Chapter XV: Immobilization and Packaging
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Preliminary Version 0.4    March 6, 1997
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Background Information

The ASRC-CEM Wilderness Emergency Medical Services Institute

The ASRC-CEM Wilderness Emergency Medical Services Institute, previously named the Wilderness Emergency Medicine Curriculum Development Project, is devoted to developing curricula for wilderness EMS providers and medical control physicians, and fosters wilderness EMS research. It is a cooperative venture of the Appalachian Search and Rescue Conference and the Center for Emergency Medicine of Western Pennsylvania. The ASRC is a large, tightly-knit wilderness search and rescue organization with eight teams throughout the mid-Appalachian states. The Center for Emergency Medicine is an emergency medicine and prehospital care research and teaching organization. It provides a medical helicopter service, an emergency medicine residency, Emergency Medical Services for the city of Pittsburgh, and conducts a variety of related projects.

The WEMSI Wilderness EMT Curriculum

This chapter is part of the WEMSI Wilderness Emergency Medical Technician Textbook. In concert with the WEMT Curriculum, the Textbook has been in development since 1986, and took as its starting point a program Dr. Conover developed for the National Association for Search and Rescue in 1980. The Project also draws on many other sources. These include the Wilderness EMT program of SOLO (Stonehearth Open Learning Opportunities), the WEMT program developed by Wilderness Medical Associates, and the Winter Emergency Care Course of the National Ski Patrol. The Wilderness Medical Society's educational and research publications provide needed background for the Textbook. The National Association of EMS Physicians has developed and has published clinical guidelines for delayed/prolonged transport; WEMSI protocols are also available as a model.

With textbooks used by its EMT and SAR prerequisites, the WEMT text provides the material needed to complete the Wilderness Prehospital Emergency Care curriculum established by the Wilderness Medical Society. (Indeed, early drafts of this textbook were a major resource for the WMS curriculum.) We assume that students have the knowledge and skills of an EMT-Basic or EMT-Paramedic. (The curriculum can accommodate both EMTs and paramedics in the same class.) We also assume that students have the knowledge and skills of the Virginia Ground Search and Rescue Field Team Member standards or better. (EMT standards are available from state EMS offices or the U.S. Department of Transportation. The Virginia GSAR standards and GSAR Manual are available from the Virginia Department of Emergency Services, 310 Turner Road, Richmond, VA 23225-6491.) The curriculum is competency-based rather than hours-based, but can be completed in 5-6 intensive days. The curriculum also recommends clinical training, for which guidelines are available in the Curriculum.

WEMT Textbook Chapter Development

An outline for each of the twenty sections was created by a Task Group of five to twenty selected members, but draws on many published sources and consultants. A Task Group Leader guides the Task Group in reviewing and revising the section, and the Curriculum Coordinator supervises all aspects of curriculum development. When the outline satisfies the Task Group, it goes to the Editorial Board, including officers of the ASRC and CEM. It also includes experts in emergency medicine, search and rescue, and education, and a State EMS director. Once acceptable to the Board, it is released to the public.

The Task Group Leader and Editor-in-Chief then produce a Textbook chapter based on the outline. Having a single editor provides a coherent, unified style. Basing chapters on the Task Group's Lesson Plans, as approved by the Editorial Board, ensures accuracy. Each chapter provides a glossary of terms new to a reader with basic EMT and SAR training. In the complete textbook, these glossaries are merged and alphabetized. Each chapter also provides references to support its statements and for further reading. Background that need not be presented in a class based on the Curriculum appear in a small, italic font.

The textbook will be commercially published when completed. All profits will be used to support curriculum development. The textbook will be submitted for publication in 1997. Until then, preliminary versions of the chapters will be printed in this format. These preliminary versions are for use at classes only when authorized by WEMSI. A Course Guide with information about Wilderness Emergency Medical Technician training and course scheduling, and a checklist for recommended in-hospital training are available. For a price list of available publications, write to: Center for Emergency Medicine, 320 McKee Place, Suite 500, Pittsburgh, PA 15213-4904, (412) 578-3203, or email wemsi+@pitt.edu.

