THE WILDERNESS INSTRUCTOR

Development of a Wilderness and Travel Medicine Rotation in an Academic Setting

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Wilderness medicine training has become increasingly popular among medical professionals, and opportunities to obtain training through conferences, workshops, and rotation electives are expanding. Although the core content is similar, they are not formally standardized in content or methodology. Furthermore, the methods of developing a wilderness medicine rotation have not been extensively described in the literature. We therefore describe our experience so that other program personnel can use or improve upon what our rotation offers.

Two board-certified faculty members of the Department of Emergency Medicine of the University of New Mexico (UNM), both with extensive outdoor experience (mountaineering expeditions, scuba diving, and extensive international clinical work), submitted a proposal for a wilderness medicine rotation for medical students to our department faculty as well as to the governing body of the School of Medicine. The topics and hours of the current course are summarized in Table 1. The course was designed to accommodate 5 to 10 third-year or fourth-year medical students who had completed clerkships in medicine and surgery as well as another core clerkship (obstetrics-gynecology or pediatrics) with a grade point average of 3.0 or above. With the approval of our department, 6 faculty members and 4 ED technicians, all with outdoor experience and wilderness medicine training, volunteered their services for didactic or hands-on sessions.

After approval by the Student Affairs Office, the course began in March 2000, with 7 medical students enrolled from our institution (5 third-year and 2 fourth-year medical students). Liability forms for the outdoor activities, approved by our university legal counsel, were also completed by the students. Our course activities included didactic sessions on wilderness medicine topics, clinical exposure, and small field trips. Since Albuquerque is surrounded by desert, mountains, and rivers that provide climbing, skiing, biking, diving, and white-wa-

ter experiences, we had many options for half- and full-day trips nearby, and we chose March for its easy access to both snow and dry land. Didactic sessions consisted of PowerPoint presentations and lectures with handouts. The following year was the first in which a class was given a formal syllabus that included updates to the previous year's presentations.

Philosophy

All faculty from our department were solicited for input on course development and improvement. In addition to pertinent topics featured in previous wilderness medicine conferences and publications, we expanded the sense of the term *wilderness medicine* to include other clinical settings associated with outdoor recreational activities. The curriculum also emphasizes emergent treatment principles, permitting our future clinicians to use their newly acquired knowledge in nonrecreational settings (emergencies that might be encountered in a small clinic, onboard an airplane, or in other situations where access to medical care might be limited).

Although some argue that such a rotation should take place primarily outdoors, the efficacy of such a model has not been prospectively validated. Our course is designed to permit the student access to a variety of true or simulated settings (a ski clinic, a dive boat, a high-altitude camp, or a situation in which the participant is "lost"), the variety of which might not be possible with rotations limited to a single geographic setting, such as the mountains. As in most rotations, however, our program relies on experiential learning, a concept widely accepted in our medical school.

Scenarios and patient contact initially served as the "learning-by-experience" events of the course. Whether they involve moulaged patients, passive mannequin training, computerized patient models, or experience in the clinic or emergency department (ED), these experiences are important constituents of the rotation. Such experiences are especially conducive to learning patient care, since the presentation of a wide array of scenarios

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Table 1. Current sessions and session lengths*

<i>Subject of session</i>	<i>Length of session†</i>	<i>Type of session</i>
Anaphylaxis	1.0	Didactic
Animal bites and rabies/veterinary medicine	2.0	Didactic
Avalanche awareness	1 d	Didactic/practical outing
Backcountry pain management	1.0	Didactic/laboratory
Climbing/knot tying	1 d	Practical outing
Clothing	1.0	Didactic
Disaster medicine/crush injury	3.0	Didactic, laboratory
Diving tutorial	3.0	Tutorial
Diving/submersion	1.5	Didactic, laboratory
Eco-Resus Challenge	1–2 d	Practical outing
ED/EMS	8.0	Practical (discontinued)
Field dentistry	1.5	Didactic/laboratory
Frostbite	1.0	Didactic
General approach to resuscitation	1.5	Didactic
General approach to trauma	3.0	Didactic
High-altitude medicine	1.5	Didactic
High-altitude medicine tutorial	3.0	Tutorial
Hunting injuries/firearm safety/tactical EMS	1 d	Didactic/practical outing
Hyperthermia	1.0	Didactic
Hypothermia	1.0	Didactic
Hypothermia lab	1.0	Laboratory
Improvised splinting/rescue	1 d	Laboratory
Infectious disease tutorial	3.0	Tutorial
Infectious disease/travel medicine	4.0	Didactic
Law and ethics in wilderness	2.0	Didactic
Leadership	1.0	Didactic
Lightning	1.0	Didactic
Marine envenomation	1.5	Didactic
Medical kits	1.5	Didactic/tutorial
Mountain bike outing	1 d	Practical outing
Mountain biking injuries	½ d	Didactic, practical
Mountain rescue	4.0	Didactic laboratory
National Park talks	2.0	Didactic
Orthopedic injuries/sports medicine	½ d	Didactic, practical outing
Overnight snow camp/shelters	1 d	Practical outing
Parasitology	2.0	Didactic/laboratory
Poisonous plants and mushrooms	1.5	Didactic, practical outing
Pretrip medical screening	1.0	Didactic
Scenarios (not prehospital week)	10.0	Practical outing
Scenarios/prehospital/BLS/ALS skills	4 d	Laboratory/practical outing
Simulated patient resuscitations (BATCAVE)	1 d	Didactic, laboratory
Ski clinic	1 d	Practical outing
Snakebites	1.0	Didactic
Special populations in wilderness	2.0	Didactic
Spinal injury	1.0	Didactic laboratory
Sports medicine	2.0	Didactic/laboratory
Third-World medicine	3.0	Didactic
Trauma/resuscitation tutorial	3.0	Tutorial
Weather prediction	1.0	Didactic
White-water emergencies/near-drowning	1 d	Didactic/practical outing
Wilderness survival and navigation	2 d	Didactic, practical outing
Wound care/suture laboratory	3.0	Laboratory

