



Appalachian Search and Rescue Conference
Center for Emergency Medicine of Western Pennsylvania

Wilderness EMT Lesson Plan

Part XVI: Disasters

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Comments to:

Bernie Roche, R.N., Task Group XVI Leader

Suite 802, 8 Godstone Road Willowdale, Ontario, Canada M2J 3C4
416-497-9789 (H)

Task Group: Roy Alson, Ph.D., M.D.; Derek Angus, M.B., Ch.B.; Richard A. Bissell, Ph.D.; Keith Conover, M.D.; Robert Koester, EMT; Richard Kunkle, M.D.; Robert Lasek, M.D.; David McCulloch; Paul Paris, M.D.; Mark Pennington; Bern Shen, M.D.; and Ralph Wilfong.

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Project Coordinator:

Keith Conover, M.D. 36 Robinhood Road
Pittsburgh, PA 15220-3014 412-561-3413

Verbose Outlines

We develop our WEMT Lesson Plans in a **verbose outline format** (what you see here). Why? Because the material is new to enough reviewers that the usual terse (“telegraphic”) lesson plan format might be incomprehensible or misleading.

Our Task Groups use these “verbose” outlines. Each part of the WEMT curriculum (about twenty in all) has a Task Group of five to twenty selected consultants. A Coordinator guides the Task Group in revising the section.

Each Task Group provides references to support its statements and for further reading. They also provide glossary entries for any new terms they introduce. (New, that is, to a reader with basic EMT and SAR training.)

Background material that should appear in the Textbook (see below), but instructors need not present in class, will appear *in a small, italic font*.

Splitting the Outlines

When the outline satisfies the Task Group, it goes to our **Editorial Board**. This Board includes officers of the Appalachian Search and Rescue Conference and Center for Emergency Medicine of Western Pennsylvania, our two sponsors. It also includes experts in emergency medicine, search and rescue, and education. The Editorial Board reviews the verbose outline, and requests any necessary revisions. Once it is acceptable to the Board, we reformat the outline, into two distinct new versions.

We rewrite the material in the standard lesson plan format, which becomes a terse “telegraphic” outline. This version will be briefly reviewed by the Project Coordinator and then released to the public. It is the result of extensive review and testing, and will be used in all our classes. But, we still publish it as a draft, because we expect many good suggestions from the public. We distribute these drafts as widely as possible. After each year of public review, the Task Groups reviews comments, and submits revisions to the Editorial Board. Once all outlines have withstood a year of public scrutiny, we will prepare a single comprehensive curriculum with a Course Guide. We will continue to review and revise the curriculum regularly.

On to a Textbook

As explained above, once the Editorial Board approves the verbose outline, we split it into two versions. Besides the terse teaching outline, it will also become the basis for a textbook chapter. The

Project Coordinator is the textbook Editor-in-Chief, and works closely with the Task Groups to consolidate and revise the verbose outlines into a comprehensive textbook. All who have contributed to the curriculum will be acknowledged as contributors. The textbook will be commercially published when completed. Until the textbook is available, we will distribute the verbose outlines or drafts of the textbook at classes.

Notes: Disasters

Wilderness EMT's are ideally trained for service in a catastrophic disaster. Lack of food, lack of water, lack of shelter, lack of transportation: these are everyday occurrences for the Wilderness EMT. Dealing with patients with traumatic and environmental injuries, dealing with patients with acute stress reactions, dealing with patients over an extended period, dealing with patients with improvised equipment: this too is the province of the WEMT. Surviving in a hostile environment and attending to the medical needs of a rescue team when remote from a hospital: all part of the WEMT's job.

So, you see, a Wilderness EMT is already suited for first-in emergency care during a catastrophic disaster. Our purpose in crafting this Curriculum was not to make it into a “Disaster EMT” Curriculum. However, we recognize that, when a catastrophic disaster occurs, someone may notice that the local WEMT's are an ideal resource to immediately drop into the disaster site. Therefore, we want to prepare Wilderness EMT's for the hazards and special considerations of such a situation.

We can envision this WEMT Curriculum being used to train Disaster WEMT's. For such a class, we would expect to have another add-on module with more in-depth coverage than provided in this short section.

Note that this current version (1.11) is incomplete. With input from several new Task Group members, Mr. Roche will provide a more detailed and revised version in the near future.