We solicit suggestions from those reading any of our Lesson Plans or Textbook chapters. Please send your comments to the Editor-in-Chief, (see title page).
Educational Objectives

1. Demonstrate the ability to apply different extremity immobilization materials in an appropriate manner, and to evaluate the adequacy of immobilization effected.

2. Demonstrate the ability to effectively and efficiently apply the following immobilization devices:
   a) "fiberglass" and similar splinting (casting) material for extremities;
   b) flexible aluminum/foam splints (e.g., SamSplints™) for extremities; and
   c) finger and toe taping.

3. Describe good ways to implement the following immobilization techniques:
   a) improvised splinting using foam pads;
   b) improvised splinting using sticks and clothing; and
   c) improvised splinting using duct tape and other body parts.

4. Describe the advantages and disadvantages of the following methods for splinting femur fractures for wilderness evacuation, including:
   a) Jones' dressing (bulky dressing and splint);
   b) simple splinting;
   c) traction splint with a commercial or improvised ankle hitch, or with skin traction using moleskin (or duct tape) and benzoin;
   d) improvised traction splinting in a litter using the litter as a splint.

5. Describe specific medical hazards of "standard" litter packaging for wilderness patients, including:
   a) pressure necrosis (status ulcers, decubiti, bedsores);
   b) restriction of ventilation;
   c) restriction of venous circulation and venous return from the legs; and
   d) management of the patient's wastes.

6. Direct moving patients with suspected spinal injuries from various contorted and confined positions to the neutral position for immobilization, using a people's hands and webbing slings.

7. Outline the advantages and disadvantages of the following methods for spinal immobilization:

8. cervical collars, both commercial and improvised with SamSplints™, Ensolite™, pack hipbelts or similar foam pads;
   a) padding inside a litter and duct tape;
   b) helmet and duct tape;
   c) Ensolite™, ThermaRest™, or similar foam pads for lumbar immobilization;
   d) full-body vacuum splints;
   e) unpadded backboards;
   f) wire basket or plastic basket litters without backboards;
   g) cervical immobilization devices (e.g., CID™); and
   h) short-board extrication devices (e.g., KED™, Sked-Ked™, XP-1™).

9. Demonstrate an acceptable method for packaging a minimally-injured patient for a lengthy wilderness evacuation.

10. Outline methods for packaging patients in a basket ("Stokes") litter given the following problems:
    a) pelvis fracture;
    b) leg fractures;
    c) unilateral or bilateral chest trauma (e.g., rib fracture, pulmonary contusion);
    d) unilateral pneumonia;
    e) decreased level of consciousness, with and without trauma;
    f) hypothermia/cold exposure;
    g) diarrhea/vomiting; and
    h) oozing wounds.

11. Discuss methods to deal with the following packaging problems:
    a) patient becomes incontinent of urine/feces;
    b) patient complains of pain in pressure areas; and
    c) IV line comes out.

12. Outline the advantages, disadvantages, specific patient-care considerations, and general packaging considerations for the following litters:
a) improvised litters and backboards (outhouse doors, packframes, skis and ski poles, pole-and-parkas, pole-and-blankets, rope stretcher);
b) wire-basket and plastic-basket ("Stokes") litters;
c) "Army" stretchers;
d) toboggans; and
e) flexible plastic litters (e.g., Sked).

13. Outline the advantages, disadvantages, and specific patient-care considerations for the following evacuation methods:
a) vertical and near-vertical lowering, raising, and high-line traverses;
b) hand-carried litter evacuations;
c) wheeled litters;
d) drags and carries; and
e) improvised carries (pack-and-pole, strap and rope-coil "piggyback" carries, "tragsitz" vertical carries).

