptoms for each agent.
1	List pulmonary agents identified as the most probable threats in CBRNE warfare or terrorist attack.
2	Recognize the clinical signs and symptoms associated with different types of pulmonary agents.
ELO 6.14	Identify Cyanide (Blood) Agents and their signs and symptoms.
1	List cyanide agents and their use as a threat in CBRNE warfare or terrorist attack.
2	Recognize the clinical signs and symptoms associated with cyanide agents.
ELO 6.15	Identify types of Riot Control Agents and their signs and symptoms.
1	List commonly used riot control agents.
2	Recognize the clinical signs and symptoms associated with riot control agents.
ELO 6.16	Identify types of Incapacitating Agents and their signs and symptoms.
1	Recognize commonly known incapacitating agents.
2	List clinical signs and symptoms associated with incapacitating agents.
ELO 6.17	Identify various toxic chemicals/materials (TICS/TIMS) that can be used as a threat in a CBRNE warfare or terrorist attack.
	Biological Agents
TLO 6.2	**Identify the various types, indicators, signs, and symptoms for exposure to Biological Agents.**
ELO 6.21	Identify types of Biological Toxins and their signs and symptoms.
1	Recognize biological toxins identified as most probable threats in a CBRNE incident.

2	List the clinical signs and symptoms associated with biological toxins used in CBRNE attack.
ELO 6.22	Identify types of Viral Agents and their signs and symptoms.
1	Recognize viral agents identified as most probable threats in a CBRNE incident.
2	List the clinical signs and symptoms associated with viral agents used in CBRNE attack.
ELO 6.23	Identify types of Bacterial Agents and their signs and symptoms.
1	Recognize bacterial agents identified as most probable threats in a CBRNE incident.
2	List the clinical signs and symptoms associated with bacterial agents used in CBRNE attack.
ELO 6.24	Classify biological agents as either lethal or incapacitating.
	Radiological/Nuclear
TLO 6.3	**Identify the biological and medical effects of ionizing radiation.**
TLO 6.4	**Determine the medical effects of ionizing radiation at the cellular level.**
TLO 6.5	**List the signs and symptoms of radiation exposure.**
TLO 6.6	**Classify radiological/nuclear agents based on their dispersal method**
TLO 6.7	**Compare the characteristics of the different levels of radiation exposure.**
	High Yield Explosives
TLO 6.8	**Identify medical effects of high yield explosives.**
TLO 6.9	**Identify explosive agent reconnaissance in casualty management.**
TLO 6.10	**Identify the thermobaric effects of explosives on casualties.**
	NBC Warning Devices
TLO 6.11	**Identify CBRNE Warning Alarms and Markers.**
ELO 6.111	Identify shape, color, and purpose of standard military and civilian NBC contamination markers and the situations requiring their use.
ELO 6.112	Identify NBC alarms and the situations requiring their use.

Triage Management	
TLO 7.1	**Perform effective triage of casualties of specific types of CBRNE incidents.**
ELO 7.11	Demonstrate initial patient assessment and emergency medical treatment in a CBRNE incident.
ELO 7.12	Perform triage for casualties with multiple injuries and different levels of contamination.
ELO 7.13	Determine how patient assessment, emergency medical treatment, and triage processes change in face of contaminated or contagious casualties.
ELO 7.14	Determine how patient assessment, emergency medical treatment, and triage processes change in face of limited resources.

Chemical Agents	
TLO 8.1	**Describe the syndromes, signs and symptoms and treatment options for exposure to the different types of chemical agents.**
ELO 8.11	Recognize the signs and symptoms, treatment and pretreatment options for each type of nerve agent.
1	Describe the mechanism of action of nerve agents.
2	List clinical signs and symptoms associated with different types of nerve agents and the time course of clinical disease and outcome for different types of nerve agents.
3	List pretreatment options for different types of nerve agents and specific treatment for casualties affected by nerve agents.
4	Determine the general approaches of treating nerve agent signs and symptoms.
5	Describe the most important side effects to treatment with atropine, oxime, and Anti-convulsants.
6	Determine when nerve agent pre-treatment is used, what is used, and why it is used.
ELO 8.12	Identify types of Blister Agents (Vesicants), the signs and symptoms, and treatment options for each agent.
1	Describe the mechanism of action of vesicants.
2	List clinical signs and symptoms associated with different types of vesicants and the time course of clinical disease and outcome for different types of vesicants.
3	Determine the general approaches to therapy for vesicants (starting with rapid decontamination) by affected system.
ELO 8.13	Identify types of Pulmonary (Choking) Agents, the signs and symptoms, and options for each agent.
1	Describe the mechanism of action of pulmonary agents.
2	List clinical signs and symptoms associated with different types of pulmonary agents and the time course of clinical disease and outcome different types of pulmonary agents.
3	Determine the general approaches to therapy for peripheral acting pulmonary agents.
ELO 8.14	Identify Cyanide (Blood) Agents, the signs and symptoms and treatment each agent.
1	Describe the mechanism of action of cyanide agents
2	List clinical signs and symptoms associated with different types of cyanide agents and the time course of clinical disease and outcome different types of cyanide agents.
3	Determine the general approaches to therapy for cyanide agent exposure.

ELO 8.15	Identify types of Riot Control Agents, the signs and symptoms, and treatment options for each agent.
1	List clinical signs and symptoms associated with riot control agents and discuss treatment options for each agent.
2	Determine the general approaches to therapy for riot control agent exposure.
ELO 8.16	Identify types of Incapacitating Agents, the signs and symptoms, and treatment options for each agent.
1	List clinical signs and symptoms associated with incapacitating agents and discuss treatment options for each agent.
2	Determine the general approaches to therapy for incapacitating agent exposure.
ELO 8.17	Identify various types of toxic chemicals/materials (TICS/TIMS), the signs and symptoms, and treatment options for these chemical/materials.
TLO 8.2	**Recognize the time course of clinical disease and outcome for each agent.**
TLO 8.3	**Identify therapeutic regimens and definitive and supportive care of victims.**
	Biological Agents
TLO 8.4	**Identify the indicators, signs, and symptoms for exposure to Biological Agents.**
ELO 8.41	List bacterial agents identified as most probable threats in a CBRNE incident.
1	List the clinical signs and symptoms associated with each agent.
2	Determine the time course of clinical disease and outcome for each patient as well as specific treatment options for different types of bacterial agents.
3	Identify treatment options for each agent.
ELO 8.42	List biological toxins identified as most probable threats in a CBRNE incident.
1	List the clinical signs and symptoms associated with biological toxins used in CBRNE attack.
2	Determine the time course of clinical disease and outcome for each patient as well as specific treatment options for different types of biological toxins.
3	Identify treatment options for each agent.
ELO 8.43	List viral agents identified as most probable threats in a CBRNE incident.
1	List the clinical signs and symptoms associated with viral agents used in CBRNE attack.
2	Determine the time course of clinical disease and outcome for each patient as well as specific treatment options for different types of viral agents.
3	Identify treatment options for each agent.

TLO 8.5	**List currently available prophylactic treatment modalities and immunizations effective against biological agent threats.**
	Radiological/Nuclear
TLO8.6	**Recognize the biological and medical effects of radiation.**
ELO 8.61	Explain the biological and medical effects of ionizing radiation.
ELO 8.62	Determine the medical effects of ionizing radiation at the cellular level.
TLO 8.7	**Identify treatment methods for radiological casualties.**
ELO 8.71	Recognize the signs and symptoms of radiation exposure.
ELO 8.72	Identify the characteristics of the different levels of radiation exposure.
ELO8.73	Describe the treatment of acute radiation syndrome.
ELO 8.74	List the signs and symptoms of radiation exposure.
ELO8.75	Compare the characteristics of the different levels of radiation exposure.
ELO 8.76	Compare the effects of radiation dose, long term effects and associated risks with risks associated with other types of behavior and activity.
TLO 8.8	**Identify currently available prophylactic treatment for radiation exposure.**
	High Yield Explosives
TLO 8.9	**Identify medical effects of high yield explosives.**
TLO 8.10	**Identify the diagnosis and treatment of high yield explosives.**
TLO 8.11	**Identify explosive agent reconnaissance in casualty management.**
TLO 8.12	**Identify the diagnosis and treatment for exposure to the thermobaric effects of explosives.**
	Operational Stress
TLO 8.13	**Provide information for commanders to implement a program which mitigates and/or prevents operational stress reactions and related issues that will sustain morale.**
ELO 8.131	Identify the contributing factors to operational stress.
ELO 8.132	Identify the signs and symptoms used in the diagnosis of operational stress.
ELO 8.133	State the importance of diagnosing operational stress.
ELO 8.134	Identify the treatment for operational stress including application of BICEPS (Brevity, Immediacy, Centrality, Expectancy, Proximity, and Simplicity).
ELO 8.135	Identify the steps that can be taken to prevent operational stress.

	Contamination Avoidance
TLO 9.1	**Identify individual and/or unit measures that should be taken to avoid or minimize:** **1) NBC munitions attacks 2) CBR Hazards** **3) Thermal radiation 4) Spread of Disease** **4) Toxic Industrial Chemicals/Materials (TICS/TIMS)**
	Personal/Collective Protection
TLO 9.2	**Identify the proper personal protective clothing for a given CBRNE incident.**
ELO 9.21	Identify the purpose, advantages, and limitations of the following protective clothing at CBRNE incidents: 1) Street clothing or work uniforms 2) Chemical-protective clothing
TLO 9.3	**Identify the respiratory protection required for a given CBRNE incident.**
ELO 9.31	Identify the purpose, advantages, and limitations of the following respiratory protection at CBRNE incidents: 1) positive pressure self-contained breathing apparatus 2) positive pressure airline respirators 3) air purifying respirators 4) powered air purifying respirator
ELO 9.32	Identify the required physical capabilities and limitations of personnel working in positive pressure self-contained breathing apparatus.
TLO 9.4	**Protect Yourself from CBRNE Injury/Contamination with Personal Protective Equipment (PPE) utilized by military personnel.**
ELO 9.41	Protect Yourself from Chemical/Biological Contamination using your assigned Mask.
1	Correctly don the field protective mask in simulated CBRNE environment within 9 seconds without hood and 15 seconds with hood.
2	Inspect, disassemble, clean, and replace worn or unserviceable parts of the field protective mask using prescribed replacement parts, procedures, and cleaning material/solutions.
ELO 9.42	State the proper use and wear of MOPP gear.
ELO 9.43	Correctly don appropriate levels of MOPP, 1 through 4 within 9 minutes and correctly identify various stages of MOPP levels 1,2, 3, and 4.
ELO 9.44	List the safety precautions and risks an individual may encounter while operating at different levels of Mission Oriented Protective Posture.
ELO 9.45	Implement correct work/rest cycles for personnel operating in MOPP.
ELO 9.46	Identify correct use and application of Skin Exposure Reduction Paste Against Chemical Warfare Agents (SERPACWA).

TLO 9.5	**Protect Yourself from CBRNE Injury/Contamination with Individual Protective Equipment (IPE) in accordance with OSHA regulations.**
ELO 9.51	State the levels of protection (A, B, C, and D) in accordance with OSHA regulations.
ELO 9.52	Identify when levels A through D should be used in accordance with OSHA regulations.
TLO 9.6	**Demonstrate the use of PPE/IPE in protecting against spread of contamination.**
TLO 9.7	**Demonstrate removal and disposal procedures of contaminated PPE/IPE.**
Self And Buddy Aid	
TLO 9.8	**Demonstrate the correct procedures for implementing self aid and buddy aid for a CBRNE incident**
ELO 9.81	Identify emergency actions that may be undertaken to maintain vital body functions of a casualty incapacitated by a CBRNE agent.
ELO 9.82	Perform procedures to administer 2 -PAM Chloride, Atropine, and Anti-Convulsant medication (i.e. Convulsant Antidote Nerve Agent (CANA)).
ELO 9.83	Identify the correct use for Pyridostigmine Bromide (NAPP - Nerve Agent Pyridostigmine Pretreatment) tabs.
ELO 9.84	Demonstrate the procedures for self decontamination.

Decontamination (Individual/Patient)	
TLO 10.1	**Determine the difference between exposure and contamination and how this affects the medical care of CBRNE victims.**
TLO 10.2	**Demonstrate basic decontamination procedures, as determined by the type of CBRNE incident.**
ELO 10.21	Identify the purpose of decontamination.
ELO 10.22	Recognize when decontamination is not required (i.e. riot agents).
ELO 10.23	List the decontaminants that can be utilized in decontamination.
ELO 10.24	Demonstrate patient decontamination in a hospital setting.
ELO 10.25	Demonstrate patient decontamination in a field environment.
ELO 10.26	Identify the uses of portable decontamination stations.
ELO 10.27	Demonstrate decontamination procedures for self and buddy.
ELO 10.28	Demonstrate decontamination procedures for site/equipment.
ELO 10.29	Demonstrate proper handling of decontaminated remains.
TLO 10.3	**Identify specific issues related to Decontamination.**
ELO 10.31	Evaluate the advantages and disadvantages when selecting indoor or outdoor decontamination sites.
ELO 10.32	Recognize Decontamination Threshold and when full emergency decontamination is implemented.
ELO 10.33	Recognize situations when dirty resuscitation would be recommended for the treatment of a CBRNE casualty.
ELO 10.34	Compare and Contrast differences of decontamination in a water-rich environment versus a water-poor environment.
ELO 10.35	State the importance of controlling decon run-off.
ELO 10.36	State the methods for handling and/or disposal of the decontamination waste.
TLO 10.4	**Compare and Contrast Contamination Control Measures.**
ELO 10.41	State the importance of establishing contamination control measures.
ELO 10.42	Demonstrate the basic steps in establishing contamination control measures.
TLO 10.5	**Identify safe patient transport following a CBRNE incident.**
ELO 10.51	Identify the procedures to ensure safe patient transport.
ELO 10.52	Identify equipment necessary to ensure safe patient transport.
ELO 10.53	Identify the procedures for transporting a contaminated patient.
TLO 10.6	**Demonstrate procedures for managing radiologically contaminated personnel.**
ELO 10.61	State the sequence of events for the decontamination of radiological casualties.
ELO 10.62	Recognize special precautions for casualties affected by ionizing radiation.

Security	
TLO 11.1	**Analyze the elements of individual and site safety as related to a CBRNE event.**
TLO 11.2	**Cite your role in establishing crime scene and evidence preservation and identify the procedures and safety precautions for collecting evidence at a CBRNE attack site.**
ELO 11.21	Implement procedures to minimize disturbance of the potential crime scene.
ELO 11.22	Implement procedures for protecting individuals and potential evidence containment operations.
ELO 11.23	Identify the procedures for the collection of evidence, including chain of custody, at a CBRNE attack site.
ELO 11.24	State the safety precautions for collecting legal evidence at a CBRNE incident.
TLO 11.3	**Cite proper notification procedures to communicate a CBRNE event.**
ELO 11.31	Identify response assets within your command.
ELO 11.32	Identify how to accurately describe a CBRNE event.
TLO 11.4	**Determine security issues as it relates to a CBRNE incident.**
ELO 11.41	Identify security management, techniques and issues related to the entrance or exit (entry control points) of non-exposed groups, such as volunteers, family members, and media.
ELO 11.42	Identify security issues related to potentially large numbers of victims, contamination risks and ongoing terrorist threats.
ELO 11.43	Determine procedures to maintain security of equipment, supplies, vehicles, treatment areas, and facilities.

TLO 12.1	**Identify CBRNE isolation precautions, contamination control and containment operations.**
ELO 12.11	Compare and Contrast appropriate isolation precautions for CBRNE casualties as part of the response for chemical, biological, and radiological events.
ELO 12.12	Demonstrate the use of infectious control measures and quarantine procedures during a biological agent response.
ELO 12.13	Identify CBRNE isolation precautions, contamination control and containment operations for fatalities.
TLO 12.2	**List CBRNE agents that have secondary transmission/communicability potential and identify appropriate protective measures.**
TLO 12.3	**Compare and Contrast the use of "hot", "warm", and "cold" zones, including the potential for expansion and establishment of new boundaries or sites.**
TLO 12.4	**Coordinate casualty and personnel movement through the "hot", "warm" and "cold" zones.**
ELO 12.41	Summarize the issues and challenges related to managing victim movement when isolation or containment is required, including casualties who exhibit symptoms or those exposed who must undergo observation.
ELO 12.42	Demonstrate the process of managing personnel entry and exit from contamination or isolation area, including exposure control and exposure a time management.
ELO 12.43	Identify security management, techniques and issues related to entrance or exit of non-exposed groups, such as volunteers, family members, and media.