XVI. Disasters

A. Educational Objectives

1. Define: multi-casualty incident; single-casualty/multiple resource incident; and catastrophic disaster.
2. Cite the major difference between a multi-casualty incident and a catastrophic disaster.
3. List three similarities between emergency medical services for wilderness rescues and for catastrophic disasters.
4. Outline principles of triage for a large multi-casualty incident in the wilderness.
5. Estimate the likely number surviving victims found within the first 24 hours after a catastrophic disaster compared with the number found thereafter.
6. Describe the effect of the first 24 hours of a large catastrophic disaster on local government, and outline an approach to organizing response teams in such a situation.
7. List logistical support services that are usually lacking in the first 24 hours of a catastrophic disaster.
8. Explain how simple medical and surgical problems can cause death or severe injury in the first 24 hours after a catastrophic disaster; indicate four important simple interventions that a WEMT can provide for such patients.
9. Identify appropriate strategies for dealing with large numbers of psychologically injured people.
10. Give four specific examples of how you can use "Murphy's Laws" to analyze disaster plans.
11. Identify specific major hazards and medical conditions associated with:
 - a. volcanic eruptions;
 - b. avalanches, landslides, and mudslides;
 - c. large storms;
 - d. wildfires; and
 - e. floods.
12. Describe important public-health and sanitation during the first days of a catastrophe, including:
 - a. food preparation and food handlers;
 - b. latrine siting; and
 - c. dealing with corpses.
13. Identify specific major hazards of travel to areas outside North America, and appropriate countermeasures, including:
 - a. sociocultural and political hazards:
 - (1) language differences,
 - (2) major cultural taboos and other important differences,
 - (3) political instability, and
 - (4) coordination with other foreign (non-local) personnel;
 - b. animal hazards:
 - (1) major poisonous reptiles,
 - (2) major poisonous insects, and
 - (3) hazardous large animals;
 - c. plant hazards; and
 - d. infectious diseases:
 - (1) malaria,
 - (2) cholera, and
 - (3) tuberculosis.
14. Identify appropriate roles for a WEMT in the early stages of a catastrophic disaster.

B. Types of Disasters

1. A **multi-casualty incident** strains local EMS and medical resources by present-

ing a large number of patients at the same time. Many EMS and hospital “disaster plans” deal primarily with such an incident. A multi-casualty incident is a disaster only in that it disrupts the operations of local EMS and hospital services. It requires the EMS agency to call in off-duty personnel, and to request mutual aid resources from other EMS agencies. Hospitals must call in off-duty personnel, may have to cancel elective surgery, and may need to expand the area used for emergency patients. Patient care seldom suffers, except for possibly some slight delays in treatment.

2. A **single casualty, multiple resource incident** such as a wilderness search or rescue will involve multiple EMS agencies. It will require them to call in outside resources, and to call in off-duty personnel, and thus it, too, is a disaster.

3. Catastrophic disasters

- a. Catastrophic disasters not only present EMS systems and hospitals with multiple casualties, but also damage the EMS systems and the hospitals. In a catastrophic disaster, roads, power, water, fire suppression, police, and other essential services are disrupted. This is very different from a multiple-casualty incident. In a multi-casualty incident, normal EMS and hospital activities are modified slightly to accommodate the extra casualties. In a catastrophic disaster, normal EMS and hospital activities are suspended, and special EMS and hospital disaster responses start. For example, disaster medical and rescue teams from foreign countries or other states come into the area, and field hospitals are set up to care for casualties.
- b. There is a complete spectrum from a simple multi-casualty incident to a major catastrophic disaster such as an earthquake that knocks down half of the buildings in San Francisco. How-

ever, there is a discontinuity in how you can respond to an incident. At some point along the spectrum, whether from number of casualties or from damage to local resources, you can no longer deal with the situation with existing resources. You must call in outside resources, and must start improvising. You must set up an organized rescue and medical response outside of the local EMS systems and hospitals.

- c. Much of the focus of catastrophic disaster planning is handling things after the first 24 hours. Many are popularizing new concepts about disaster management, including the idea that in many cases, unsolicited disaster aid just piles up and makes things more difficult. Our emphasis here is solely on the first 24-48 hours.