14. Given a choice of several evacuation routes with different times, and different special problems (e.g., necessity for a vertical head-up lower or raise), give medical recommendations for choice of evacuation route for the following patients:
a) multiple trauma with ongoing fluid resuscitation;
b) uncomplicated mild (90.5 degree F) subacute hypothermia;
c) isolated head injury with decreasing level of consciousness;
d) uncomplicated cervical spine injury; and
e) acute myocardial infarction.

15. Outline the advantages, disadvantages, and specific patient-care considerations for the following transportation methods:
a) helicopter:
b) ground-loading,
c) long-line "pick-off" or "pull-out",
d) hoist ("horse collar," jungle/forest penetrator, and litter;
e) watercraft:
f) rafts,
g) canoes and kayaks, and
h) larger rescue boats;
i) motor vehicles:
j) All-Terrain Vehicles (ATVs),
k) motorcycles and trail bikes, and
l) snowmobiles; and
m) pack animals.

16. Outline positioning and managing patients with head injuries. In particular, describe the effects of:
a) Trendelenburg position;
b) restriction across the external neck veins;
c) positions with the head to one side or the other; and
d) the slightly head-up position with the head in neutral position.¹

17. Describe principles for selecting items for personal and team medical kit contents exclusive of medications, including durability, flexibility, simplicity, size, cost, safety, and security.

18. Identify appropriate and inappropriate items for personal and team medical kits.

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**Spinal Immobilization**

Vacuum splints for spinal immobilization.²

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**Glossary**

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**References**


Part XVI: Disasters

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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-
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:

C. Disaster/Wilderness EMS Similarities

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4. In both, rescuers need overland evacuation skills (the roads may be destroyed).

5. In both, there is need for extended pre-hospital care:
XVI: Disasters

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 reflect 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 after 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.
XVI: Disasters

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 with a zip-lock bag, and pressure-patching corneal abrasions with duct tape and scraps of clean clothing)
Disaster Roles for the WEMT

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

Wilderness EMT
Lesson Plan

Part XVII: Introduction to/Review of Advanced Skills

Draft Version 1.00  August 16, 1992 (reprinted August 1994)
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**Notes: Advanced Skills**

Wilderness rescue is very much a team sport, and EMT-Basics must be ready and able to assist advanced providers (EMT-Paramedics, nurses, and doctors) with advanced skills. Thus, this section orients the EMT-Basic to assisting with advanced procedures in the wilderness, and to managing patients when the advanced provider is disabled or not immediately available. For instance, the EMT-Basic must be able to manage IV lines, to check for IV patency, and to remove infiltrated IV catheters.

Almost all advanced skills needed by an advanced wilderness provider can be found in the standard EMT-Paramedic training curriculum. Therefore, this section teaches EMT-Paramedics no new skills. (Possible exceptions might be adding escharotomy and fasciotomy for EMT-Paramedics, or adding IV therapy for EMT-Basics. We leave it up to those who implement a course based on this Curriculum, and wish to add such skills, to use available resources such as the D.O.T. IV Technician module.)

Applying advanced skills in the wilderness takes ingenuity. This section of the curriculum prepares EMT-Paramedics to adapt their advanced skills appropriately to the wilderness environment.

This version (1.00) contains only the educational objectives; Mr. Yee will fill out the remain-
XVII: Advanced Skills

XVII. Introduction to and Review of Advanced Skills

A. Educational Objectives*

1. Identify ways to help verify endotracheal tube placement, including:
   a. lung and abdominal auscultation;
   b. checking tube length at the teeth or gums;
   c. end-tidal CO₂ monitors; and
   d. syringe aspiration.

2. Demonstrate proper technique to pull back an endotracheal tube that may have become lodged in a mainstem bronchus, including:
   a. deflating the balloon;
   b. repositioning the tube;
   c. re-inflating the tube; and
   d. securing the endotracheal tube again.

3. Identify the roles and usefulness of intravenous therapy, including:
   a. hydration;
   b. electrolyte supplementation;
   c. drug administration;
   d. blood administration; and
   e. obtaining blood samples.