Extraction and Evacuation	
TLO 13.1	**Identify principles of extraction in a CBRNE incident.**
ELO 13.11	Compare and Contrast the advantages and hazards associated with the rescue and extraction of casualties from a CBRNE incident site.
ELO 13.12	Identify measures of personnel evacuation in downwind hazard areas.
TLO 13.2	**Cite the methods of casualty evacuation from a CBRNE incident site.**
ELO 13.21	Demonstrate procedures and equipment used for safe patient transport following a CBRNE incident.
ELO 13.22	Determine the issues and challenges of transporting casualties from a CBRNE site.
ELO 13.23	List the uses and problems with the different modes of transportation including air versus ground.
ELO 13.24	Identify the contamination and decontamination issues as they relate to vehicles, supplies, and equipment used for transporting CBRNE casualties.
ELO 13.25	Identify principles of containment and transport of contaminated casualties, fatalities, equipment, and other items related to a CBRNE incident.
Environmental Assessment	
TLO 13.3	**Identify principles of hazard and risk assessment for CBRNE agents.**
TLO 13.4	**Identify the procedure for termination/all clear for a CBRNE scene.**

	Command & Control
TLO 14.1	**Identify the components and variables of the Incident Command Systems (ICS).**
ELO 14.11	Summarize your duties and responsibilities as they relate to the Hospital Emergency Incident Command System (HEICS).
ELO 14.12	Summarize your duties and responsibilities as they relate to the Incident Command System (ICS)
ELO 14.13	Summarize your duties and responsibilities as they relate to the Unified Command System (UCS)
ELO 14.14	Identify your role and responsibilities in the stages of Disaster and Emergency Management (Mitigation, Preparedness, Response, Recovery).
TLO 14.2	**Identify the installation logistical authority as it relates to storage, issuance, and use of CB pretreatment drugs and antidotes.**
TLO 14.3	**Characterize your role among federal agencies and other support infrastructures when faced with a CBRNE incident.**
TLO 14.4	**Perform health risk assessments to quantify and qualify CBRNE exposure data to determine short- and long-term health risks.**
ELO 14.41	State the purpose of conducting a risk assessment.
ELO 14.42	Identify the five steps of conducting a risk assessment. 1) Identify Hazard 2) Assess Hazard 3) Develop controls and make decisions 4) Implement controls 5) Supervise/evaluate
TLO 14.5	**Identify additional CBRNE related public and EMS issues.**
TLO 14.6	**Coordinate mortuary affairs in a mass casualty scenario.**
ELO 14.61	Identify the risks and challenges associated with fatality management and evidence preservation, as well as the social and religious issues related to mass fatality management.
ELO 14.62	State appropriate techniques for handling the deceased, considering potentially large numbers, contamination risks, storage and transportation of remains, and evidence preservation.
	Communication
TLO 14.7	**Identify proper notification procedures for CBRNE event including NBC reports, military notification channels, and public health.**
TLO 14.8	**Report NBC Contamination through national warning and hazard control systems.**
TLO 14.9	**Identify risk communication strategies.**
TLO 14.10	**Identify alternate means of communication with local, state, and federal agencies within the geographical area.**
TLO 14.11	**Identify the components of a media-management plan.**

DETECTION BY EQUIPMENT	
TLO 15.1	**Describe detection and survey equipment for detecting, identifying, and monitoring hazards associated with a CBRNE release.**
ELO 15.11	Identify different equipment and methods used in the detection and monitoring of chemical, biological and radiological agents.
ELO 15.12	Identify the safety precautions of the different types of detection and monitoring equipment.
ELO 15.13	Identify the limitations of the different types of detection and monitoring equipment.
IDENTIFICATION - LABORATORY	
TLO 15.2	**Characterize the differences between presumptive and confirmatory laboratory testing.**
TLO 15.3	**List guidelines that should be followed to package and ship biological agents.**
ASSESSMENT/SURVEILLANCE/REPORTING	
TLO 15.4	**Perform assessment/surveillance/reporting procedures for chemical casualties (short & long term).**
TLO 15.5	**Perform assssment/surveillance/reporting procedures for biological casualties (short & long term).**
TLO 15.6	**Perform assessment/surveillance/reporting procedures for radiation casualties including the utilization of the Biodosimetry Assessment Tool (BAT).**
ELO 15.61	Maintain and report cumulative radiation dose status.
ELO 15.62	Characterize the effects of a unit's radiation exposure status (RES) related to mission requirements.

DETECTION BY EQUIPMENT	
TLO 16.1	**Operate detection and survey equipment for recognizing, detecting, and monitoring hazards from CBRNE release.**
ELO 16.11	Operate chemical detection instruments utilizing established protocols.
ELO 16.12	Operate biological detection instruments utilizing established protocols.
ELO 16.13	Operate radiological devices utilizing established protocols.
ELO 16.14	Demonstrate contamination identification and detection methods utilized during monitoring and survey operations.
ELO 16.15	Recognize limitations related to the collection, detection, classification and identification of solids, liquids, and gases.
IDENTIFICATION - LABORATORY	
TLO 16.2	**Describe the role, utilization, and capabilities of the facilities associated with the Laboratory Response Network (LRN).**
ELO 16.21	Identify the four LRN Laboratory Levels and the type of facilities at each level.
ELO 16.22	Identify the tasks by capacity for each LRN Laboratory level.
ELO 16.23	Identify if your laboratory is participating in LRN and their capabilities of testing CBRNE samples.
ELO 16.24	Identify the nearest higher level laboratory that samples would be sent for additional testing.
ELO 16.25	Demonstrate procedures to pack and ship biological agents.
TLO 16.3	**Perform gas chromography testing for suspected chemical agents.**
ASSESSMENT/SURVEILLANCE/REPORTING	
TLO 16.4	**Organize and conduct CBRNE monitoring, survey and reporting operations.**
ELO 16.41	Coordinate investigations of unusual sickness and fatalities in situations involving CBRNE hazards and endemic diseases.
ELO 16.42	Implement medical monitoring protocols in coordination with the on-scene incident commander.
ELO 16.43	Collect, correlate, and submit data for various CBRNE reports.

Operations and Force Protection	
TLO 17.1	**Initiate the Incident Command System (ICS).**
ELO 17.11	Characterize and understand the Incident Command System (ICS).
ELO 17.12	Compare and Contrast the components of Incident Command System and Unified Command System (UCS).
TLO 17.2	**Establish and operate an Emergency Operations Center (EOC).**
TLO 17.3	**Coordinate CBRNE response with local, regional, state, and federal authorities and agencies.**
ELO 17.31	Identify the processes for supporting local, regional, state, and federal emergency response plans.
ELO 17.32	Identify the resources available to address psychological, medical, and environmental needs associated with a CBRNE incident.
ELO 17.33	Determine the capacity of the existing healthcare system and resources.
ELO 17.34	Coordinate with the federal, state and city authorities and agencies to prevent and, if necessary mitigate and manage the consequence of a CBRNE incident.
TLO 17.4	**State the JCAHO standards of care for Emergency Management and Disaster Preparedness.**
TLO 17.5	**Identify the roles and jurisdictions of Federal agencies in response to a potential CBRNE incident.**
TLO 17.6	**Implement protocols to secure and control of the incident site.**
ELO 17.61	Identify assets and resources available for controlling and securing the scene.
ELO 17.62	Implement procedures and protocols for setting up locations for the command post, staging areas, medical monitoring functions, and proper isolation boundaries for the different zones for the incident scene.
ELO 17.63	Implement security and management techniques related to the minimization of hazardous exposures to personnel .
ELO 17.64	Identify security issues related to potentially large numbers victims, contamination risks and ongoing terrorist threats.
ELO 17.65	Initiate procedures to maintain security of equipment, supplies, vehicles, treatment areas, and facilities.
TLO 17.7	**Characterize your role in support of a criminal investigation of a potential CBRNE incident.**

ELO 17.71	Implement procedures to minimize disturbance of the potential crime scene.
ELO 17.72	Implement procedures for protecting individuals and potential evidence.
TLO 17.8	**Collect samples utilizing chain of custody and contamination control procedures.**
ELO 17.81	Implement chain of custody procedures including the handling, collecting, recording, securing, and transporting of evidence collected on the scene.
TLO 17.9	**Collect, correlate and forward threat information regarding potential terrorist/criminal actions involving possible CBRNE agents.**
TLO 17.10	**Develop plan for handling mass casualties.**
ELO 17.101	Develop plan to expand patient capacity at your facility.
ELO 17.102	Initiate memorandums of understanding agreements defining local medical facilities suppport capabilities.
ELO 17.103	Initiate patient movement (medical regulating) and Medivac procedures.
ELO 17.104	Coordinate response capability for assisting state and local authorities utilizing the National Diaster Medical System (NDMS).
TLO 17.11	**State the purpose of the Joint Mortuary Affairs Program.**
ELO 17.111	Describe the three programs that make up the Joint Mortuary Affairs Program. 1) Current Death Program 2) Graves Registration Program 3) Concurrent Return Program
ELO 17.112	Identify Local, State, and Federal laws relating to the identification and management of remains.
ELO 17.113	Identify the risks and challenges associated with fatality management and evidence preservation, as well as the social and religious issues related to mass fatality management.
ELO 17.114	State appropriate techniques for handling the deceased, considering potentially large numbers, contamination risks, storage and transportation of remains, and evidence preservation.

Chemical Agents	
TLO 18.1	**Initiate the medical management of a casualty with nerve agent exposure.**
ELO 18.11	Identify the mechanism of toxicodynamics of nerve agents.
ELO 18.12	Identify the most prominent symptoms that follow the clinical latent period.
ELO 18.13	Identify the definitive laboratory tests utilized for the clinical management of nerve agents.
ELO 18.14	Identify therapeutic regimens and definitive and supportive care of victims.
TLO 18.2	**Initiate the medical management of a casualty with exposure to a Blister (Vesicant) agent.**
ELO 18.21	Identify the mechanism of toxicodynamics of vesicants.
ELO 18.22	Identify the most prominent symptoms that follow the clinical latent period.
ELO 18.23	Identify the definitive laboratory tests utilized for the clinical management of vesicants agents.
ELO 18.24	Identify therapeutic regimens and definitive and supportive care of victims.
TLO 18.3	**Initiate the medical management of a casualty with exposure to a Pulmonary (Choking) agent.**
ELO 18.31	Identify the mechanism of toxicodynamics of pulmonary agents.
ELO 18.32	Identify the most prominent symptoms that follow the clinical latent period.
ELO 18.33	Identify the definitive laboratory tests utilized for the clinical management of pulmonary agents.
ELO 18.34	Identify therapeutic regimens and definitive and supportive care of victims.
TLO 18.4	**Initiate the medical management of a casualty with exposure to a Cyanide (Blood) agent.**
ELO 18.41	Identify the mechanism of toxicodynamics of cyanide agents.
ELO 18.42	Identify the most prominent symptoms that follow the clinical latent period.
ELO 18.43	Identify the definitive laboratory tests utilized for the clinical management of cyanide agents.
ELO 18.44	Identify therapeutic regimens and definitive and supportive care of victims.
TLO 18.5	**Initiate the medical management of a casualty with exposure to a Riot Control agent.**
ELO 18.51	Identify the mechanism of toxicodynamics of cyanide agents.
ELO 18.52	Identify the most prominent symptoms that follow the clinical latent period.
ELO 18.53	Identify the definitive laboratory tests utilized for the clinical management of cyanide agents.
ELO 18.54	Identify therapeutic regimens and definitive and supportive care of victims.

TLO 18.6	**Initiate the medical management of a casualty with exposure to a Incapacitating agent.**
ELO 18.61	Identify the mechanism of toxicodynamics of cyanide agents.
ELO 18.62	Identify the most prominent symptoms that follow the clinical latent period.
ELO 18.63	Identify the definitive laboratory tests utilized for the clinical management of cyanide agents.
ELO 18.64	Identify therapeutic regimens and definitive and supportive care of victims.
TLO 18.7	**Initiate the medical management of a casualty with exposure to a toxic chemicals/materials (TICS/TIMS) agent.**
ELO 18.71	Identify the mechanism of toxicodynamics of TICS/TIMS agents.
ELO 18.72	Identify the most prominent symptoms that follow the clinical latent period.
ELO 18.73	Identify the definitive laboratory tests utilized for the clinical management of TICS/TIMS agents.
ELO 18.74	Identify therapeutic regimens and definitive and supportive care of victims.
	Biological Agents
TLO 18.8	**Initiate the long term medical management of a casualty with exposure to a Bacterial Agent.**
ELO 18.81	Identify therapeutic regimens and definitive and supportive care of victims.
TLO 18.9	**Initiate the long term medical management of a casualty with exposure to a Biological Toxin.**
ELO 18.91	Identify therapeutic regimens and definitive and supportive care of victims.
TLO 18.10	**Initiate the long term medical management of a casualty with exposure to a Viral Agent.**
ELO 18.101	Identify therapeutic regimens and definitive and supportive care of victims.
	Radiological/Nuclear
TLO 18.11	**Identify Factors which affect Radiation Response.**
TLO 18.12	**Recognize the biological and medical effects of radiation.**
ELO 18.121	Explain the biological and medical effects of ionizing radiation.
1	Determine the acute medical effects of ionizing radiation.
2	Determine the chronic medical effects of ionizing radiation.
ELO 18.122	Differentiate direct from indirect radiation-induced cellular damage.
ELO 18.123	Recognize the signs and symptoms of radiation exposure.
ELO 18.124	Identify the characteristics of the different levels of radiation exposure.
TLO 18.13	**Identify signs and symptoms and treatment methods for acute radiation syndrome.**
ELO 18.131	Describe the pathophysiology of Acute Radiation Syndrome (ARS) and its subsyndromes.
ELO 18.132	Determine the clinical features of ARS and its subsyndromes.

ELO 18.133	Identify available treatments for ARS and for associated infections and combined injuries.
ELO18.134	Identify the time course requirements for treatments in ARS.
TLO 18.14	**Identify signs and symptoms and treatment methods for Chronic radiation syndrome.**
ELO 18.141	Recognize the signs and symptoms for Chronic Radiation Syndrome.
ELO 18.142	Identify the time course requirements for treatments in Chronic Radiation Syndrome.
ELO18.143	Describe the treatment of chronic radiation syndrome.
TLO 18.15	**Identify Radiation exposure status categories and corresponding dose estimates.**
TLO 18.16	**Compare the effects of radiation dose, long term effects and associated risks with risks associated with other types of behavior and activity.**
TLO 18.17	**List the isotopes representing most probable threats for use in Radiation Dispersal Devices (RDD).**
ELO 18.171	List the optimal treatment for each.
ELO 18.172	Determine the time course requirements for treatment of each.
ELO 18.173	List the diagnostic modalities required for each isotope.
TLO 18.18	**Identify infectious complications of irradiation.**
ELO 18.181	Determine management of infections in immunocompromised patients.
TLO 18.19	**Identify radiation combined injury concerns.**
ELO 18.191	Compare how exposure to ionizing radiation potentates the effects of BW/CW agents.
ELO 18.192	Determine the medical management for radiation combined injuries.
TLO 18.20	**Determine the medical effects of embedded depleted uranium.**
	Biomodulators
TLO 18.21	**Recognize the potential of biomodulators.**
ELO 18.211	List potential mechanisms.
ELO 18.212	List effective dose ranges.
ELO 18.213	List the potential means of production

Command, Control & Communication	
TLO 19.1	**Initiate the Incident Command System (ICS).**
ELO 19.11	Characterize and understand the Incident Command System (ICS).
ELO 19.12	Compare and Contrast the components of Incident Command System and Unified Command System (UCS).
ELO 19.13	Coordinate with the on-scene commander the latest threat information from data and information gathered.
ELO 19.14	Conduct incident critique and debrief actions taken during the response to a CBRNE event and documenting lessons learned.
TLO 19.2	**Establish and operate an Emergency Operations Center (EOC).**
TLO 19.3	**Develop a Emergency Operations Plan.**
ELO 19.31	State the goals and guiding principles that are necessary when developing an emergency operations plan.
ELO 19.32	Define the eight sections of the basic emergency operations plan.
TLO 19.3	**Identify the four stages of Disaster and Emergency Management (Mitigation, Preparedness, Response, and Recovery).**
ELO 19.41	State the crucial role mitigation play in saving lives and property.
ELO 19.42	Determine vulnerability based on identified hazards.
ELO 19.43	Define the emergency manager's role in mitigation.
ELO 19.44	Identify tools for mitigation.
ELO 19.45	State what is involved in the preparedness phase of emergency management.
ELO 19.46	Identify the five stages of emergency response.
ELO 19.47	State how to assess and report damage in order to address short- and long-term needs.
ELO 19.48	List recovery-related activities that occur after a disaster or emergency.
ELO 19.49	Identify considerations for recovery planning.
TLO 19.5	**State the JCAHO standards of care for Emergency Management and Disaster Preparedness.**

TLO 19.6	**Identify the installation logistical authority as it relates to storage, issuance, and use of CB pretreatment drugs and antidotes.**
ELO 19.61	Identify logistics requirements in obtaining antidotes and pharmaceuticals needed for the treatment of chemical agent exposure.
ELO 19.62	Identify logistics requirements in obtaining immunizations/antibiotics needed in the treatment/prevention against biological agents exposure.
ELO 19.63	Identify logistics requirements in obtaining pharmaceuticals needed for the treatment due to radiation exposure.
ELO 19.64	Coordinate the process needed to active the National Pharmaceutical Stockpile Program.

