HAZARDOUS MATERIALS MEDICAL TECHNICIAN

20 FST4050
“EMERGENCY MEDICAL RESPONSE to HAZARDOUS MATERIALS INCIDENTS”
Armando S. Bevelacqua
INTRODUCTION

Unless we have a belief that we can effect change within the environment in which we live and work, the past events will repeat themselves. For many years, EMS providers, the fire service, and emergency responders, have approached Hazardous Materials scenes without the benefit of medical considerations. Over time our understanding of these incidents grew. With each year of experience, a new solution to a problem was discussed and implemented. However, the medical aspect has been mostly disregarded; until now. This program is an attempt towards the complete management of a hazardous materials incident. It is the awareness of such an incident, regardless of its size, that will protect the Fire Department, Ambulance Service, Emergency Response Personnel, Emergency Departments and the community in which they serve. By utilizing medical controls, heighten awareness, and problem identification; a system towards improved efficiency can be managed.

As this course will illustrate, the services that are presently available within any ALS system, can improve Hazardous Materials mitigation. The key here is the available knowledge, training, and skill application each pre-hospital provider maintains.

COURSE GOALS

OBJECTIVE: The main goal is to identify and outline areas of medical importance when dealing with a Hazardous Materials incident. The assessment is from a TEAM prospective with emphasis on Team Safety and Support. The presentation is organized to assist the team members in making decisions based upon information gained and weighted on a scale of risk versus gain.

DESCRIPTION: Awareness and community involvement has increased significantly over the past few years. The concerns from the private sector as well as from the Fire Protection agencies are very real. How we view an incident, understand and gather information, deciding how to deal with the problems is the beginning toward mitigation of the incident. Medical efforts are focused on decontamination, medical techniques. Specialized equipment, and limited antidotal treatments in order to “gain control” of a hazardous materials incident from a medical aspect. Standard Operating Guidelines, Identification of Common Nomenclature, Chemistry applications along with the Decontamination Procedures, and selective Medical Techniques and Equipment are but a few topics that will be discussed in depth.

STUDENT OUTCOMES: Upon completion of this course, students will be able to:

1. Given a set of scene parameters the participant shall understand the philosophy, organization, and operation of injury evaluation and risk prevention.
2. Define the tactical and strategic approach to hazmat medicine in the field, causally collection point, and definitive care facility.
3. Understand the principles of toxicology as it relates toward the response vs civilian
exposure.
4. Identify and apply the techniques for conducting an effective toxidrome exam, and create the action plan for that patient.
5. Apply medical techniques to a variety of potential exposure profiles (toxidrome).

CONCLUSION: Our outlined approach is designed for the fire suppression unit, Hazardous Materials Team Member, Emergency Medical Service which will support activity, Administrative service, and Supporting members of the HazMat response, including the receiving medical facility, all create a loop for medical mitigation of a hazardous materials incident. None needs to be left out when discussions and preplanning take place.

EVALUATION OBJECTIVES

1. Describe the various definitions of Hazardous Materials.
2. Given a set of definitions, the student will identify the components of:
   A. Negligence
   B. Standard of Care
   C. Federal Law
   D. Federal Regulations
   E. Consensus Standards
3. The student will discuss the principles of Standard of Care, standards, and operating guidelines as it relates to the hazardous materials incident.
4. Describe the considerations when the student may be:
   A. Within a dispatch center
   B. Responding to a scene
   C. Once on scene
   D. Within the medical sector
      1. Treating patients
      2. Transporting patients
5. Identify the DOT classifications, NFPA 704, and UN numbers of hazardous materials.
6. Given a list of chemical terms the student will identify the definition.
7. Identify the chemical families of representative commodities.
8. The student shall explain the terminology that is utilized in the reference texts for:
   A. Common Chemicals
   B. Toxicological Data
9. Discuss the differences in acute, subchronic, and chronic exposure.
10. Describe the overall goals of the Medical Surveillance Program.
11. Describe the components in detail the cursory physical.
12. Describe the high potential contamination risks.

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13. Discuss the decontamination procedure and the considerations thereof.
14. Discuss the transportation issues that may arise at a hazardous materials incident.
15. Describe the equipment that may be required in terms of medical sectors needs.
16. Describe how chemical profiles effect the exposed patient in terms of:
   A. Respiratory tract involvement.
   B. Skin absorption
   C. Ocular injuries
   D. Cardiovascular abnormalities
   E. Heat related emergencies
   F. Cold related emergencies
17. Discuss the levels of respiratory injuries and the relationship to pulse oximetry.
18. Describe the type of physiologic cardiac responses, its mechanism, and differences from typical ACLS treatment.
19. Describe the anatomy and physiology of skin and ocular injuries.
20. Describe the insertion of the Morgan Lens.
21. Discuss the physiology of:
   A. Carbon Monoxide poisoning
   B. Cyanide poisoning
   C. Hydrogen Sulfide poisoning
   D. Nitrite and Nitrate poisoning
   E. Organophosphate poisoning
   F. Carbamate poisoning
   G. Hydrofluoric Acid
   H. Phenol poisoning
   I. Radiation.
   J. Chemical warfare agents.
   K. Biological warfare agents.
22. Discuss the treatment of:
   A. Carbon Monoxide poisoning
   B. Cyanide poisoning
   C. Hydrogen Sulfide poisoning
   D. Nitrite and Nitrate poisoning
   E. Organophosphate poisoning
   F. Carbamate poisoning
   G. Hydrofluoric Acid
   H. Phenol poisoning
   I. Radiation.
   J. Chemical warfare agents.
   K. Biological warfare agents.
23. Discuss the how heat emergencies can effect the emergency worker.
24. Describe the considerations in terms of biological (biohazards) emergencies.
25. Discuss the hazards found in a clandestine lab.
26. Identify the potential clandestine lab.
27. Discuss the uses of air monitoring equipment.