4. Identify dangers of IV therapy for patient and EMT, including:
   a. catheter shear;
   b. air embolism;
   c. infection;
   d. local irritation (phlebitis);
   e. clotting (thrombophlebitis); and
   f. needlesticks and other blood exposure.

5. Identify equipment used for IV therapy and its function, including:
   a. peripheral over-the-needle catheters;
   b. central through-the-needle catheters;
   c. central over-the-wire ("Seldinger") catheter kits;
   d. macrodrip and microdrip tubing;
   e. blood warming tubing extension sets;
   f. three-way stopcocks; and
   g. solution bags.

6. Identify common sites for peripheral IVs, including:
   a. dorsal hand veins;
   b. veins of the forearm;
   c. veins of the antecubital fossa;
   d. saphenous vein of medial ankle; and
   e. external jugular vein.

7. Identify common sites for central IVs, including:
   a. internal jugular vein;
   b. subclavian vein; and
   c. femoral vein.

8. Identify proper technique for starting a peripheral IV, including:
   a. site choice and preparation;
   b. venipuncture and threading the catheter;
   c. securing intravenous catheters for the wilderness context;
   d. aseptic technique, site rotation, and site care.

9. Outline the Seldinger Wire Technique for central lines, and describe how to assist in such a procedure.

* These items will, for the most part, be familiar to paramedics and EMTs with advanced training. However, EMT-Basics must be able to perform these skills in case the team's advanced provider is disabled or absent.
Educational Objectives

10. Demonstrate how to assess the patency of an intravenous catheter, including:
   a. inspection for swelling;
   b. checking for backflow of blood; and
   c. observing continued flow of intravenous solution.

11. Demonstrate proper technique for discontinuing an intravenous infusion when the catheter has become dislodged or is infiltrating, including:
   a. proper care to prevent contamination with blood;
   b. proper disposal of contaminated materials in the backcountry setting; and
   c. shutting off the intravenous infusion and pulling the catheter.

12. Demonstrate how to adapt intravenous infusions for the wilderness environment, including:
   a. how to attach heat packs and insulation to provide a warm infusion;
   b. how to secure intravenous lines against inadvertent dislodging;
   c. how to use a blood pressure cuff as an infusion pump;
   d. how to place an intravenous bag under the patient and use the patient’s own weight for pressure infusion, including clearing the line of air;
   e. how to carry an intravenous bag on a single-length runner in the armpit, and run the intravenous line down one’s parka sleeve to protect from cold.

13. For nasogastric intubation:
   a. discuss indications, contraindications, limitations, and the role of orogastric intubation as an alternative, as applied to the wilderness context;
   b. describe equipment used for gastric intubation in the wilderness context, and modifications needed for wilderness use;
   c. describe patient positioning and the general technique of gastric intubation;
   d. discuss securing gastric tubes and site care;
   e. discuss considerations of clogging when administering food via a gastric tube; and
   f. the method to check for residual volumes and their significance.

14. For urinary catheterization:
   a. discuss indications and contraindications;
   b. describe the standard equipment used;
   c. describe how to choose an appropriate size catheter;
   d. explain the need for aseptic technique;
   e. describe standard site preparation;
   f. describe the technique for catheter insertion;
   g. describe securing the catheter;
   h. discuss site maintenance and urine output monitoring for litter patients;
   i. discuss the role of urinary catheterization in patients with suspected pelvis fracture or genital trauma; and
   j. discuss the use of a “Texas” (condom) catheter as an alternative to standard urinary catheterization, and its advantages and disadvantages.

15. Describe the purpose, indications, general technique, complications, and equipment needed for:
   a. escharotomy;
   b. fasciotomy;
   c. surgical cricothyroid membrane airways; and
   d. needle thoracentesis and chest tubes, including the use of flutter (“Heimlich”) valves in the wilderness context.
Glossary
(reserved)

References
(reserved)