TLO 19.7	**Coordinate CBRNE response with local, regional, state, and federal authorities and agencies.**
ELO 19.71	Compare and Contrast local, regional, state, and federal emergency response plans.
ELO 19.72	Identify the resources available to address psychological, medical, and environmental needs from a CBRNE incident.
ELO 19.73	Characterize the capacity of the existing healthcare systems and resources.
ELO 19.74	Coordinate with the federal, state and city authorities and agencies to prevent and, if necessary mitigate and manage the consequence of a CBRNE incident.
TLO 19.8	**Develop plan and supervise CBRNE detection, identification, and marking operations; supervise crossing of contaminated areas; and estimate and calculate NBC hazards and casualty estimates.**
TLO 19.9	**Develop plan for handling mass casualties.**
ELO 19.91	Develop plan to expand patient capacity at your facility.
ELO 19.92	Initiate memorandums of understanding agreements established local medical facilities to assist with incident.
ELO 19.93	Initiate procedures needed for patient movement (medical regulating) and Medivacs.
ELO 19.94	Coordinate response capability for assisting state and local authorities utilizing the National Disaster Medical System (NDMS).
TLO 19.10	**State the purpose of the Joint Mortuary Affairs Program.**
ELO 19.101	Describe the three programs that make up the Joint Mortuary Affairs Program. 1) Current Death Program 2) Graves Registration Program 3) Concurrent Return Program

ELO 19.102	Identify Local, State, and Federal laws relating to the identification and management of remains.
TLO 19.11	**Provide information for commanders to implement a program which mitigates and/or prevents operational stress reactions and related issues that will sustain morale.**
ELO 19.111	Identify the contributing factors to operational stress.
ELO 19.112	Identify the signs and symptoms used in the diagnosis of operational stress.
ELO 19.113	State the importance of diagnosing stress reactions and potential causes.
ELO 19.114	Identify the treatment for operational stress including application of BICEPS (Brevity, Immediacy, Centrality, Expectancy, Proximity, and Simplicity).
ELO 19.115	Identify the steps that can be taken to prevent operational stress.
ELO 19.116	State commanders' responsibility in reducing the potential for the development of operational stress.
TLO 19.12	**Conduct Critical Incident Debriefings.**
TLO 19.13	**Advise the commander and community leaders on the health effects of CBRNE as well as the medical effects of immunizations, pretreatments, chemoprophylaxis, and treatment.**
TLO 19.14	**Provide medical guidance on the establishment of radiation exposure levels.**

APPENDIX 2

CBRNE Emergency Medical Preparedness/Response Course Matrix

Courses:

The courses are targeted to the following audiences:

- Basic Course - Civilian employees/contractors (non-medical/non-security)
- Operator/Responder Course - Incident responders; general Medics/Corpsmen, non-medical clinicians/ technicians, security personnel, basic EMS
- Clinician Course - Incident clinicians; physicians, dentist, veterinarians, nurses, Physician Assistants, Independent Duty Medical Technicians, advanced EMS
- Executive/Commander Course - Incident Commanders; hospital commanders and executive staff

Training Modules:

Modules 1-11 in the CBRNE Emergency Preparedness and Response Course Matrix are presented in a distributed learning format.

- Module 1 - Introduction to CBRNE Warfare and Terrorism
- Module 2 - Recognition of the CBRNE Threat
- Module 3 - Personal/Collective Protection
- Module 4 - Casualty Assessment, Decontamination and Evacuation
- Module 5 - Disaster and Emergency Management
- Module 6 - Notification Procedures
- Module 7 - Chemical Agents
- Module 8 - Biological Agents
- Module 9 - Radiological and Nuclear Agents
- Module 10 - High Yield Explosives
- Module 11 - Mental Health Treatment Protocols

BASIC COURSE

This course consists of 5 modules from the CBRNE Emergency Medical Preparedness/Response Course Matrix. It is written for the civilian employees and contractors working in medical treatment facilities. This includes office workers housekeeping, security guards, and facility workers. All the areas of competency are to a basic level of subject and task knowledge proficiency. At the conclusion of this course, attendees will gain a basic understanding of facts and procedures related to responding to a CBRNE incident.

Module 1. Introduction to CBRNE Warfare/Terrorism
Module 3. Personal/Collective Protection
Module 4. Decontamination
Module 5. Disaster and Emergency Management
Module 6. Notification Procedures

OPERATOR/RESPONDER COURSE

This course consists of 10 modules from the CBRNE Emergency Medical Preparedness/Response Course Matrix. It is written for military incident responders working in medical treatment facilities. This includes non-medical clinicians/technicians, dentists and basic EMS personnel. The areas of competency are to a basic and advanced level of subject and task knowledge proficiency. At the conclusion of this course, attendees will be able to analyze facts and principles about the subject and draw conclusions. They will be able to identify why the task must be done and why each step is needed.

Module 1 - Introduction to CBRNE Warfare and Terrorism
Module 2 - Recognition of the CBRNE Threat
Module 3 - Personal/Collective Protection
Module 4 - Casualty Assessment, Decontamination and Evacuation
Module 5 - Disaster and Emergency Management
Module 6 - Notification Procedures
Module 7 - Chemical Agents
Module 8 - Biological Agents
Module 9 - Radiological and Nuclear Agents
Module 10 - High Yield Explosives

CLINICIAN COURSE

This course consists of 11 modules from the CBRNE Emergency Medical Preparedness/Response Course Matrix. It is written for military clinicians working in medical treatment facilities. This includes physicians, nurses, physician assistants, independent duty medical technicians and advanced EMS personnel. The areas of competency are to an advanced and specialized level of subject and task knowledge proficiency. At the conclusion of this course attendees will be able to analyze facts and principles about the subject, draw conclusions and make proper decisions about the subject. They will be able to identify why the task must be done, why each step is needed and resolve problems relating to the task.

Module 1 - Introduction to CBRNE Warfare and Terrorism
Module 2 - Recognition of the CBRNE Threat
Module 3 - Personal/Collective Protection
Module 4 - Casualty Assessment, Decontamination and Evacuation
Module 5 - Disaster and Emergency Management
Module 6 - Notification Procedures
Module 7 - Chemical Agents
Module 8 - Biological Agents
Module 9 - Radiological and Nuclear Agents
Module 10 - High Yield Explosives
Module 11 - Mental Health Treatment Protocols

EXECUTIVE/COMMANDER COURSE

This course consists of 6 modules from the CBRNE Emergency Medical Preparedness/Response Course Matrix. It is written for military executives and commanders working in medical treatment facilities. The areas of competency are to an advanced and specialized level of subject and task knowledge proficiency. At the conclusion of this course attendees will be able to analyze facts and principles about the subject, draw conclusions and make proper decisions about the subject. They will be able to identify why the task must be done, why each step is needed and resolve problems relating to the task.

Module 1 - Introduction to CBRNE Warfare and Terrorism
Module 2 - Recognition of the CBRNE Threat
Module 3 - Personal/Collective Protection
Module 4 - Casualty Assessment, Decontamination and Evacuation
Module 5 - Disaster and Emergency Management
Module 6 - Notification Procedures

APPENDIX 3

CBRNE Training Continuum
Initial Level

	Recognition	Detection	Force Protection & First Aid	Decontamination	Incident Response
General Medics/Corpsmen (DoD & Contract Technicians/Medical Assistants)	CBRNE EM Prep/Response - Operator	CBRNE EM Prep/Response - Operator	CBRNE EM Prep/Response- Operator	CBRNE EM Prep/Response- Operator	CBRNE EM Prep/Response - Operator
Independent Duty Medics/Corpsmen	CBRNE EM Prep/Response - Clinician Domestic Preparedness HP	CBRNE EM Prep/Response - Clinician Domestic Preparedness HP	CBRNE EM Prep/Response - Clinician Domestic Preparedness HP	CBRNE EM Prep/Response - Clinician Domestic Preparedness HP	CBRNE EM Prep/Response - Clinician Domestic Preparedness HP
Medical Corps (DoD & Contract Medical Providers)	CBRNE EM Prep/Response - Clinician OBC (Army) Domestic Preparedness HP	CBRNE EM Prep/Response - Clinician OBC (Army) Domestic Preparedness HP	CBRNE EM Prep/Response - Clinician OBC (Army) Domestic Preparedness HP	CBRNE EM Prep/Response - Clinician OBC (Army) Domestic Preparedness HP	CBRNE EM Prep/Response - Clinician Domestic Preparedness HP
Dental Corps (DoD & Contract Dentists)	CBRNE EM Prep/Response - Clinician OBC (Army) Domestic Preparedness HP	CBRNE EM Prep/Response - Clinician OBC (Army) Domestic Preparedness HP	CBRNE EM Prep/Response - Clinician OBC (Army) Domestic Preparedness HP	CBRNE EM Prep/Response - Clinician OBC (Army) Domestic Preparedness HP	CBRNE EM Prep/Response - Clinician Domestic Preparedness HP
Veterinary Corps (DoD & Contract Veterinarians)	CBRNE EM Prep/Response - Clinician OBC (Army) Domestic Preparedness HP	CBRNE EM Prep/Response - Clinician OBC (Army) Domestic Preparedness HP	CBRNE EM Prep/Response - Clinician OBC (Army) Domestic Preparedness HP	CBRNE EM Prep/Response - Clinician OBC (Army) Domestic Preparedness HP	CBRNE EM Prep/Response - Clinician Domestic Preparedness HP
Nurse Corps (DoD & Contract Nurses)	CBRNE EM Prep/Response - Clinician OBC (Army) Domestic Preparedness HP	CBRNE EM Prep/Response - Clinician OBC (Army) Domestic Preparedness HP	CBRNE EM Prep/Response - Clinician OBC (Army) Domestic Preparedness HP	CBRNE EM Prep/Response - Clinician OBC (Army) Domestic Preparedness HP	CBRNE EM Prep/Response - Clinician Domestic Preparedness HP
Medical Service Corps - Administration (DoD & Contract Healthcare Administrators)	CBRNE EM Prep/Response - Clinician OBC (Army) COT (Air Force) Domestic Preparedness HP	CBRNE EM Prep/Response - Operator OBC (Army) Domestic Preparedness HP	CBRNE EM Prep/Response - Operator OBC (Army) Domestic Preparedness HP	CBRNE EM Prep/Response - Operator OBC (Army) Domestic Preparedness HP	CBRNE EM Prep/Response - Operator Domestic Preparedness HP
USA - Medical Specialist Corps USN - Medical Service Corps - HCS/CCS USAF- Biomedical Science Corps (DoD & Contract Biomedical Specialists/Technologists)	CBRNE EM Prep/Response - Clinician CBRNE EM Prep/Response - Operator OBC (Army) Domestic Preparedness HP	CBRNE EM Prep/Response - Clinician CBRNE EM Prep/Response - Operator OBC (Army) Domestic Preparedness HP	CBRNE EM Prep/Response - Clinician CBRNE EM Prep/Response - Operator OBC (Army) Domestic Preparedness HP	CBRNE EM Prep/Response - Clinician CBRNE EM Prep/Response - Operator OBC (Army) Domestic Preparedness HP	CBRNE EM Prep/Response - Clinician CBRNE EM Prep/Response - Operator Domestic Preparedness HP
Physician Assistant (DoD & Contract Physician Assistants)	CBRNE EM Prep/Response - Clinician OBC (Army) Domestic Preparedness HP	CBRNE EM Prep/Response - Clinician OBC (Army) Domestic Preparedness HP	CBRNE EM Prep/Response - Clinician OBC (Army) Domestic Preparedness HP	CBRNE EM Prep/Response - Clinician OBC (Army) Domestic Preparedness HP	CBRNE EM Prep/Response - Clinician Domestic Preparedness HP
DoD & Contract Personnel (Non-medical/Non-Security)	CBRNE EM Prep/Response - Basic	N/A	CBRNE EM Prep/Response - Basic	CBRNE EM Prep/Response - Basic	CBRNE EM Prep/Response - Basic
DoD & Contract Personnel Security	CBRNE EM Prep/Response - Operator	CBRNE EM Prep/Response - Operator	CBRNE EM Prep/Response - Operator	CBRNE EM Prep/Response - Operator	CBRNE EM Prep/Response - Operator

CBRNE Training Continuum
Sustainment Level

	Recognition	Triage Management	Diagnosis & Treatment	Force Protection & First Aid	Decontamination
General Medics/Corpsmen (DoD & Contract Technicians/Medical Assistants)	EMPRC-Operator FCBC/MEIR Navy CBRE	EMPRC-Operator FCBC/MEIR Navy CBRE	EMPRC-Operator FCBC/MEIR Navy CBRE	EMPRC-Operator FCBC/MEIR Navy CBRE	EMPRC-Operator FCBC
Independent Duty Medics/Corpsmen	EMPRC-Clinician MCBC/MEIR Navy CBRE Domestic Preparedness HP	EMPRC-Clinician MCBC/MEIR Navy CBRE Domestic Preparedness HP	EMPRC-Clinician MCBC/MEIR Navy CBRE Domestic Preparedness HP	EMPRC-Clinician MCBC/MEIR Navy CBRE Domestic Preparedness HP	EMPRC-Clinician MCBC
Medical Corps (DoD & Contract Medical Providers)	EMPRC-Clinician MCBC/MEIR Navy CBRE Domestic Preparedness HP Combat Casualty Care Course (C4)	EMPRC-Clinician MCBC/MEIR Navy CBRE Domestic Preparedness HP	EMPRC-Clinician MCBC/MEIR Navy CBRE Domestic Preparedness HP Combat Casualty Care Course (C4)	EMPRC-Clinician MCBC/MEIR Navy CBRE Domestic Preparedness HP Combat Casualty Care Course (C4)	EMPRC-Clinician MCBC
Dental Corps (DoD & Contract Dentists)	EMPRC-Clinician MCBC/MEIR Navy CBRE Domestic Preparedness HP Combat Casualty Care Course (C4)	EMPRC-Clinician MCBC/MEIR Navy CBRE Domestic Preparedness HP	EMPRC-Clinician MCBC/MEIR Navy CBRE Domestic Preparedness HP Combat Casualty Care Course (C4)	EMPRC-Clinician MCBC/MEIR Navy CBRE Domestic Preparedness HP Combat Casualty Care Course (C4)	EMPRC-Clinician MCBC
Veterinary Corps (DoD & Contract Veterinarians)	EMPRC-Clinician MCBC/MEIR Navy CBRE Domestic Preparedness HP	EMPRC-Clinician MCBC/MEIR Navy CBRE Domestic Preparedness HP	EMPRC-Clinician MCBC/MEIR Navy CBRE Domestic Preparedness HP	EMPRC-Clinician MCBC/MEIR Navy CBRE Domestic Preparedness HP	EMPRC-Clinician MCBC
Nurse Corps (DoD & Contract Nurses)	EMPRC-Clinician MCBC/MEIR Navy CBRE Domestic Preparedness HP Combat Casualty Care Course (C4)	EMPRC-Clinician MCBC/MEIR Navy CBRE Domestic Preparedness HP	EMPRC-Clinician MCBC/MEIR Navy CBRE Domestic Preparedness HP	EMPRC-Clinician MCBC/MEIR Navy CBRE Domestic Preparedness HP	EMPRC-Clinician MCBC
Medical Service Corps - Administration (DoD & Contract Healthcare Administrators)	EMPRC-Operators/Executive FCBC/MEIR Navy CBRE Domestic Preparedness HP	EMPRC-Operators/Executive FCBC/MEIR Navy CBRE Domestic Preparedness HP	N/A	EMPRC-Operators/Executive FCBC/MEIR Navy CBRE Domestic Preparedness HP	EMPRC-Operator/Executive FCBC
USA - Medical Specialist Corps USN - Medical Service Corps - HCS/CCS USAF- Biomedical Science Corps (DoD & Contract Biomedical Specialists/Technologists)	EMPRC-Clinician/Operators FCBC/MEIR Navy CBRE Domestic Preparedness HP Combat Casualty Care Course (C4)	EMPRC-Clinician/Operators FCBC/MEIR Navy CBRE Domestic Preparedness HP Combat Casualty Care Course (C4)	EMPRC-Clinician/Operators FCBC/MEIR Navy CBRE Domestic Preparedness HP Combat Casualty Care Course (C4)	EMPRC-Clinician/Operators FCBC/MEIR Navy CBRE Domestic Preparedness HP Combat Casualty Care Course (C4)	EMPRC-Clinician/Operators FCBC
Physician Assistant (DoD & Contract Physician Assistants)	EMPRC-Clinician MCBC/MEIR Navy CBRE Domestic Preparedness HP Combat Casualty Care Course (C4)	EMPRC-Clinician MCBC/MEIR Navy CBRE Domestic Preparedness HP Combat Casualty Care Course (C4)	EMPRC-Clinician MCBC/MEIR Navy CBRE Domestic Preparedness HP Combat Casualty Care Course (C4)	EMPRC-Clinician MCBC/MEIR Navy CBRE Domestic Preparedness HP Combat Casualty Care Course (C4)	EMPRC-Clinician MCBC
DoD & Contract Personnel (Non-medical/Non-Security)	EMPRC-Basic	N/A	EMPRC-Basic	EMPRC-Basic	EMPRC-Basic
DoD & Contract Personnel Security	EMPRC-Operators	EMPRC-Operators	N/A	EMPRC-Operators	EMPRC-Operators