C. Disaster/Wilderness EMS Similarities

1. The first hours of a catastrophic disaster share many characteristics with the wilderness. In a catastrophic disaster, the victims don’t wander into the wilderness; the wilderness is forced upon the victims.
2. In both wilderness and catastrophe, there is not enough shelter, and victims and rescuers are exposed to environmental extremes (e.g., heat, cold, snow, rain), as well as dangers of urban areas (e.g., fire, building collapse).
3. In both, there is not enough potable water or food.
4. In both, rescuers need overland evacuation skills (the roads may be destroyed).
5. In both, there is need for extended pre-hospital care:

- a. there are not enough physicians or hospitals in the initial stages of the disaster;
- b. transport is usually delayed due to damage to airports and rail lines, and due to a lack of ground ambulances;
- c. people may be entrapped for long periods of time;
- d. the rescue teams need to be entirely self-sufficient, and must travel with very light but rugged personal equipment; and
- e. WEMT's may need to provide primary care for minor injuries due to a lack of physicians and hospitals.

D. Wilderness Multi-Casualty Incidents

1. First, a brief review of principles of triage for multi-casualty incidents, and guidelines for management of backcountry triage. For example, assume that a 747 commercial aircraft is down, in the mountains, with 100 dead, 100 OK, and 200 with various injuries, all to be managed by a single field team:
 - a. (reserved)
 - b. (reserved)

E. Principles of Catastrophe Management

1. **Late is not much better than never**
Our concern is the first one to three days after a catastrophic disaster. Just as with an aircraft crash, there is a "golden day" in which many lives can be saved, and our training and planning must re-

flect these realities. In a catastrophic disaster, you must respond quickly to save lives. "Among persons found alive, 89% were rescued within the first 24 hours, mostly without the use of heavy equipment." This was the conclusion of an investigation into the great Armenian earthquake of 1988.¹

2. **There are no rules; there is no government**

No local disaster plan survives contact with the chaos of "The Big One." The administrators who made the disaster plan and who are supposed to carry it out are gone: dead, looking for loved ones, or just trying to survive. (The mayor of Leninikan, in Soviet Armenia, remarked after the earthquake that about 80% of his government officials were dead.) Those from the outside, who are now the only effective organization in the area, are from many different areas. They do not share a common disaster plan, and often they do not even share a common language. The best way to deal with this seems to be to first set up small, independent units working under the Incident Command System (ICS), then later to amalgamate these units into larger structures.* Later these structures can be disassembled.

3. **There is no support: the disaster area is a wilderness**

- a. Transportation is unreliable or nonexistent. While your team may be able to find a vehicle, and you may be able to find gas, and the roads may be passable, there is no assurance of any of these things. Bridges, rail lines, and airports may be destroyed or unsafe. Your team must be ready to travel on

* The Incident Command System (ICS) is a U.S. national standard system for managing wildfires, rescues, searches, disasters, or any other sort of incident. Almost all U.S. wilderness search and rescue teams use the ICS or a variation of it for search and rescue operations, so it should be no difficulty for SAR-trained WEMT's to adapt their search management training to a disaster setting.

foot and to carry all personal survival, rescue, and medical gear. Water may be available, but you must disinfect all water must be purified. Team members must take portable shelter, as buildings may be unsafe.

- b. From a letter to a member of the American response team to the Armenian earthquake: "Several months ago, you and I discussed the 'bare bones' scenario for disaster response: a bare parking lot as a base. As you told me, that's exactly what you found in Armenia. (Of course, you did have a field nearby where a hole could serve as an outhouse, so it wasn't a complete bare-bones situation.)"

4. **In a catastrophe, simple medical problems kill**

Gram positive sepsis from untreated soft tissue wounds and burns. Tetanus from grossly contaminated wounds. Minor crush injuries with mild myoglobinuria combine with dehydration from infectious diarrhea to cause acute renal failure. These are the kind of preventable problems that kill just after a catastrophe. In our modern medical system, they are so trivial that they are not even considered significant problems. However, right after a catastrophe, you may be able to save many lives with just bandages and Gatorade™. The team also might carry cases of tetanus toxoid and oral erythromycin. With Katadyn® filters, cases of iodine water purification tablets, or even a few scrounged bottles of Clorox® and some large lightweight plastic bags for water, along with a box of salt, you can rehydrate and save victims of dysentery and dehydration. Simply by giving out a box of leaf bags and showing how to use them for shelter, you might save 50 people from dying of hypothermia.