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28. Identify the limitations of instruments used in air monitoring.
29. Describe the confined space, its definition, response levels and hazards.
30. Discuss the scene structure in terms of safety.
31. Identify the components of the quality improvement program in detail and its application.

COURSE FORMAT

This course awards five-quarter credit hours and is divided into twelve chapters within five units. The units are assigned over a two-three week period such that all material can be covered within an academic quarter. Two textbooks are identified as the subject matter content, each complements each other for an overall course load. With this in mind consistent reading and exercise practice is necessary in order to complete this course within the ten-week academic quarter.

1. Unit Overview
These are found in the beginning of each topic heading within the textbook entitled “Emergency Medical Response to Hazardous Materials Incidents” they will provide the reader an overall view of the material that the student is about to cover. Associated with the chapter objectives and the chapter introduction, it will briefly outline the material presented, highlighting in advance key points to be anticipated, contained within the assigned unit.

2. Chapter Objectives
The objectives indicate what the student should have learned at the conclusion of the unit of study. These serve as a measuring tool by which progress of the student may be compared too. The student can readily see whether or not the objectives are being met and take appropriate additional action to eliminate any deficiency in the learning process.

3. Text Exercises
These exercises found within the textbook and have been designed to allow the student a self-evaluation of his/her knowledge of the textbook reading. They are multiple choice and essay in nature. The essay questions have several possible answers each are considering a basic principle that must be a part of each answer. It is expected of the student to answer all the questions that are at the end of each chapter relating this study topic within material found in each text.

4. Assignments
The written assignments are designed to assist the student with the organization and implementation of a Hazardous Materials Medical program within his/her department. The objective outlined approach within each chapter and assignment walks through the organizational process. The textbooks required are the books entitled “Emergency Medical Response to Hazardous Materials, and Terrorism Handbook for Operational Responders.” Because there are no written tests within this course the student is required to produce written documentation of the issues that the instructor has placed forth.

All assignments may require additional research in order to achieve the desired
educational goal. However, the research is geared to a minimum as it is designed to relate
to the students possible planning and implementation sources.

Each paper shall have a face sheet, table of contents, and the body (see example
below in topic paper), which includes the questions that were answered. Assignments can
be mailed to the University of Cincinnati or E-Mailed to the instructor at
AbevelacquAOL.com (Emailing is preferred for quick turn around). Please make this as an
attached file E-mail as a .doc file. Conferences in a chat room on the internet at a pre-
designated time or conference calls are encouraged and planned for.

Grades are based upon three assignments (which includes the discussion board
questions and your answers to these questions) and the topic paper with the topic paper
holding the most weight. The three assignments represent 65% of the grade with the topic
paper holding 35%. Late papers more then one week shall be reduced by one letter
grade, unless time frames have been discussed with the instructor. Grace periods are
granted upon discussion with the instructor and for good reasons.

About the instructor:

Armando S. Bevelacqua is 35 plus year veteran of the fire service and the
recipient of the 2010 “In the Zone Award” and the “Level A Award” for leadership,
service and support in education of the hazardous materials first response
community. Recently retired from City of Orlando Fire Department, Orlando Florida
where he served as Chief of Special Operations, Homeland Security and Medical
Command. Armando also teaches at local colleges, instructing Fire and EMS Classes.
He writes free-lance, publishing articles and educational textbooks. He is published
with topics on report writing for EMS providers, Emergency Medical Response to
Handbook for Operational Responders and a Chemistry book geared for the first
responder. He has been presented nationally on several controversial issues in the
disciples of Technical Rescue, EMS, Hazardous Materials and Management. Armando
lectures to fire departments throughout North America, Canada and Europe. He is an
adjunct instructor for the National Fire Academy, additionally a WMD/Haz-Mat
instructor for the Federal Bureau of Investigations along with an international initiative
involving WMD Counter proliferation in former Soviet Union States through the
Department of Defense as well as with several federal agencies.

Chief Bevelacqua serves on several federal, state and local committees. He holds
membership to the Inter-Agency Board (IAB) for Training and Exercise development -
IAB discussing issues affecting USAR and HazMat deployment, and training as it
relates to terrorism and which have developed the national “Selected Equipment List”
(SEL) for first responders. Technical Consultant to the NFPA 472, and 473 Technical
Committees along with representation on the ASTM standards development

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committee for emergency response. Chief Bevelacqua has assisted in the development of standards and protocols such as with Rocky Mountain Poison Control for the development of standardized Medical Protocol for the WMD event and for the State Department for WMD training of embassy delegates.