CBRNE Training Continuum
Sustainment Level

	Security	Isolation & Containment	Extraction/ Evacuation/ Environmental Assessment	Command, Control, & Communications	Detection, Identification, and Surveillance
General Medics/Corpsmen (DoD & Contract Technicians/Medical Assistants)	EMPRC-Operators	EMPRC-Operators	EMPRC-Operators	EMPRC-Operators	EMPRC-Operators
Independent Duty Medics/Corpsmen	EMPRC-Clinicians	EMPRC-Clinicians	EMPRC-Clinicians	EMPRC-Clinicians	EMPRC-Clinicians
Medical Corps (DoD & Contract Medical Providers)	EMPRC-Clinicians	EMPRC-Clinicians	EMPRC-Clinicians	EMPRC-Clinicians	EMPRC-Clinicians
Dental Corps (DoD & Contract Dentists)	EMPRC-Clinicians	EMPRC-Clinicians	EMPRC-Cliniclans	EMPRC-Clinicians	EMPRC-Clinicians
Veterinary Corps (DoD & Contract Veterinarians)	EMPRC-Clinicians	EMPRC-Clinicians	EMPRC-Clinicians	EMPRC-Clinicians	EMPRC-Clinicians
Nurse Corps (DoD & Contract Nurses)	EMPRC-Clinicians	EMPRC-Clinicians	EMPRC-Clinicians	EMPRC-Clinicians	EMPRC-Clinicians
Medical Service Corps - Administration (DoD & Contract Healthcare Administrators)	EMPRC-Operators/Executive	EMPRC-Operators/Executive	EMPRC-Operators/Executive	EMPRC-Operators/Executive	EMPRC-Operators/Executive
USA - Medical Specialist Corps USN - Medical Service Corps - HCS/CCS USAF- Biomedical Science Corps (DoD & Contract Biomedical Specialists/Technologists)	EMPRC-Clinician/Operators	EMPRC-Clinician/Operators	EMPRC-Clinician/Operators	EMPRC-Clinician/Operators	EMPRC-Clinician/Operators
Physician Assistant (DoD & Contract Physician Assistants)	EMPRC-Clinicians	EMPRC-Clinicians	EMPRC-Clinicians	EMPRC-Clinicians	EMPRC-Clinicians
DoD & Contract Personnel (Non-medical/Non-Security)	EMPRC-Basic	N/A	N/A	N/A	N/A
DoD & Contract Personnel Security	EMPRC-Operators	EMPRC-Operators	EMPRC-Operators	EMPRC-Operators	EMPRC-Operators

CBRNE Training Continuum
Advanced Level

	Detection, Identification, and Surveillance	Operations and Force Protection	Diagnosis & Treatment	Command, Control, & Communications
General Medics/Corpsmen (DoD & Contract Technicians/Medical Assistants)				
Independent Duty Medics/Corpsmen	MCBC		MCBC/MEIR	
Medical Corps (DoD & Contract Medical Providers)	MCBC	HLS Medical Executive Course	MCBC/MEIR	HLS Medical Executive Course
Dental Corps (DoD & Contract Dentists)		HLS Medical Executive Course	MCBC/MEIR	HLS Medical Executive Course
Veterinary Corps (DoD & Contract Veterinarians)		HLS Medical Executive Course		HLS Medical Executive Course
Nurse Corps (DoD & Contract Nurses)		HLS Medical Executive Course	MCBC MEIR Domestic Preparedness HP	HLS Medical Executive Course
Medical Service Corps - Administration (DoD & Contract Healthcare Administrators)		HLS Medical Executive Course Emergency Response to Terrorism-FEMA Incident Command System (FEMA-IS195) HEICS Emergency Manager (FEMA-IS1)		HLS Medical Executive Course Emergency Response to Terrorism-FEMA Incident Command System (FEMA-IS195) HEICS Emergency Manager (FEMA-IS1)
USA - Medical Specialist Corps USN - Medical Service Corps - HCS/CCS USAF- Biomedical Science Corps (DoD & Contract Biomedical Specialists/Technologists)		HLS Medical Executive Course	MCBC/MEIR	HLS Medical Executive Course
Physician Assistant (DoD & Contract Physician Assistants)	MCBC	HLS Medical Executive Course	MCBC/MEIR	HLS Medical Executive Course
DoD & Contract Personnel (Non-medical/Non-Security)				
DoD & Contract Personnel Security		Emergency Response to Terrorism/FEMA Incident Command System (FEMA-IS195) HEICS		Emergency Response to Terrorism/FEMA Incident Command System (FEMA-IS195) HEICS

APPENDIX 4

CBRNE STANDARDS OF PROFICIENCY REPORT
INITIAL TRAINING LEVEL
____ QTR FY 04

SAMPLE

Service: _____ Active/Reserve (Circle Component)	# of Personnel	Recognition	Detection	Force Protection & First Aid	Decontamination	Incident Response
Active/Reserve Personnel						
General Medics/Corpsmen	112,445					
Independent Duty Medics/Corpsmen	40,000					
Medical Corps	20,927					
Dental Corps	6,097					
Veterinary Corps	713					
Nurse Corps	29,513					
Medical Service Corps - Administration	12,870					
USA - Medical Specialist Corps USN - Medical Service Corps - HCS/CCS USAF- Biomedical Science Corps	6,838					
Physician Assistant	2,242					
Total Active Duty	231,645					
DoD Personnel						
Technicians/Medical Assistants	8,145					
Medical Providers	614					
Dentists	45					
Veterinarians	14					
Nurses	5,299					
Healthcare Administration	2,000					
Biomedical Specialists/Technologists	4,000					
Physician Assistants	371					
Non-medical/Non-Security	5,000					
Security	2,000					
Total DoD Personnel	27,488					
Contract Personnel						
Technicians/Medical Assistants	1,000					
Medical Providers	1,000					
Dentists	800					
Veterinarians	100					
Nurses	4,000					
Healthcare Administration	200					
Biomedical Specialists/Technologists	200					
Physician Assistants	100					
Non-medical/Non-Security	100					
Security	500					
Total Contract Personnel	8,000					

CBRNE STANDARDS OF PROFICIENCY REPORT
SUSTAINMENT LEVEL
___ QTR FY 04

SAMPLE

Service: _____ Active/Reserve (Circle Component)	# of Personnel	Event Recognition	Triage Management	Diagnosis & Treatment	Force Protection & First Aid	Decontamination
ACTIVE DUTY						
General Medics/Corpsmen	112,445					
Independent Duty Medics/Corpsmen	40,000					
Medical Corps	20,927					
Dental Corps	6,097					
Veterinary Corps	713					
Nurse Corps	29,513					
Medical Service Corps - Administration	12,870					
USA - Medical Specialist Corps USN - Medical Service Corps - HCS/CCS USAF- Biomedical Science Corps	6,838					
Physician Assistant	2,242					
Total Active Duty	231,645					
DoD Personnel						
Technicians/Medical Assistants	8,145					
Medical Providers	614					
Dentists	45					
Veterinarians	14					
Nurses	5,299					
Healthcare Administration	2,000					
Biomedical Specialists/Technologists	4,000					
Physician Assistants	371					
Non-medical/Non-Security	5,000					
Security	2,000					
Total DoD Personnel	27,488					
Contract Personnel						
Technicians/Medical Assistants	1,000					
Medical Providers	1,000					
Dentists	800					
Veterinarians	10					
Nurses	4,000					
Healthcare Administration	200					
Biomedical Specialists/Technologists	200					
Physician Assistants	100					
Non-medical/Non-Security	100					
Security	500					
Total Contract Personnel	7,910					

CBRNE STANDARDS OF PROFICIENCY REPORT
SUSTAINMENT LEVEL
___ QTR FY 04

SAMPLE

Service: _____ Active/Reserve (Circle Component)	# of Personnel	Security	Isolation & Containment	Extraction, Evacuation, and Environment Assessment	Command, Control & Communications	Detection, Identification, and Surveillance
ACTIVE DUTY						
General Medics/Corpsmen	112,445					
Independent Duty Medics/Corpsmen	40,000					
Medical Corps	20,927					
Dental Corps	6,097					
Veterinary Corps	713					
Nurse Corps	29,513					
Medical Service Corps - Administration (Executive Medicine Personnel)	12,870					
USA - Medical Specialist Corps USN - Medical Service Corps - HCS/CCS USAF- Biomedical Science Corps	6,838					
Physician Assistant	2,242					
Total Active Duty	231,645					
DoD Personnel						
Technicians/Medical Assistants	8,145					
Medical Providers	614					
Dentists	45					
Veterinarians	14					
Nurses	5,299					
Healthcare Administration	2,000					
Biomedical Specialists/Technologists	4,000					
Physician Assistants	371					
Non-medical/Non-Security	5,000					
Security	2,000					
Total DoD Personnel	27,488					
Contract Personnel						
Technicians/Medical Assistants	1,000					
Medical Providers	1,000					
Dentists	800					
Veterinarians	100					
Nurses	4,000					
Healthcare Administration	200					
Biomedical Specialists/Technologists	200					
Physician Assistants	100					
Non-medical/Non-Security	100					
Security	500					

CBRNE STANDARDS OF PROFICIENCY REPORT
SUSTAINMENT LEVEL
___ QTR FY 04

SAMPLE

Total Contract Personnel	8,000					

CBRNE STANDARDS OF PROFICIENCY REPORT
ADVANCED LEVEL
___ QTR FY 04

SAMPLE

Service: _____ Active/Reserve (Circle Component)	# of Personnel	Detection, Identification, and Surveillance	Operations & Force Protection	Diagnosis & Treatment	Command, Control & Communications
ACTIVE DUTY					
General Medics/Corpsmen	12,000				
Independent Duty Medics/Corpsmen	4,000				
Medical Corps	7,614				
Dental Corps	100				
Veterinary Corps	20				
Nurse Corps	10,000				
Medical Service Corps - Administration (Executive Medicine Personnel)	6,000				
USA - Medical Specialist Corps USN - Medical Service Corps - HCS/CCS USAF- Biomedical Science Corps	1,107				
Physician Assistant	1,000				
Total Active Duty	41,841				
DoD Personnel					
Technicians/Medical Assistants	500				
Medical Providers	2,000				
Dentists	200				
Nurses	600				
Veterinarians	2				
Healthcare Administration	100				
Biomedical Specialists/Technologists	200				
Physician Assistants	100				
Non-medical/Non-Security	100				
Security	2,000				
Total DoD Personnel	5,802				
Contract Personnel					
Technicians/Medical Assistants	100				
Medical Providers	100				
Dentists	50				
Veterinarians	10				
Nurses	500				
Healthcare Administration	40				
Biomedical Specialists/Technologists	50				
Physician Assistants	20				
Non-medical/Non-Security	10				
Security	500				
Total Contract Personnel	1,380				

Appendix F

Chemical, Biological, Radiological, Nuclear, or High Yield Explosive (CBRNE) Training Effectiveness Analysis

Summary Report

March 2004

A Collaborative Effort Between:

US Army Office of the Surgeon General,
Medical Nuclear Biological and Chemical Branch (OTSG Medical NBC)
US Army Medical Command, Homeland Security Branch (MEDCOM HLS)
Army Medical Department Center and School (AMEDD C&S)
Southeast Regional Medical Command (SERMC)

Compiled by the
Center for Total Access (CTA), SERMC

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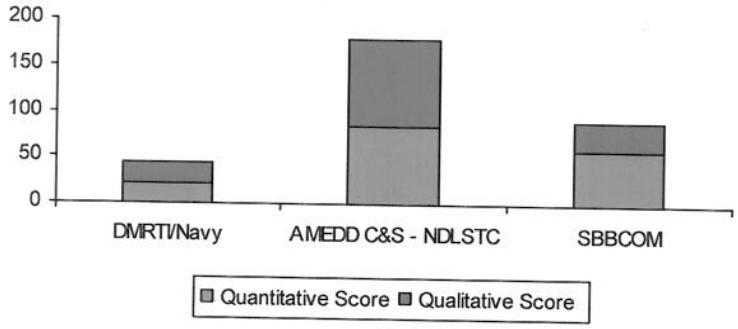
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Executive Summary.

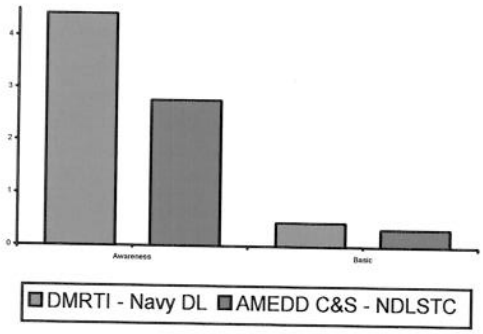
The Chemical, Biological, Radiological, Nuclear, or High Yield Explosive (CBRNE) training effectiveness analysis (TEA) report is will analyze the existing requirements and guidance, to develop recommendations for the optimal training program that would ensure the readiness of military medical personnel and military treatment facilities.

The analysis was achieved through a systematic comparative analysis of the currently available training options, including the Defense Medical Readiness Training Institute (DMRTI)/Navy training option, the Army Medical Department Center and School (AMEDD C&S) – National Disaster Life Support Training Center (NDLSTC) training options and U.S. Army Soldier Biological and Chemical Command (SBCCOM) course offerings. This report compared and contrasted these curricula in accordance with DMTRI training requirements policy memo (9 January 2004) and relevant Army Medical Department (AMEDD), Department of Defense (DoD), national and international standards, regulations and guidelines.

The CBRNE TEA approach leveraged a coordinated staff effort between the OTSG Medical NBC, MEDCOM HLS, AMEDD C&S and the CTA -SERMC. All relevant standards, guidelines and requirements were collected and sorted into appropriate training categories. Training objectives, course curricula and antidotal details about each available CBRNE training option were collected. This information was then systematically analyzed with respect to quantitative and qualitative criteria for a comprehensive CBRNE training program by a review team panel. The results were compiled and reviewed for statistical significance. Based upon the results of both the quantitative and qualitative analysis, it was determined that the AMEDD C&S – NDLSTC training program provided the most robust training option, with respect to all relevant CBRNE training standards, guidelines and formal recommendations:



Furthermore, the life cycle management analysis of the DMTRI/Navy CBRNE training and the AMEDD C&S NDLSTC training, revealed that the AMEDD C&S NDLSTC training option provided a 37% decrease in required hours for awareness level training, and a 27% decrease in required hours of clinical training:



Due to the robust nature of the AMEDD C&S – NDLSTC curricula, and the efficiency of the training content, the results of this analysis have revealed that this option is recommended for MEDCOM implementation.

The deadly potential of chemical, biological, radiological, nuclear or high-yield explosive (CBRNE) weapons has been known for centuries, but never before has the threat seemed as evident or as imminent.[1]

Lieutenant General James B. Peake
United States Army Surgeon General

Purpose. The intent of the Chemical, Biological, Radiological, Nuclear, or High Yield Explosive (CBRNE) training effectiveness analysis (TEA) report is will analyze the existing requirements and guidance, to develop recommendations for the optimal training program that would ensure the readiness of military medical personnel and military treatment facilities. This will be realized through a systematic training effectiveness analysis (TEA) of the present CBRNE training options. The TEA will compare and contrast the training programs available to the military with the following guidelines, recommendations, standards and regulations:

AMEDD Standard	AMEDD Center and School (AMEDD C&S) Core Competencies
DoD Standard	Defense Medical Readiness Training Institute (DMRTI) Core Competencies: Chemical, Biological, Radiological, Nuclear, and (High Yield) Explosives (CBRNE) Training – Standards of Proficiency and Metrics
DoD Regulation	Department of Defense Directive (DODD) 3025.1 Military Support to Civil Authorities
Federal Guideline	Department of Homeland Security Federal Emergency Management Agency (DHS FEMA) Emergency Management Exercise Reporting System (EMERS) – OMB No. 3067-0248
Federal Guideline	Domestic Preparedness Program in the Defense Against Weapons of Mass Destruction First Responders Performance Objectives
National Standard	Occupational Safety and Health Administration (OSHA) Standards: OSHA 1910.120 Hazardous Waste Operations and Emergency Response
National Guideline	American College of Emergency Physicians (ACEP) Task Force of Health Care and Emergency Services Professionals on Preparedness for Nuclear, Biological, and Chemical Incidents
International Guideline	International Nursing Coalition for Mass Casualty Education (INCMCE)
National Guideline	American Medical Association (AMA)
National Standard	National Fire Protection Association (NFPA) Standards: NFPA 472 – Professional Competence of Responders to Hazard Materials Incidents NFPA 473 – Competencies for EMS Personnel Responding to Hazardous Materials Incidents
National Standard	Joint Commission on Accreditation of Healthcare Organizations (JCAHO) Emergency Management Standards: JCAHO EC.1.4 JCAHO EC.2.9.1

Scope. The CBRNE training effectiveness analysis (TEA) will target training programs from the following organizations:

Organization	Course	Description	Format	Prerequisites	Class Size
DMTRI – NAVY	CBRNE Clinical Course	Eleven module, didactic course for CBRNE clinical response*	Online training	None	unlimited
AMEDD C&S - NDLSTC	Basic Disaster Life Support Course (BDLS®)	Eight hour didactic curricula developed for an "all-hazards" medical response**	Classroom or online training	None	unlimited
	Advanced Disaster Life Support Course (ADLS®)	Sixteen hour, hybrid course with an advanced didactic component and an eight hour hands-on practicum	Classroom and exercise	BDLS®	50 students
SBCCOM	Domestic Preparedness Hospital Provider Course (DPHP)	Eight hour, didactic course for of WMD medical response and defensive actions (includes an instructor training component)	Classroom	None	25 students
	Technician EMS Course (TEMS)	Eight hour, hybrid course for WMD medical response targeted for first responders	Classroom and exercise	None	20 students
	Medical Facility Provider Course (MFPC)	Eight hour, hybrid course for WMD medical response targeted for MTF administrative and clinical staff	Classroom and exercise	None	25 students

* Module 8 not available at time of this analysis.
** "All Hazards" approach in accordance with the Presidential Directive of 17 Dec 2003

Other Training Considerations. At the time of this analysis, other CBRNE training initiatives were noted, but not considered for this comparison.