5. **A disaster is also a psychological disaster**

The psychological states often seen af-

ter a disaster are described in the section on *Stress Management and Critical Incident Stress Debriefing*. That section also offers guidelines on management of individual victims with one of these conditions. In a true disaster setting, you must use the principles of triage and of good management.

- a. Sometimes, in the interests of saving as many lives as possible, you may want to use the walking wounded (those with relatively minor physical injury) to escort hysterical survivors to a place of relative safety where both groups will be safe. This will leave your team and the able-bodied to care for the other survivors.

b. (reserved)

6. **In a catastrophe, Murphy's Laws prevail**

Murphy's Laws originated as set of humorous observations about the problems of conducting scientific research. However, the grains of truth they contain can serve as the basic tenets for your catastrophe planning.

- a. **Murphy's First Law:** Nothing is as easy as it looks.
- b. **Murphy's Second Law:** Everything takes longer than you think.
- c. **Murphy's Third Law:** In any field of scientific endeavor, anything that can go wrong will go wrong.
- d. **Murphy's Fourth Law:** If there is a possibility of several things going wrong, the one that will cause the most damage will be the one to go wrong.
- e. **Murphy's Fifth Law:** If anything just cannot go wrong, it will anyway.
- f. **Murphy's Sixth Law:** If you perceive that there are four possible ways in which a procedure can go wrong, and circumvent these, then a fifth way, unprepared for, will promptly develop.

- g. **Murphy's Seventh Law:** Left to themselves, things tend to go from bad to worse.
 - h. **Murphy's Eighth Law:** If everything seems to be going well, you have obviously overlooked something.
 - i. **Murphy's Ninth Law:** Nature always sides with the hidden flaw.
 - j. **Murphy's Tenth Law:** Mother nature is a bitch.
 - k. **Murphy's Eleventh Law:** It is impossible to make anything foolproof because fools are so ingenious.
 - l. **Murphy's Law of Thermodynamics:** Things get worse under pressure.
7. Here is a real example of Murphy's Laws at work. When the American team responded to a recent disaster, federal support to the team included handheld radios for communication between team members. These were state-of-the-art programmable handhelds, but, unfortunately, they were programmed for different frequencies. No programming plug was provided to allow reprogramming, so they were useful primarily for hammering in tent stakes. You might say that we should plan to include a programming plug for future responses. However, Murphy's Laws tell us that the programming plug would soon be separated from the radios. A better way would be to assure that each radio could be reprogrammed without a programming plug. If you wanted to instead provide a programming plug for each radio, in view of Murphy's Laws, you'd have to attach it via high-tensile-strength steel cable.

F. Natural Disasters: Special Considerations

- 1. Volcanic Eruptions
- 2. Avalanches, Landslides, and Mudslides
- 3. Large Storms

- 4. Wildfires
- 5. Floods

G. Specific Disaster Medical Problems

- 1. Sanitation
 - a. Water treatment is discussed in the section on *The Wilderness Environment*.
 - b. Food Preparation and Food Handlers
 - c. Latrine siting
 - d. Corpses
- 2. Infectious Diseases
 - a. Gas gangrene
 - b. Tetanus
- 3. Endemic diseases and plant/animal hazards
 - a. Common Contagious Diseases
 - (1) Malaria
 - (2) Cholera
 - b. Central and South America
 - c. Europe
 - d. Soviet Union
 - e. Asia
 - f. Africa

H. Disaster Roles for the WEMT

- 1. Search
- 2. Extrication
- 3. Medical treatment
 - a. Triage at aid stations and in the field
 - b. Improvised first aid in the field using minimal equipment (e.g., examining eye injuries with a penlight, irrigating eye injuries with a zip-lock bag, and pressure-patching corneal abrasions with duct tape and scraps of clean clothing)

c. Providing intermediate-term care at aid stations:

- (1) plaster or fiberglass splints for fractures that don't require reduction
- (2) cleaning and "tacking together" large wounds for later delayed primary closure
- (3) caring for infectious diseases (e.g., dysentery, cholera) using oral or IV fluid replacement
- (4) nursing care for patients destined for evacuation to a field hospital

4. Body recovery

5. Psychological support (see the sections on *Stress Management and Critical Incident Stress Debriefing* and on *Principles of General Medicine* for this).

Glossary

(reserved)

References

1. Noji EK, Kelen GD, Armenian HK, et al. The 1988 earthquake in Soviet Armenia: a case study. *Ann Emerg Med* 1990;19(8):891-897.