SCHEDULE of ASSIGNMENTS

WEEK ONE  (Unit Overview)
Chapter 1   Hazardous Materials Concepts
Chapter 2   Scene Organization and Standing Operating Guidelines
Chapter 1,6,8 of the THOR manual

WEEK TWO (Unit Overview)
Chapter 3   Chemical Behavior

WEEK THREE
Chapter 4   Essentials of Toxicology

First Assignment Due
Assignment paper and discussion board activity

WEEK FOUR (Unit Overview)
Chapter 5   Body Systems and the Environment

WEEK FIVE
Chapter 6   Treatment Modalities
Chapter 2,3,4,5 of the THOR manual

Second Assignment Due
Assignment paper and discussion board activity

WEEK SIX (Unit Overview)
Chapter 7   Medical Surveillance

WEEK SEVEN
Chapter 8   Hazardous Materials Consideration for Hospitals
Chapter 2,3,4,5 of the THOR manual

WEEK EIGHT (Unit Overview)
Chapter 9   Biohazard Awareness, prevention and protection
Chapter 10  Clandestine Drug Laboratories

Third Assignment Due
Assignment paper and discussion board activity

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WEEK NINE
Chapter 11  Air Monitoring
Chapter 8,7 of the THOR manual
Chapter 12  Confined Space Medical Operations.

WEEK TEN Review of material and Final Project
SUBJECT AREA 1

1. Describe the considerations of each response group: A detailed approach that would either make their job easier or the educational criteria that would be needed for such an in house class.
   A. Dispatchers
   B. Operational Response Personnel
   C. Place in order what considerations categories and subcategories that each of the above groups should consider responding to a hazardous materials release and contrast this to what would be needed if the event involved weapons of mass destruction.

2. Explain how each of the above considerations will affect the response of the emergency system in total.

3. Utilizing the information in Chapters 1, 2 and Appendix B construct a complete bulletined emergency response plan. (Hint: contact your local LEPC for local plan, and utilize local emergency jurisdictions emergency operating guidelines as a reference).

SUBJECT AREA 2

1. List and research 20 of the most common chemicals that are stored/transported, or supplied within your jurisdiction (Hint: Contact your LEPC for assistance; this should have been analyzed in Question 1 subject area 1)

2. For each chemical list all chemical and physical properties or Top ten most common with the addition of NBC agents as follows: Neurotoxins, Chemical Asphyxiates, Respiratory Irritants, Skin and Eye Irritants, and Riot Control agents, and the signs and symptoms

3. Identify the chemical families the top ten belongs too and the most common hazards both acute and chronic.

4. Identify the toxicological statistics (TLV, TWA, STEL, TLV, etc.)

5. List all synonyms.

SUBJECT AREA 3

1. Utilizing the above 10 chemicals identify those chemicals that can be preplanned for antidotal treatment, and list the toxic syndrome they will fall into.
2. Identify the target organs or systems that will be affected by acute and chronic exposures.

3. Utilizing the chapter scenarios in Chapter 5 and 6 give a narrative on your actions based on the questions and your capabilities within your current system.

4. Express (draw) a detailed decontamination corridor utilizing your available resources, then contrast it to equipment needed in order to handle mass causality.

**SUBJECT AREA 4**

1. Identify your procedures that may be employed within your medical surveillance program (see Chapter 7, page 349, the chapter scenario as an example of your predicament)

2. Briefly describe how your local hospital or hospitals could assist you with a MSP.

3. How do the Biohazard rules and regulations (Ryan White) affect operational procedures?

Discuss how Clandestine labs, air monitoring, and confined space operations affect your medical operational procedures.

Answer the chapter scenarios at the end of chapters 7, 8, 9, and 10.

**ASSIGNMENTS**

**First Assignment:** Subject Area 1 & Assignment paper and discussion board activity

**Second Assignment:** Subject Area 2 & Assignment paper and discussion board activity

**Third Assignment:** Subject Area 3 and 4 & Assignment paper and discussion board activity

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TOPIC PAPER
The topic paper is a combination of work already produced with additional information. Because of the fact that this class does not require a written final test the topic paper is designed and intended to serve as a proposal document for the implementation of such a program within your respective department. All topic papers may require additional research, with appropriate footnotes and bibliography. The topic paper is not graded until all the components of the question are answered, to the level of detail that would be required for such a proposal. This may include additional work on the part of the student before a final grade is awarded. This will only occur if the instructor feels that the question that was chosen was not answered to the best of the student’s ability in association with the depth required.

Final Topic Assignment
Your Chief of the agency you work for would like to start a full hazardous materials medical response component to the department. What are the educational requirements, training into the future, hazards that are found within the community to highlight such a response towards, and the cost of such a program?

Hint: Look at this as a proposal that you would prepare for if given this task with all the information and budget.

Suggested outline:
Introduction
Executive Summary
Discussion
  Supportive Documentation
  Similar programs
  Educational requirements
  Protocol
  Medical Surveillance
Program Implementation
Summary
Bibliography