DMRTI/Navy online training. The DMRTI/Navy CBRNE distance learning program may also offer additional distance learning courses as a companion to their clinician CBRNE course including: a Basic course, an Operator/Responder course; and an Executive Commander Course. At the time of this analysis, these additional online training options were not available for review.

Joint Interagency Civil Support Training Center (JICSTC). The JICSTC offers a number of CBRNE related training opportunities through the US Army Reserve Medical Training Site at Fort Dix. The curricula, however, is varied based upon specific unit requests. Based upon the training requests, the JICSTC staff coordinates instructors from other programs (including BDLS and ADLS) to provide instruction at their facility. Because the curricula was not fixed from one training event to another, the JICSTC was not well suited to this training analysis

Background. The terrorist events of September 11, 2001 illustrated clear requirements for advanced level homeland security requirements within the United States (US). On October 19, 2001, the US General Accounting Office (GAO) released a reported describing the low level of proficiency within the military healthcare system with respect to readiness for Chemical, Biological, Radiological, Nuclear, or High Yield Explosive (CBRNE) scenarios. [2] The scope of the GAO review was limited to deployed military healthcare personnel.

The Department of Defense (DoD) concurred with the findings and recommendations in this report. On December 17, 2001, the Army Surgeon General (TSG) released a memorandum implementing a medical nuclear, biological and chemical (NBC) training program for all Army personnel through short courses, Army Medical Department Center and School (AMEDD C&S) training and individual military treatment facility (MTF) instruction. Furthermore, in February 2002, the Assistant Secretary of Defense for Health Affairs (ASD HA) sent a letter to the DoD Inspector General (IG) assigning tasks for resolution of issues identified in the GAO report. The tasking to resolve training issues was initially assigned to the Joint Staff. In June 2002, the ASD(HA) sponsored an integrated process team (IPT), chaired by BUMED, provided an update to the DoD IG regarding efforts to redress the GAO report recommendations. This update included a definition of training task requirements, and reassigned this standardization effort from the Joint Staff to the Defense Medical Readiness Training Institute (DMRTI).

Throughout January and February of 2003, DMTRI developed a tri-service strategy for CBRNE training standardization, matching training requirements to a Navy sponsored web-based training course, under development with DMTRI involvement. The Army non-concurred with the approach of leveraging DMTRI sponsored training materials, rather than establishing formal DoD training standards that could be leveraged within each service. Specifically, AMEDD C&S insisted that DMTRI include a review of national training standards before finalizing their training requirements. Throughout the spring and summer of 2003, the DMTRI efforts continues, over the Army objectives. DMRTI released their proposal for a standardized tri-service CBRNE Training Program. In the fall of 2003, the DMRTI released their final report, the *Chemical, Biological, Radiological, Nuclear, and (High Yield) Explosives (CBRNE) Training Standards of Proficiency and Metrics*.

The DMTRI standardized tri-service training program report outlined the standards of proficiency that will be required for all medical personnel (active, reserve, civil service and contract) throughout DoD. The DMRTI reporting metrics targeted a 50% DoD implementation in FY04 and full implementation by FY06. Reporting requirements for this initiative, the *CBRNE Standards of Proficiency Report*, are comprised of numbers of individual personnel at the service level throughout DoD, starting with the Medical Corps of all three services. By FY06, reporting requirements for this tri-service directive level would include individual tracking of 231,645 active duty personnel, 27,488 civilian personnel, and 7,910 contract personnel. [3]

The standards of proficiency outlined by the DMRTI document exceeded 250 specific core competencies. A DMRTI sponsored tri-service course review revealed that none of the existing DoD courses could support the required billets to meet the CBRNE standardization goals, and that a uniform training program to meet the standards of proficiency did not exist. [4] The development of additional training initiatives would be required. Proposed recommendations included a distance learning initiative for basic, operator responder, physician, and executive/commander training programs, modeled after a collaborative DMTRI/Navy training effort:

	Basic Course	Operator Responder Course	Clinician Course	Executive / Commander Course
Construct:	6 modules	10 modules	11 modules	6 modules
Target Audience:	MTF level civilian and contract employees	MTF incident responders	MTF level clinicians	MTF level military executives and commanders
Estimated Time:	6 hours	10 hours	11 hours	6 hours

DMTRI provided a briefing and prepared a policy memorandum for signature to the ASD(HA), but failed to address the Army non-concurrence issues. Furthermore, the memorandum for signature was never formally staffed through appropriate service specific chains of command. The DMTRI standardized tri-service program was signed by the Assistant Secretary of Defense for Health Affairs, William Winkenwerder, Jr. on January 9, 2004. [3]

Army Non-Concurrence Issues. At the time of this report, the AMEDD C&S was conducting a review of the DMRTI CBRNE training standards of proficiency and metrics, and identified several critical issues to achieving MEDCOM implementation:

Lack of Collective Training. The standards of proficiency and metrics outlined in the DMTRI report focused on individual, rather than collective competencies for a CBRNE response. Metrics and reporting requirements were focused on individual progress, rather than military treatment facility (MTF) or unit level "readiness" for a CBRNE event. The DMRTI training standards, while comprehensive for awareness and individual skills training, did not address any collective training requirements that would be fundamental to an exercise or actual CBRNE event. This is noteworthy because of the specific military readiness deficiencies noted in the GAO report were in regard to collective related exercise activities. [2]

Lack of Integration with Service Training and Exercise Programs. Because the DMTRI report did not include collective training requirements, the tri-service CBRNE training program will not ingrate into existing MEDCOM and AMEDD C&S training activities for augmentation, and will not support the local MTF commander in meeting annual JCAHO exercise requirements. Anecdotally, the AMEDD C&S noted that a preferable approach would be to serve broad goals of unit level readiness, with correlating metrics and reporting criteria. A CBRNE training program that correlated to an Army Unit Readiness Training Evaluation Program (ARTEP) would allow MTF Commanders, Regional Medical Commands and MEDCOM to track CBRNE response readiness, without being inundated with reporting minutia for individuals.

Poorly Defined Target Audiences. It is unclear which personnel (civilian and contract) will be considered in the DRMTI defined metrics. Specifically, the target audience defined by the DMRTI report includes personnel that do not always fall under MEDCOM control. For example, installation EMT and ambulance workers can fall under the authority of the installation, or a sharing agreement with the local community, rather than under the direct control of the AMEDD. It is unknown whether these personnel were counted in the determination of the baseline performance metrics.

Reporting Requirements. The DMRTI report defined a centralized reporting metrics that would provide cumulative training statistics across DoD. However, the specific scope and methodology of the reporting requirements within MEDCOM is not addressed. A tri-service aggregated report will preclude each Commander from determining his/her unit level CBRNE readiness.

Life Cycle Management Not Addressed. The DMTRI report did not address the impact of the CBRNE Training requirement on the availability to provide healthcare services within the MTF.

Based upon this issues, and to address the need for further specificity, the AMEDD C&S developed 154 CBRNE core competencies that included awareness, individual and collective training requirements. These competencies complement and augment the DMTRI fundamentals. However, the span and range of all of the aforementioned training requirements were limited in scope, and did not consider the DoD role in medical support to a homeland security event. DoD Directive 3025.1 Military Support to Civil Authorities defines the supporting role of the military response for a continental United States (CONUS) based CBRNE event, where military medical personnel would be expected to complement other federal, state and local responders.

In addition to the MEDCOM considerations, there are many civilian policies and standards with respect to CBRNE that would apply to a DoD medical support role in a homeland security event. In April 2001, the Task Force of Health Care and Emergency Services Professionals on Preparedness for Nuclear, Biological, and Chemical Incidents released a report outlining the requirements to develop training for medical response to CBRNE incidents. [5] In August 2003, the Educational Competencies for Registered Nurses

Responding to Mass Casualty Incidents Report was published by the International Nursing Coalition for Mass Casualty Education (INCMCE).[6] The American Medical Association (AMA), Occupational Safety and Health Administration (OSHA) and National Fire Protection Association (NFPA) standards also apply to a military CBRNE response.

Furthermore, all medical facilities, including military medical treatment facilities (MTFs) must comply with the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) Emergency Management Standards. These standards require that annual exercise activities be conducted in a manner than results in collective training. The Department of Homeland Security Federal Emergency Management Agency (DHS FEMA) leverages the Emergency Management Exercise Reporting System (EMERS) to standardize the reporting and assessment between collective exercise events.

In light of the numerous considerations with respect to Army implementation of a CBRNE training initiative that could be disseminated and sustained on a large scale in accordance with the intent of the DMTRI report and documented GAO findings, a comparative analysis of the existing training curricula was required.

Methodology. The training effectiveness analysis was a coordinated staff effort between the OSTG, AMEDD C&S, and the Southeast Regional Medical Command (SERMC). The training effectiveness analysis was a multi-phase process:

Organization of Existing Training Requirements. Collected training requirements from DMRTI and AMEDD C&S. Competencies were refined to isolate specific requirements. The resulting list of objectives was then reviewed to eliminate redundancies. Additional criteria from additional organizations with medical and emergency response oversight were used to refine the training requirements listing. The final list was sorted into four training categories: awareness; individual; collective; and specialty. Awareness training requirements were further sorted into preparatory, basic and advanced requirements, based upon target audience.

Data Collection from Existing Training Curricula. Current training objectives and course content data were collected from the following training programs:

- DMTRI – Navy online CBRNE Clinical training
- BDLS®
- ADLS®
- Domestic Preparedness Hospital Provider (DPHP) Course
- Technician EMS (TEMS) Course
- Medical Facility Provider (MFP) Course

Comparative Analysis. The training programs were evaluated with respect to both quantitative, qualitative and life cycle management considerations.

Quantitative Analysis. Aggregated and refined training requirements for awareness, individual, collective and specialty training were used as objective considerations to evaluate each training program. A four-member review panel conducted arithmetic scoring of each training program with respect to these requirements. If the course curricula included the competency in their stated objectives, or could be located within the course materials, the training program was credited with a single point. If no correlating objective or specific content could be located for the specific competency, the program received zero points. Specific training requirements used in the quantitative analysis are listed in Appendices A-H.

Qualitative Analysis. Subjective criteria were developed based upon implementation considerations, life cycle management considerations, and previously documented Army Surgeon General guidance. These criteria were leveraged to score the programs in the same manner as the quantitative analysis:

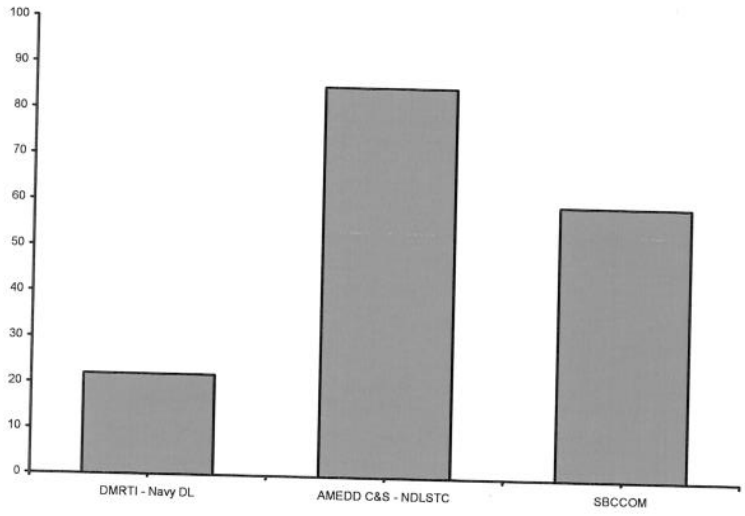
- Can the program of instruction be adapted to a variety of class sizes [11]?
- Is the program of instruction scalable with respect to the level of training provided for target audience [11]?
- Can the program on instruction be adopted in a phased implementation, with a first priority of ER and first responder training [11]?
- Can the program of instruction be adapted to Service specific requirements with DoD [11]?
- Is the program of instruction structured in a manner to allow for migration to Distance Learning [11]?
- Is the program of instruction structured in a manner to allow for migration for a mobile training solution [11]?
- Does the program of instruction have documented re-certification or renewal requirements?
- Does the program of instruction support interactive training at the unit or MTF level (collective training) [11]?
- Does the program of instruction adhere to documented standards for execution?

- Does the program of instruction include standardized training for instructors [11]?
- Does the program of instruction have formal evaluation criteria [11]?
- Does the program of instruction provide acknowledgement of successful completion (CME, CEU or other formal contact hours)?
- Does the training program contribute to the professional development of the target audience?
- Does the program on instruction include a methodology for aggregating and reporting progress/completion for the unit and or MTF administrative personnel [11]?

Life Cycle Management Analysis. The aggregate number of training hours required for both awareness and basic level training were contrasted between the programs, to determine the most efficient course of training delivery.

Results Quantitative Analysis. The training programs were assessed with respect to individual objective criteria. These criteria were organized into awareness, individual, collective and specialty training categories. The AMEDD C&S – NDLSTC course offerings ranked consistently higher than the DMTRI/Navy and SBCCOM offerings, throughout all four categories. Detailed results of the quantitative analysis can be found in Appendix A.

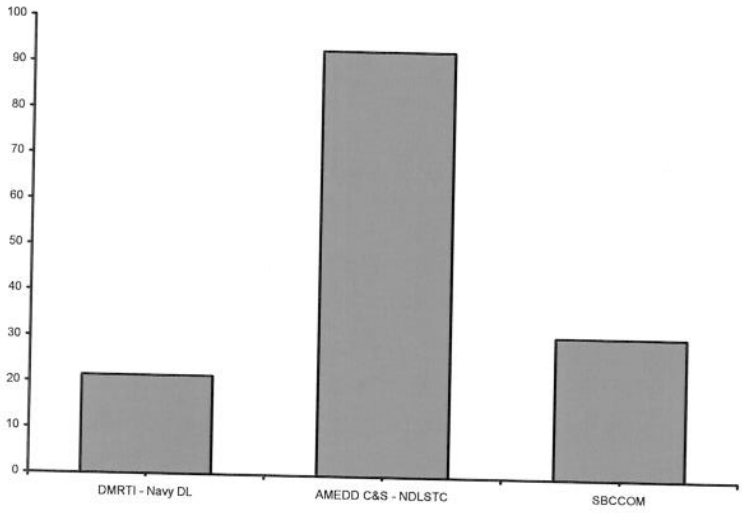
Objective Comparison: Mean Scores Stratified Against Training Categories



	DMTRI/NAVY	AMEDD C&S – NDLSTC	SBCCOM
Awareness Criteria	87.83	94.58	62.34
Individual Criteria	0	85.71	52.38
Collective Criteria	0	81.43	72.86
Specialty Criteria	0	78.88	51.36
Mean Score:	21.96	85.15	59.74

Results Qualitative Analysis. The training programs were assessed with respect to fourteen subjective criteria. For two of the criteria, the available data limited the comparative scoring for the reviewing panel. Specifically, information regarding an instructor curriculum could not be obtained from the SBCCOM courses, and was assumed to be non-existent. Reporting methodologies for the DMTRI – Navy online CBRNE clinical course had not been developed at the time of this assessment, and were scored accordingly. Information on SBCCOM reporting was limited, and assumed by the panel not to focus at the MTF level. Detailed results of the quantitative analysis can be found in Appendix B.

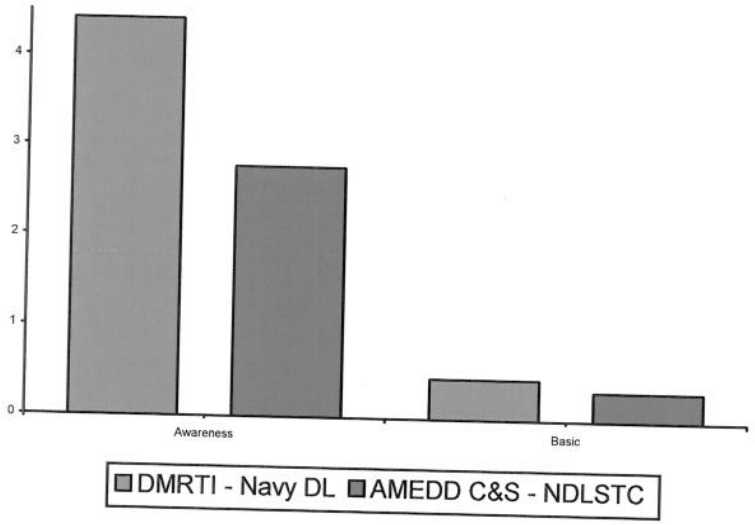
Subjective Comparison: Mean Scores Stratified Against Training Programs



	DMTRI/NAVY	AMEDD C&S – NDLSTC	SBCCOM
Mean Score:	21.43	92.85	30.95

Based upon the results of the quantitative and qualitative analysis, it was determined that the AMEDD C&S – NDLSTC training program provided the most robust training option, with respect to all relevant CBRNE training standards, guidelines and formal recommendations.

Results Life Cycle Management Analysis. The total training hours required by the DMTRI – Navy joint training solution was compared the requirements of the AMEDD – NDLSTC curricula. For awareness level training – the AMEDD – NDLSTC CDLS® training solution will require 37% less training than the DMTRI – Navy basic course. For the active duty medical corps, basic clinical training using the BDLS® solution will require 27 % less training that the DMTRI-Navy clinical course:



	DMTRI Basic Course	NDLSTC - CDLS®	DMTRI Clinician Course	NDLSTC - BDLS®
Construct:	6 modules	4 modules	11 modules	8 modules
Target Audience:	MTF level civilian and contract employees	MTF level civilian and contract employees	MTF level clinicians	MTF level clinicians
Projected Audience Size:	73,584	73,584	4,156	4,156
DMTRI Estimated Time To Complete Courses:	6 hours	4 hours	11 hours	8 hours
Sustainment Frequency*	10	10	10	10
Life Cycle Training Requirement	4,415,040 hrs	2,943,360 hrs	457,160 hrs	332.480 hrs

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Definitions.

Training Effectiveness Analysis (TEA) = a comparative analysis of training alternatives in support of operational requirements [7]

Training Standardization = the imposition of an established or widely recognized model of authority or excellence to an educational activity [7]

Awareness Training = an educational activity, providing general knowledge or understanding, in preparation for skilled behavior or specific mission requirements [7, 8]

Preparatory Awareness Training = an introductory educational activity, leading to general knowledge [8.10]

Basic Awareness Training = an primary educational activity, leading to general knowledge [8]

Advanced Awareness Training = an higher level educational activity, leading to general knowledge [8]

Individual Training = an educational activity, leading to skilled behavior concerning the roles and duties of one person [7,8, 9]

Collective Training = an educational activity, leading to cohesive, skilled behavior concerning members of a cooperative enterprise, institution or unit, with respect to specific mission requirements [7, 8]

Specialty Training = an educational activity, leading to skilled behavior for a niche function [8]

Basic Specialty Training = an primary educational activity, leading to skilled behavior for a niche function [8]

Advanced Specialty Training = an higher level educational activity, leading to skilled behavior for a niche function [8]

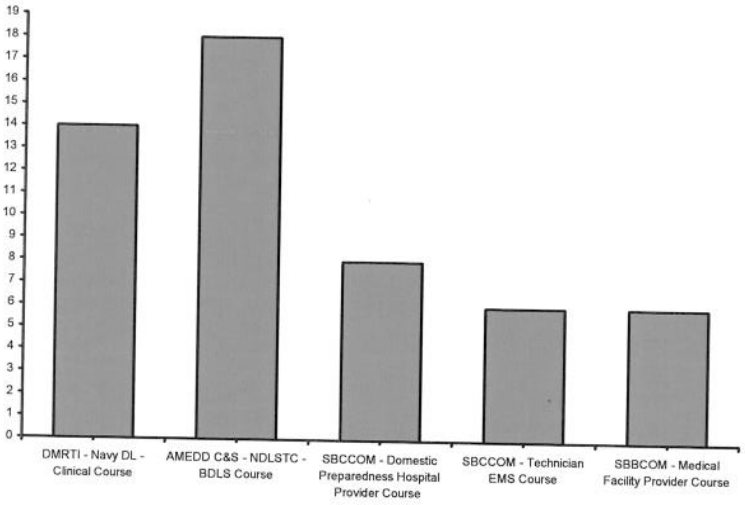
Sustainment Training = an educational activity, maintaining knowledge or preserving skilled behaviors [10]

Train-The-Trainer = an educational activity, leading to skilled behavior and the ability to export the knowledge and skills of the course material to other students.

Appendix A – Detailed Results - Quantitative Analysis.

The training programs were assessed with respect to individual objective criteria. For awareness training, didactic competencies were subdivided into three categories. Eighteen preparatory awareness competencies for all audiences (non-clinical, operator/responders, clinical, and administrative staff) were contrasted between the five existing CBRNE training program options. Results are listed in Table 1 and Appendix C.

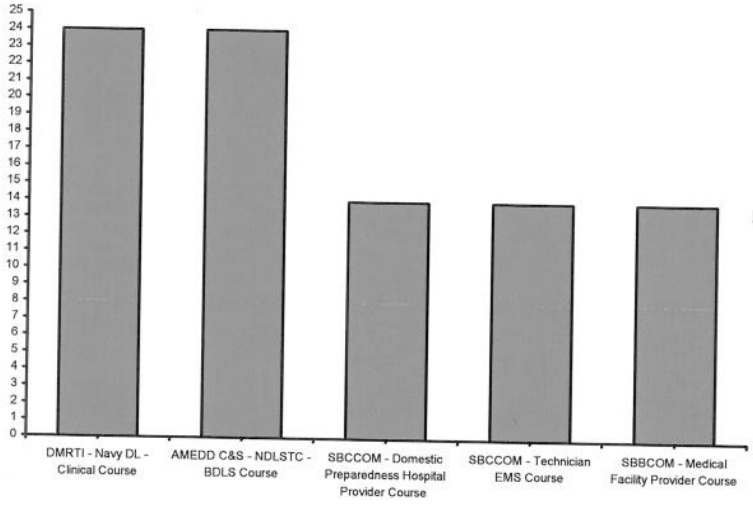
Table 1. Awareness Training Comparison – Preparatory Level
(target audience: all)



	DMRTI Clinical	BDLS	DPHP	TEMS	MFP
Score:	14	17	8	6	6
Standard Deviation	± 0.43	±0.24	±0.51	±0.49	±0.49
Percentage:	77.78%	94.44%	44.44%	33.33%	33.33%

Twenty-eight basic awareness competencies for the majority of the AMEDD audiences (operator/responders, clinical and administrative staff) were contrasted between the five existing CBRNE training program options. Results are listed in Table 2 and Appendix D.

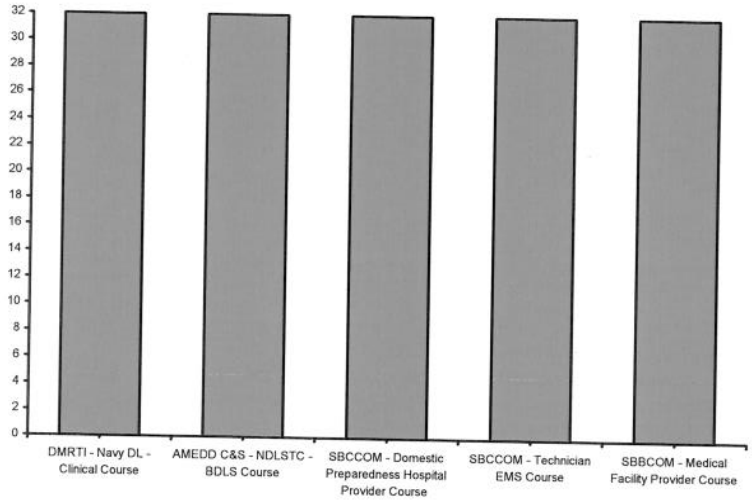
Table 2. Awareness Training Comparison – Basic Level
(target audience: all, minus non-medical personnel)



	DMRTI Clinical	BDLS	DPHP	TEMS	MFP
Score:	24	25	14	14	14
Standard Deviation	± 0.38	±0.35	±0.51	±0.49	±0.49
Percentage:	85.71%	89.29%	50.00%	50.00%	50.00%

Thirty-two advanced awareness competencies for clinical staff were contrasted between the five existing CBRNE training program options. The clinical aspects of the five training programs were statistically equivalent. Results are listed in Table 3 and Appendix E.

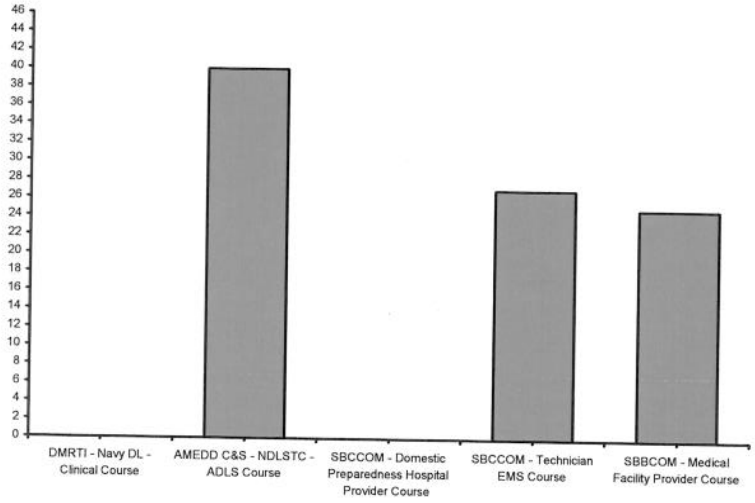
Table 3. Awareness Training Comparison – Advanced Level
(target audience: clinical staff and operator/responders)



	DMRTI Clinical	BDLS	DPHP	TEMS	MFP
Score:	32	32	32	32	32
Standard Deviation	--	--	--	--	--
Percentage:	100.00%	100.00%	100.00%	100.00%	100.00%

For individual training, the five training programs were assessed for forty-six basic competencies. Because the DMTRI-Navy clinical course did not offer hands-on activities for individual skills assessment, it did not meet any of the forty-six competencies, and was scored accordingly by the review panel. Similar limitations were experienced when reviewing the SBCCOM Domestic Preparedness Hospital Provider Course. The hands-on skills portion of the NDLSTC, ADLS was used for individual skills assessment. Results are listed in Table 4 and Appendix F.

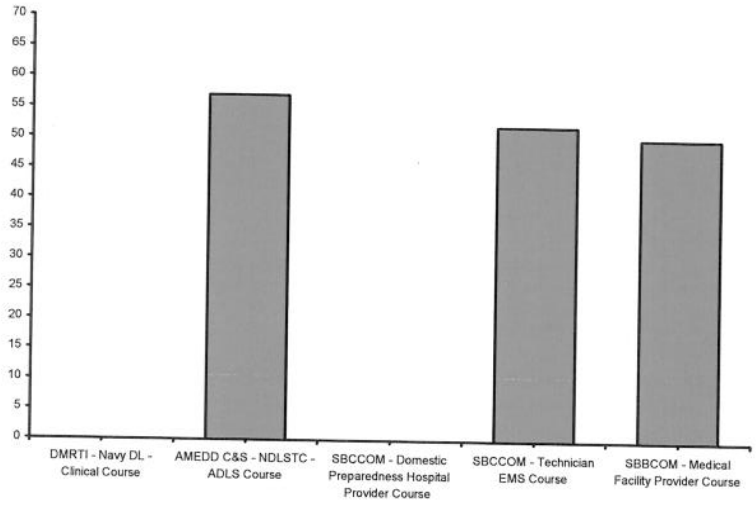
Table 4. Individual Training Comparison – Basic Level
(target audience: operator/responders and clinical staff)



	DMRTI Clinical	BDLS	DPHP	TEMS	MFP
Score:	0	36	0	23	21
Standard Deviation	--	± 0.35	--	± 0.50	± 0.51
Percentage:	--	85.71%	--	54.76%	50.00%

For collective training, the five training programs were assessed for ninety basic competencies. Because the DMTRI-Navy clinical course did not offer hands-on activities for collective skills, it did not meet any of the ninety competencies, and was scored accordingly by the review panel. Similar limitations were experienced when reviewing the SBCCOM Domestic Preparedness Hospital Provider Course. The hands-on skills portion of the NDLSTC, ADLS was used for the collective assessment. Results are listed in Table 5 and Appendix G.

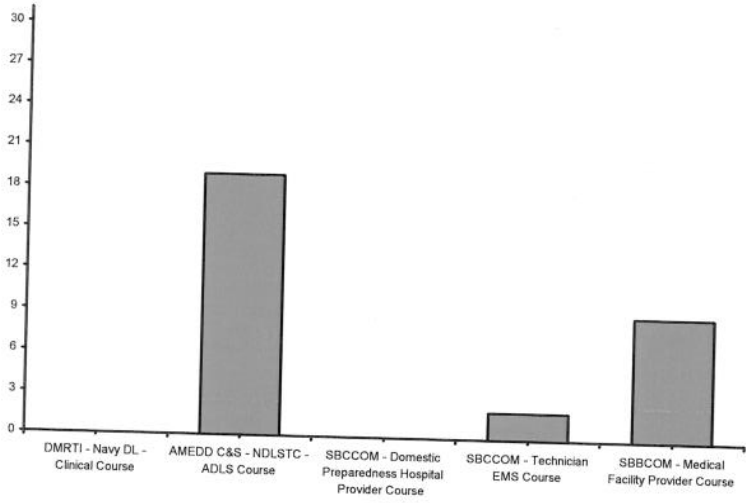
Table 5. Collective Training Comparison
(target audience: all)



	DMRTI Clinical	BDLS	DPHP	TEMS	MFP
Score:	0	57	0	52	50
Standard Deviation	--	± 0.38	--	± 0.43	± 0.45
Percentage:	--	81.43%	--	74.29%	71.43%

For basic specialty training, the five training programs were assessed against thirty-one competencies. Because the DMTRI-Navy clinical course did not offer hands-on activities for specialty skills, it did not meet any of the competencies, and was scored accordingly by the review panel. Similar limitations were experienced when reviewing the SBCCOM Domestic Preparedness Hospital Provider Course. The hands-on skills portion of the NDLSTC, ADLS was used for the basic specialty assessment. Results are listed in Table 6 and Appendix H.

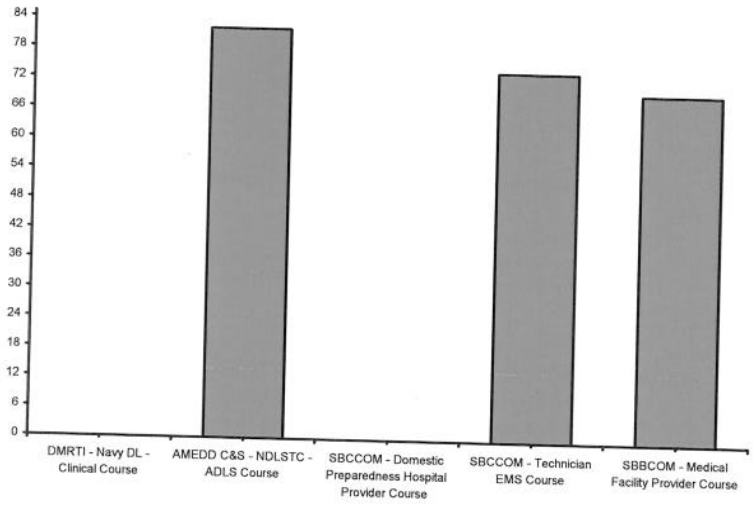
Table 6. Specialty Training Comparison – Basic Level
(target audience: executive, operator/responders, clinical)



	DMRTI Clinical	BDLS	DPHP	TEMS	MFP
Score:	0	19	0	2	9
Standard Deviation	--	± 0.50	--	± 0.25	± 0.46
Percentage:	--	61.29%	--	6.45%	29.03%

For advanced specialty training, the five training programs were assessed against eighty-five competencies. Because the DMTRI-Navy clinical course did not offer hands-on activities for specialty skills, it did not meet any of the competencies, and was scored accordingly by the review panel. Similar limitations were experienced when reviewing the SBCCOM Domestic Preparedness Hospital Provider Course. The hands-on skills portion of the NDLSTC, ADLS was used for the advanced specialty assessment. Results are listed in Table 7 and Appendix I.

Table 7. Specialty Training Comparison – Advanced Level
(target audience: operator/responders, clinical)

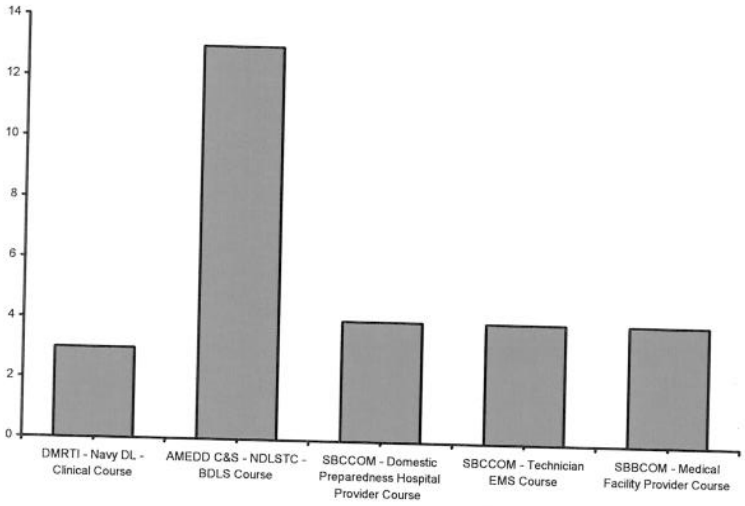


	DMRTI Clinical	BDLS	DPHP	TEMS	MFP
Score:	0	82	0	74	70
Standard Deviation	--	± 0.19	--	± 0.34	± 0.38
Percentage:	--	96.47%	--	87.06%	82.35%

Appendix B – Detailed Results - Qualitative Analysis.

The training programs were assessed with respect to fourteen subjective criteria. For two of the criteria, the available data limited the comparative scoring for the reviewing panel. Specifically, information regarding an instructor curriculum could not be obtained from the SBCCOM courses, and was assumed to be non-existent. Reporting methodologies for the DMTRI – Navy online CBRNE clinical course had not been developed at the time of this assessment, and were scored accordingly. Information on SBCCOM reporting was limited, and assumed by the panel not to focus at the MTF level. Results are listed in Table 8 and Appendix H.

Table 8. Subjective Comparison



	DMRTI Clinical	BDLS	DPHP	TEMS	MFP
Score:	3	13	5	4	4
Standard Deviation	± 0.43	± 0.27	± 0.50	± 0.47	± 0.47
Percentage:	21.43%	92.86%	35.71%	28.57%	28.57%

Appendix C – Awareness Skills Assessment – Preparatory Level

		DMRTI Clinical	BDLS	DPHP	TEMS	MFP
	CBRNE historical perspective					
	Identify historical and current CBRNE threats:					
1	a. historical evolution of CBRNE capabilities	0	1	1	1	1
2	b. notable CBRNE historic events	0	1	1	1	1
3	c. geopolitical events	0	1	1	1	1
	Identify possible CBRNE weapons substances:					
4	a. commonly encountered hazardous materials	1	1	0	0	0
5	b. associated hazards and risks	1	1	1	1	1
	Identify possible indicators of CBRNE event:					
6	a. likely conditions (weather, wind, temperature) for deployment of chemical threat agents.	1	0	0	0	0
7	b. possible dissemination devices	1	1	1	1	1
8	c. likely locations for the release	1	1	0	0	0
	Disaster and Emergency Management					
	Describe potential outcomes of a CBRNE event:					
9	a. public health aspects	1	1	1	0	0
10	b. community infrastructure	1	1	1	0	0
11	c. medical aspects of military-civilian response	0	1	0	0	0
	Identify Emergency Response Activities:					
12	a. summarize the functions and responsibilities of the ICS and UCS	1	1	0	0	0
13	b. identify the four stages of Disaster and Emergency Management	1	1	0	0	0
14	c. identify the local, regional, and federal resources available during a disaster	1	1	0	0	0
	Recognition					
15	Identify a suspicious situation that requires security notification.	1	1	0	0	0
	Security/Crime Scene					
16	Identify the requirements for a crime scene and evidence preservation at a CBRNE site.	1	1	0	0	0
17	Identify the requirements for containment operations.	1	1	0	0	0
	Self And Buddy Aid					
18	Identify emergency actions that may be undertaken to maintain vital body functions	1	1	1	1	1
	Score:	**14**	**17**	**8**	**6**	**6**
	Standard Deviation	**0.43**	**0.24**	**0.51**	**0.49**	**0.49**
	Percentage:	**77.78%**	**94.44%**	**44.44%**	**33.33%**	**33.33%**

Appendix D – Awareness Skills Assessment – Basic Level

		DMRTI Clinical	BDLS	DPHP	TEMS	MFP
	Detection, Identification, and Monitoring					
	Identify different equipment and methods used in the detection, identification and monitoring of chemical, biological and radiological agents.	1	1	0	0	0
1	a. Identify the safety precautions of the different types of detection and monitoring equipment.	1	1	0	0	0
2	b. Identify the limitations of the different types of detection and monitoring equipment.	1	1	0	0	0
	Identify CBRNE Warning Alarms and Markers.					
	a. Identify NBC contamination markers and the situations requiring their use:					
3	i NATO	0	0	0	0	0
4	ii. military	1	1	0	0	0
5	iii. civilian	0	1	0	0	0
	b. Identify NBC alarms and the situations requiring their use.					
6	i NATO	0	0	0	0	0
7	ii. military	1	1	0	0	0
8	iii. civilian	0	1	0	0	0
	Recognition					
	Identify types of CBRNE agents:					
9	a. Identify signs and symptoms due to the exposure to various Chemical Agents.	1	1	1	1	1
10	b. Identify signs and symptoms due to the exposure to various Biological Agents.	1	1	1	1	1
11	c. Identify signs and symptoms due to the exposure to various Radiological Agents.	1	1	1	1	1
12	d. Identify common types of injuries associated with Nuclear blasts.	1	1	1	1	1
13	e. Identify signs and symptoms due to the exposure to High-Yield Explosives.	1	1	1	1	1
14	f. epidemiological indicators	0	1	0	0	0
	Personal/Collective Protection					
	Describe the purpose, advantages, and limitations of the following at CBRNE incidents:					
15	a. street clothing or work uniforms	1	0	1	1	1
16	b. chemical-protective clothing	1	1	1	1	1
17	Identify the respiratory protection required for a given CBRNE event	1	1	1	1	1
18	Describe the proper use and wear of PPE.	1	1	1	1	1
19	Describe personnel protective measures for radiological agents	1	1	1	1	1
	Operational Stress					
20	Identify the contributing factors to operational stress.	1	1	0	0	0
21	Identify the steps that can be taken to prevent operational stress.	1	1	0	0	0

	Triage					
22	Describe CBRNE triage and primary care priorities in casualties with multiple injuries	1	1	1	1	1
	Decontamination (Individual/Patient)					
23	Describe the difference between exposure and contamination.	1	1	1	1	1
24	Identify the purpose of decontamination.	1	1	1	1	1
25	State the importance of establishing contamination control measures.	1	1	1	1	1
	Patient Transport					
26	Identify the procedures to ensure safe patient transport.	1	1	0	0	0
27	i. Identify the procedures for transporting a contaminated patient.	1	1	0	0	0
28	Identify equipment necessary to ensure safe patient transport.	1	0	0	0	0
	Total Score:	**24**	**25**	**14**	**14**	**14**
	Standard Deviation	**0.38**	**0.35**	**0.51**	**0.51**	**0.51**
	Percentage:	**85.71%**	**89.29%**	**50.00%**	**50.00%**	**50.00%**

Appendix E – Awareness Skills Assessment – Advanced Level

		DMRTI Clinical	BDLS	DPHP	TEMS	MFP
	Identification					
	Identify Chemical Agents used in an CBRNE event:					
	a. Nerve Agents					
1	i. Describe the mechanism of action of nerve agents	1	1	1	1	1
2	ii. List clinical signs and symptoms associated with different types of nerve agents	1	1	1	1	1
3	iii. Describe the time course of clinical disease	1	1	1	1	1
4	iv. List outcomes for different types of nerve agents.	1	1	1	1	1
	b. Vesicants					
5	i. Describe the mechanism of action of vesicants.	1	1	1	1	1
6	ii. List clinical signs and symptoms associated with different types of vesicants.	1	1	1	1	1
7	iii. Describe the time course of clinical disease	1	1	1	1	1
8	iv. List outcomes for different types of vesicants.	1	1	1	1	1
	c. Pulmonary Agents/Cyanide					
9	i. Describe the mechanism of action of pulmonary agents.	1	1	1	1	1
10	ii. Describe the mechanism of action of cyanide agents.	1	1	1	1	1
11	ii. List clinical signs and symptoms associated with different types of pulmonary/cyanide agents	1	1	1	1	1
12	iii. Describe the time course of clinical disease	1	1	1	1	1
13	iv. List outcomes for different types of pulmonary/cyanide agents	1	1	1	1	1
	d. Riot Control/Incapacitating Agents					
14	i. Describe the mechanism of action of riot control agents.	1	1	1	1	1
15	ii. Describe the mechanism of action of incapacitating agents.	1	1	1	1	1
16	ii. List clinical signs and symptoms associated with different types of riot/incapacitating agents	1	1	1	1	1
17	iii. Describe the time course of clinical disease	1	1	1	1	1
18	iv. List outcomes for different types of riot/incapacitating agents	1	1	1	1	1

	e. Bacterial Agents, Viral Agents and Biological Toxins					
19	i. Describe the mechanism of action for bacterial agents	1	1	1	1	1
20	ii. Describe the mechanism of action for viral agents	1	1	1	1	1
21	iii Describe the mechanism of action for biological toxins	1	1	1	1	1
22	iv. Describe the clinical signs and symptoms associated with bacterial agents	1	1	1	1	1
23	v. Describe the clinical signs and symptoms associated with viral agents.	1	1	1	1	1
24	vi. Describe the clinical signs and symptoms associated with biological toxins	1	1	1	1	1
25	vii. Describe the time course of clinical disease	1	1	1	1	1
26	viii. List outcomes for different types of bacterial agents, viral agents and biological toxins	1	1	1	1	1
	f. Radiological/Nuclear					
27	i. Describe the mechanism of action for ionizing radiation.	1	1	1	1	1
28	ii. Describe the clinical signs and symptoms of radiation exposure.	1	1	1	1	1
29	iii. Describe the time course of clinical disease	1	1	1	1	1
30	vi. List outcomes for different levels of radiation exposure	1	1	1	1	1
	f. High Yield Explosives					
31	i. Describe the mechanism of action for exposure to high yield explosives	1	1	1	1	1
32	ii. Describe the clinical signs and symptoms of exposure to high yield explosives	1	1	1	1	1
	Total Score:	**32**	**32**	**32**	**32**	**32**
	Standard Deviation	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
	Percentage:	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**

Appendix F – Individual Skills Assessment

		DMTRI Clinical	ADLS	DPHP	TEMS	MFP
	CBRNE Warfare & Terrorism					
1	Identify possible dissemination devices and likely locations for use of CBRNE agents.	0	1	0	1	1
2	Recognize the likely locations for the release of CBRNE weapons and the potential outcomes.	0	1	0	1	1
3	Recognize likely conditions (weather, wind, temperature) for deployment of chemical threat agents.	0	1	0	1	1
	Disaster and Emergency Management					
4	Determine your role as it relates to components of an emergency response plan.	0	1	0	0	0
	Describe communication in emergency response:					
5	Within your command.	0	1	0	0	0
6	With outside agencies (Navy, DoD, emergency services, host city/nation)	0	1	0	0	0
7	With the media.	0	1	0	0	0
8	With family, friends, etc.	0	0	0	0	0
	Detection, Identification, and Monitoring					
9	Identify different equipment and methods used in the detection, identification and monitoring of chemical, biological and radiological agents.	0	1	0	0	0
10	Identify the safety precautions of the different types of detection and monitoring equipment.	0	1	0	0	0
11	Identify the limitations of the different types of detection and monitoring equipment.	0	1	0	0	0
12	Identify CBRNE Warning Alarms and Markers.	0	1	0	0	0
	Identify shape, color, and purpose of NBC contamination markers and the situations requiring their use:					
13	NATO	0	0	0	0	0
14	Military	0	0	0	0	0
15	Civilian	0	0	0	0	0
	Recognition					
16	Identify types of CBRNE agents	0	1	0	1	1
17	Recognize the indicators of a CBRNE incident or event.	0	1	0	1	1
18	Identify proper notification procedures to communicate a CBRNE event.	0	1	0	1	1
19	Identify how to accurately describe a CBRNE event.	0	1	0	1	1
	Response					
20	React to a Chemical or Biological Hazard or Attack.	0	1	0	1	1
21	React to a Nuclear Hazard or Attack.	0	1	0	1	1
22	React to a Radiological Hazard or Attack.	0	1	0	1	1
23	React to a High-Yield Explosive Hazard or Attack.	0	1	0	1	1
	Crime Scene					
24	Recognize your role in establishing crime scene and evidence preservation.	0	1	0	0	0
25	Identify procedures to minimize disturbance of the potential crime scene.	0	1	0	0	0
26	Identify procedures for protecting individuals and potential evidence.	0	1	0	0	0
	Isolation/Security					
27	Determine that a situation appears suspicious and requires isolation/security.	0	1	0	0	0
28	1. Identify behavior unusual to work area and/or symptoms indicating exposure.	0	1	0	0	0

29	Recognize the elements of self and scene safety as related to a CBRNE event.	0	1	0	0	0
30	Describe your duties/role in contamination avoidance	0	1	0	0	0
	Individual Protective Clothing					
31	State the proper use and wear of MOPP gear.	0	1	0	1	1
32	Correctly identify various stages of MOPP levels 1,2, 3, and 4.	0	1	0	1	1
33	List all limitations of personal protective equipment used in CBRNE environments.	0	1	0	1	1
34	Protect yourself from CBRNE Injury/Contamination with personal protective equipment (PPE) utilized by military personnel.	0	1	0	1	1
35	Inspect, disassemble, clean, and replace worn or unserviceable parts of the field protective mask using prescribed replacement parts, procedures, and cleaning material/solutions.	0	0	0	1	1
36	Implement correct work/rest cycles for personnel operating in MOPP.	0	0	0	1	1
37	Demonstrate the use of PPE/IPE in protecting against spread of contamination.	0	1	0	1	1
38	Demonstrate removal and disposal procedures of contaminated PPE/IPE.	0	1	0	1	1
	Self And Buddy Aid					
39	Demonstrate the correct procedures for implementing self aid and buddy aid for a CBRNE incident:	0	1	0	1	1
40	1. Demonstrate an understanding of the A, B, C, and Ds (airway, bleeding, circulation and decontamination).	0	1	0	1	1
41	2. Perform procedures to administer 2 -PAM Chloride, Atropine, and Anti-Convulsant medication (i.e., Convulsant Antidote Nerve Agent (CANA)).	0	1	0	1	1
	Decontamination (Individual/Patient)					
42	Demonstrate basic decontamination procedures, as determined by the type of CBRNE incident.	0	1	0	1	1
43	Demonstrate decontamination procedures for self, buddy, and equipment.	0	1	0	1	1
44	Demonstrate the basic steps in establishing contamination control measures.	0	1	0	1	1
	Evacuation					
45	1. Recite departmental evacuation routes and procedures.	0	1	0	1	0
46	2. Know equipment to utilize for the specific departmental evacuation plan.	0	1	0	1	0
	Score:	**0**	**40**	**0**	**27**	**25**
	Standard Deviation	**0.00**	**0.34**	**0.00**	**0.50**	**0.50**
	Percentage:	**0.00%**	**86.96%**	**0.00%**	**58.70%**	**54.35%**

Appendix G – Collective Skills Assessment

		ADLS	TEMS	MFP
	Recognize a CBRNE event.			
	Determine that a situation appears suspicious and requires isolation/security.			
1	1. Identify behavior unusual to work area and/or symptoms indicating exposure.	1	1	1
2	2. Recognize through hearing, seeing, smelling, touching or tasting that a situation is suspicious.	1	1	1
3	3. Implement the RACE (Rescue, Activate alarm, Confine the fire, Evacuate/Extinguish) formula.	0	0	0
4	4. Notify proper authorities.	1	1	1
	Response			
	Utilize planning tools to respond to a CBRNE incident.			
5	1. Follow the Code Orange procedures as outlined in the MTF Disaster Plan/Emergency Preparedness Plan.	1	1	1
6	2. Comply with the Incident Command System (ICS)	1	0	1
7	3. Identify public affairs methods of disseminating information.	1	0	1
8	4. Coordinate with local, state, federal agencies.	1	0	0
9	5. Request appropriate pre-position logistics stock	1	1	0
10	6. Utilize casualty estimates per scenario	0	0	0
11	React to Chemical Hazard or Attack	1	1	1
12	1. Utilize chemical detection equipment	1	1	1
13	React to Biological Hazard or Attack	1	1	1
14	React to a Nuclear Hazard or Attack.	1	1	1
15	React to a Radiological Hazard or Attack.	1	1	1
16	1. Utilize radiological monitors	1	1	1
17	React to a High-Yield Explosive Hazard or Attack.	1	1	1
	Isolation/Security			
	Use appropriate Isolation/security procedures for a CBRNE incident.			
18	1. Control access of personnel and/or vehicles to the facility.	1	1	1
19	2. Control access of personnel to quarantined areas.	1	1	1
20	3. Take immediate actions to protect and secure area of operation upon notification of a CBRNE incident.	1	1	1
21	4. Implement facility lock down plan, if necessary.	0	0	1
22	5. Conduct riot control operations, as needed.	1	1	0
23	6. Implement procedures to contain/control combative patients.	1	1	1
24	7. Secure property.	1	1	1
	Containment			
	Follow the necessary procedures to contain the effects of a CBRNE incident.			
25	1. Coordinate with legal officials for restriction of movement orders.	1	0	0
	Prevent the spread of contamination.			
26	1. Conduct patient contact surveys.	1	1	1
27	2. Set up hot line	1	1	1
28	3. Conduct waste management, i.e. water and clothing.	1	1	1
29	4. Isolate HVAC in contaminated areas.	0	0	1
30	5. Establish isolation wards (see isolation competency).	0	0	1
31	6. Establish routes	1	1	1
32	7. Conduct PPE exchange	0	1	0
33	8. Demonstrate removal and disposal procedures of contaminated PPE/IPE.	1	1	1
34	9. Identify authorized personnel involved in CBRNE response.	1	1	1

	Triage Management			
35	Perform effective triage of casualties of specific types of CBRNE incidents.	1	1	1
36	Demonstrate initial patient assessment and emergency medical treatment in a CBRNE incident.	1	1	1
37	Perform triage for casualties with multiple injuries and different levels of contamination.	1	1	1
38	Determine how patient assessment, emergency medical treatment, and triage processes change in face of contaminated or contagious casualties.	1	1	1
39	Determine how patient assessment, emergency medical treatment, and triage processes change in face of limited resources.	1	1	1
	Evacuation			
	Evacuate a casualty from a contaminated areas to a decontamination staging area.			
40	1. Secure and protect for transport	1	1	1
41	2. Mobilize for safe transportation	1	1	1
42	3. Request monitoring/identification equipment.	1	1	1
43	4. Utilize identified evacuation routes.	1	1	1
44	5. Demonstrate safe patient transport following a CBRNE incident.	1	1	0
	Decontamination			
	Prepare decontamination area for contaminated patients.			
45	1. Select appropriate site	1	1	1
46	2. Coordinate for HAZMAT assistance.	1	1	1
47	3. Set up site	1	1	1
48	4. Implement crowd control procedures.	1	1	1
49	5. Use monitoring equipment.	1	1	1
50	6. Recognize injuries.	1	1	1
51	7. Manage contaminated waste products, i.e., water, clothing	1	1	1
	Demonstrate basic decontamination procedures, as determined by the type of CBRNE incident.			
	1. Demonstrate use and operation of:			
52	a. emergency resuscitation equipment	1	1	1
53	b. monitoring equipment	1	1	1
54	c. decontamination equipment/materials	1	1	1
55	2. Conduct patient decontamination procedures.	1	1	1
	3. Conduct facilities decontamination, to include:			
56	- vehicles	0	0	0
57	- buildings	0	0	0
58	- parking lots	0	0	0
59	4. Demonstrate proper handling of decontaminated remains.	1	1	1
	Operational Stress			
60	Provide information for commanders to implement a program which mitigates and/or prevents operational stress reactions and related issues that will sustain morale.	1	0	0
	Communications			
61	Maintain consistent contact with emergency responders and agencies.	1	1	1
62	Demonstrate the ability to communicate to the medical control/receiving facility regarding the hazardous materials			
63	1. Type and nature of the incident.	1	1	0
64	2. Name of the materials involved and its physical state.	1	1	0
65	3. Number of potential patients.	1	1	0
66	4. Extent of decontamination accomplished.	1	1	1
	Recovery			
	Recover a facility/site to normal operational status.			

67	1. Validate decontamination procedures.	0	0	0
68	2. Conduct logistical reconstitution	0	0	0
69	3. Establish and monitor recovery time for personnel.	0	0	0
70	4. Coordinate public affairs announcements.	1	0	0
	Score	**57**	**52**	**50**
	Standard Deviation	**0.38**	**0.43**	**0.45**
	Percentage	**81.43%**	**74.29%**	**71.43%**

Appendix H – Specialty Skills Assessment – Basic Level

		ADLS	TEMS	MFP
	Disaster Management – Planning			
	Identify and or develop planning tools when developing implementing instructions and accompanying planning guidance to prepare for a CBRNE incident including:			
1	1. Describe the Federal Response Plan and the circumstances when the command may be asked to participate in a local or regional response. Maintain a copy of this plan and monitor the progress toward the National Response Plan.	1	0	0
2	2. Identify, establish, and maintain contact with local, state, federal agencies.	1	0	0
3	a. Identify the capacity of the existing healthcare system and resources.	1	0	1
4	3. Pre-position logistics requirements	1	1	0
5	4. Develop casualty estimates	0	0	0
6	5. Describe the National Disaster Medical System.	1	0	0
7	6. Describe the chain of command for a MTF and how it will integrate into a unified chain of command.	1	0	1
8	7. Identify public affairs methods of disseminating information.	1	0	1
9	8. Develop simple to use departmental checklists for response to CBRNE incident	1	1	1
	Identify and review the command emergency management plan, including:			
10	1. Instructions/planning guidance for early discharge of patients from the hospital.	0	0	1
11	2. Instructions/planning guidance for referral/transfer of patients between medical facilities.	0	0	1
12	3. Instructions/planning guidance for mobilization of personnel.	0	0	1
13	4. Instructions/planning guidance for restriction of visitors to MTF.	0	0	1
14	5. Instructions/planning guidance for increasing security.	0	0	1
	Identify and review a ready-for-use system which enables patient administrators to relate patients clearly to the event, e.g. , for investigation authorities			
15	1. Develop a method of linking patients clearly to the CBRNE event.	0	0	0
16	2. Develop reliable identification systems of patient personal properties.	0	0	0
17	3. Identify a rapid admissions and tracking system.	0	0	0
	Communications			
	Identify and review a comprehensive communication plan that incorporates military, local, state and federal agencies within the local geographical area:			
18	1. Develop a primary means of communication with local, state and federal agencies within the local geographical area.	1	0	0
19	2. Develop a secondary means of communication with local, state and federal agencies within the local geographical area.	1	0	0
20	3. Develop a plan to exercise emergency communications systems annually in response to a CBRNE incident.	0	0	0
21	Demonstrate correct use of all primary and backup communications systems (phone, FAX, email, message traffic, radios, SAT COM, etc.)	1	0	0
	Containment/Security			
	Know the roles of responding departments and outside agencies involved in containment.			
22	1. Identify and access available resources for containment, internal to the MTF.	1	0	0
23	2. Identify available resources for containment, external to the MTF.	1	0	0
	Operational Stress			
24	Identify the contributing factors to operational stress.	1	0	0

25	Identify the signs and symptoms used in the diagnosis of operational stress.	1	0	0
26	State the importance of diagnosing operational stress.	1	0	0
27	Identify the treatment for operational stress including application of BICEPS (Brevity, Immediacy, Centrality, Expectancy, Proximity, and Simplicity).	1	0	0
28	Identify the steps that can be taken to prevent operational stress.	1	0	0
	Recovery			
29	Define recovery in an emergency disaster incident.	0	0	0
30	Identify the three parts to the recovery process.	0	0	0
31	Identify the federal, state and local resources available to address psychological, medical and environmental needs from a Weapons of Mass Destruction incident.	1	0	0
	Score	**19**	**2**	**9**
	Standard Deviation	**0.50**	**0.25**	**0.46**
	Percentage	**61.29%**	**6.45%**	**29.03%**

Appendix I – Specialty Skills Assessment – Advanced Level

		ADLS	Technician EMS course	Medical Facility Provider Course
	Recognize a CBRNE Event			
1	List all currently available equipment used to detect and identify chemical agents.	1	0	0
2	List all currently available equipment used to detect and identify biological agents.	1	0	0
3	Understand the laboratory identification and diagnosis for biological agents.	0	0	0
4	List all currently available equipment used to detect and identify radiological/nuclear agents.	1	0	0
	Containment			
	Assess the affected area for contamination, when possible.			
5	1. Utilize radiological monitors	1	1	1
6	2. Utilize chemical detection equipment	1	1	1
7	3. Conduct patient contact surveys.	1	1	1
	Individual Protective Clothing - Mission Oriented Protective Posture			
8	1. positive pressure self-contained breathing apparatus	1	0	0
9	2. positive pressure airline respirator	1	0	0
10	3. air purifying respirator	1	1	1
11	4. powered air purifying respirator	1	0	0
12	Identify the required physical capabilities and limitations of personnel working in positive pressure self-contained breathing apparatus.	0	0	0
13	Identify correct use and application of Skin Exposure Reduction Paste Against Chemical Warfare Agents (SERPACWA).	0	0	0
14	Protect yourself from CBRNE Injury/Contamination with Individual Protective Equipment (IPE) in accordance with OSHA regulations.	1	1	1
15	State the levels of protection (A, B, C, and D) in accordance with OSHA regulations.	1	1	1
16	Identify when levels A through D should be used in accordance with OSHA regulations.	1	1	1
	Treatment			
17	Demonstrate an understanding of the A, B, C and D (airway, bleeding, circulation and decontamination).	1	1	1
18	Demonstrate the actions necessary to efficiently treat the psychologically injured patient.	1	0	0
	Chemical Agents			
19	Identify various types of toxic industrial chemicals/toxic industrial materials (TICS/TIMS), the signs and symptoms, and treatment options for these chemical/materials.	1	1	1
	Nerve Agents			
20	List clinical signs and symptoms associated with different types of nerve agents	1	1	1
21	Describe CBRNE triage and primary care priorities in casualties with multiple injuries and different levels of nerve agent contamination.	1	1	1
22	Determine when nerve agent pre-treatment is used, what is used, and why it is used.	1	0	0
23	Describe the most important side effects to treatment with atropine, oxime, and anti-convulsants.	1	1	1
24	List specific treatment for casualties affected by nerve agents.	1	1	1
25	List the time course of clinical disease and outcome for different types of nerve agents.	1	1	1

	Vesicants			
26	List clinical signs and symptoms associated with different types of vesicants	1	1	1
27	Describe CBRNE triage and primary care priorities in casualties with multiple injuries and different levels of vesicant contamination.	1	1	1
28	List pretreatment options for different types of vesicants	1	1	1
29	List specific treatment for casualties affected by vesicants.	1	1	1
30	Determine the general approaches to therapy for vesicants (starting with rapid decontamination) by affected system.	1	1	1
31	List the time course of clinical disease and outcome for different types of vesicants.	1	1	1
	Pulmonary Agents/Cyanide			
32	List pulmonary agents identified as the most probable threats	1	1	1
33	List cyanide agents identified as the most probable threats	1	1	1
34	List clinical signs and symptoms associated with different types of pulmonary agents	1	1	1
35	List the time course of clinical disease and outcome different types of pulmonary agents.	1	1	1
36	List clinical signs and symptoms associated with different types of cyanide agents	1	1	1
37	List the time course of clinical disease and outcome different types of cyanide agents.	1	1	1
38	Describe CBRNE triage and primary care priorities in casualties with multiple injuries and different levels of pulmonary agent contamination.	1	1	1
39	Describe CBRNE triage and primary care priorities in casualties with multiple injuries and different levels of cyanide contamination.	1	1	1
40	List pretreatment options for different types of pulmonary agents	1	1	1
41	List specific treatment for casualties affected by pulmonary agents.	1	1	1
42	List pretreatment options for different types of cyanide agents	1	1	1
43	List specific treatment for casualties affected by cyanide agents.	1	1	1
	Riot Control/Incapacitating Agents			
44	List clinical signs and symptoms associated with riot control agents and discuss treatment options for each agent.	1	1	1
45	List clinical signs and symptoms associated with incapacitating agents and discuss treatment options for each agent.	1	1	1
46	Determine the general approaches to therapy for incapacitating agent exposure.	1	1	1
47	Describe CBRNE triage and primary care priorities in casualties with multiple injuries and different levels of riot control agent contamination.	1	1	1
48	Describe CBRNE triage and primary care priorities in casualties with multiple injuries and different levels of incapacitating agent contamination.	1	1	1
	Biological Agents (Bacterial, Viral, Biological Toxin)			
49	List all currently available pretreatment, prophylaxis or immunizations effective against biological agent threats.	1	1	1
50	List bacterial agents identified as most probable threats in a CBRNE incident.	1	1	1
51	List viral agents identified as most probable threats in a CBRNE incident.	1	1	1
52	List biological toxins identified as most probable threats in a CBRNE incident.	1	1	1
53	Discuss the clinical signs and symptoms associated with bacterial agents used in CBRNE attack.	1	1	1
54	Discuss the clinical signs and symptoms associated with viral agents used in CBRNE attack.	1	1	1
55	Discuss the clinical signs and symptoms associated with biological toxins used in CBRNE attack.	1	1	1

56	Determine the time course of clinical disease and outcome for each patient as well as specific treatment options for different types of biological agents.	1	1	1
57	Determine the time course of clinical disease and outcome for each patient as well as specific treatment options for different types of viral agents.	1	1	1
58	Determine the time course of clinical disease and outcome for each patient as well as specific treatment options for different types of biological toxins.	1	1	1
59	Identify therapeutic regimens and definitive and supportive care of victims.	1	1	1
60	Describe CBRNE triage and primary care priorities in casualties with multiple injuries and different levels of biological contamination.	1	1	1
	Radiological/Nuclear			
61	Identify types, properties, and units of ionizing radiation.	1	1	1
62	List the possible sources of ionizing radiation as well as the different methods of measurement of ionizing radiation.	1	1	1
63	Recognize the biological and medical effects of radiation.	1	1	1
64	Explain the biological and medical effects of ionizing radiation.	1	1	1
65	Determine the medical effects of ionizing radiation at the cellular level.	1	1	1
66	Identify treatment methods for radiological casualties.	1	1	1
67	Recognize the signs and symptoms of radiation exposure.	1	1	1
68	Identify the characteristics of the different levels of radiation exposure.	1	1	1
69	Describe the treatment of acute radiation syndrome.	1	1	1
70	List the signs and symptoms of radiation exposure.	1	1	1
71	Compare the characteristics of the different levels of radiation exposure.	1	1	1
72	Compare the effects of radiation dose, long term effects and associated risks with risks associated with other types of behavior and activity.	1	1	1
73	Identify currently available prophylactic treatment for radiation exposure.	1	1	1
	High Yield Explosives			
74	Identify medical effects of high yield explosives.	1	1	1
75	Identify the thermobaric effects of explosives on casualties.	1	1	1
76	Identify the diagnosis and treatment of high yield explosives.	1	1	1
77	Identify the diagnosis and treatment for exposure to the thermobaric effects of explosives.	1	1	1
	Evacuation			
	Evacuate a casualty from a contaminated areas to a decontamination staging area.			
78	1. Describe the procedures for preparing the vehicle and equipment for the CBRNE patient.	1	1	0
79	2. Describe the concept of patient transfer from the incident site to the decontamination area and then to the treatment area.	1	1	0
80	3. Coordinate for monitoring/identification equipment.	1	1	0
81	4. Identify evacuation routes.	1	1	0
	Decontamination			
82	Identify the purpose of decontamination.	1	1	1
83	Demonstrate the basic steps in establishing contamination control measures.	1	1	1
84	Utilize various solutions and methods to decontaminate personnel, vehicles and buildings.	1	1	1
85	Discuss the necessary decontamination procedures and special precautions involved with biological agent casualties.	1	1	1
	Score	**82**	**74**	**70**
	Standard Deviation	**0.19**	**0.34**	**0.38**
	Percentage	**96.47%**	**87.06%**	**82.35%**

Appendix J – Subjective Assessment

		DMRTI - Navy		NDLSTC			SBCCOM	
		DL Clinical Course	CDLS	BDLS	ADLS	DPHP	TEMS	MFP
1	Can the program of instruction be adapted to a variety of class sizes?	1	1	1	0	0	0	0
2	Is the program of instruction scalable with respect to the level of training provided for target audience?	0	0	1	0	0	0	0
3	Can the program on instruction be adopted in a phased implementation, with a first priority of ER and first responder training?	0	1	1	1	0	0	0
4	Can the program of instruction be adapted to service specific requirements with DoD?	0	1	1	1	0	0	0
5	Is the program of instruction structured in a manner to allow for migration to Distance Learning?	1	1	1	0	0	0	0
6	Is the program of instruction structured in a manner to allow for migration for a mobile training solution?	0	1	1	1	1	1	1
7	Does the program of instruction have documented re-certification or renewal requirements?	0	1	1	1	0	0	0
8	Does the program of instruction support interactive training at the unit or MTF level (collective training)?	0	0	0	1	1	1	1
9	Does the program of instruction adhere to documented standards for execution?	1	1	1	1	1	1	1
10	Does the program of instruction include standardized training for instructors?	0	1	1	1	1	0	0
11	Does the program of instruction have formal evaluation criteria?	0	1	1	1	1	1	1
12	Does the program of instruction provide acknowledgement of successful completion (CME, CEU or other formal contact hours)?	0	1	1	1	0	0	0
13	Does the training program contribute to the professional development of the target audience?	0	1	1	1	0	0	0
14	Does the program on instruction include a methodology for aggregating and reporting progress/completion for the unit and or MTF administrative personnel?	0	1	1	1	0	0	0
	Total Score:	**3**	**12**	**13**	**11**	**5**	**4**	**4**
	Standard Deviation:	**0.43**	**0.36**	**0.27**	**0.43**	**0.50**	**0.47**	**0.47**
	Percentage:	**21.43%**	**85.71%**	**92.86%**	**78.57%**	**35.71%**	**28.57%**	**28.57%**

Note: Gray areas indicate incomplete data or functionality at time of assessment.