*ALS indicates advanced life support; BATCAVE, basic advanced trauma computer-assisted virtual experience; BLS, basic life support; d, day; ED, emergency department; and EMS, emergency medical service(s).

†All session lengths are given in hours unless noted otherwise. Total: 221.5 ± 8 hours. Note: Half-day sessions were approximately 4 hours in duration; full-day sessions were approximately 8 hours in duration. Session lengths do not include tutorial homework assignments.

Table 2. Current course blocks*

<i>Week 1</i>	<i>Resuscitation and prehospital rescue</i> <ul style="list-style-type: none"> ● Accelerated WFR certification course/scenarios ● Advanced cardiac and trauma skills/human patient simulator ● Search and rescue ● Orthopedics/improvisation
<i>Week 2</i>	<i>Environmental emergencies</i> <ul style="list-style-type: none"> ● Barometric, thermal, and survival medicine ● Unique medical situations and conditions ● Wilderness travel, kits, and preparation
<i>Week 3</i>	<i>Field trip and bugs, drugs, and bites</i> <ul style="list-style-type: none"> ● Mammalian injuries and veterinary medicine ● Plant, insect, reptilian, and oceanographic toxicology ● Field trip—selected topics not previously discussed/scenarios
<i>Week 4</i>	<i>Travel medicine and putting it all together</i> <ul style="list-style-type: none"> ● Infectious disease ● Travel medicine ● International, disaster, and remote medicine ● Eco-Resus Challenge and final examination

*WFR indicates Wilderness First Responder (course).

not commonly encountered in an outdoor, hospital, or clinic setting can take place in a short time. Simulated encounters also minimize patient risk: the student is free to make errors and learn from them.

Democracy and interaction with others on a patient management care team are people skills best learned through communication with one another, delegation of duties, conflict management, leadership, and “follower-ship.”¹ Ideally, this progression leads to the ability to ask for advice or help, which is a difficult trait to teach those who are accustomed throughout their medical training to being independent thinkers in a system that rewards those who have “the right answer.” Some participants viewed this approach as disorganized. However, most of the class (about three fourths) realized, on last-day exit interviews, that the difficult experience of working with others in a democratic way could serve them well in their professional and outdoor careers.

Course evolution

The curriculum was originally adapted from wilderness medicine courses attended or taught by the faculty, chapter headings in the third edition of *Wilderness Medicine* by Auerbach,² and in the Wilderness Emergency Medical Technician (EMT) curriculum taught by the Emergency Medical Services (EMS) Academy of the University of New Mexico.³ As the course was refined, suggestions from directors of existing wilderness medicine programs (E. Peterson, MD, unpublished data, 2002; C.

Stockhoff, unpublished data, 2002) augmented the course; materials from Wilderness Medical Associates, with approval from current faculty for the program, were integrated into our latest classes. Ideas were also garnered from wilderness medical courses with active Web sites.^{4–7} The course is updated yearly on the basis of new advances or trends in the literature.^{8–12} Wilderness medicine faculty members are responsible for updating the sections that they teach, with a core directorship of 5 faculty members who determine necessary global changes for didactic sessions, field trips, syllabi, scenarios, tutorials, test examinations, and the inclusion or deletion of materials. These decisions are based on updates to the literature, comments and evaluation forms from the students, and course grades. The current course is divided into blocks, as shown in Table 2.

The first class admitted 7 students from our university; the subsequent year admitted the same number with 1 extern. The third class had 14 students and 1 emergency medicine intern (a part-time participant) as well as a sub-intern who had taken the class the previous year. The fourth class had 16 students, and the current class has 22 (with 2 emergency medicine residents and 2 of our emergency medicine nurses). Our Graduate Medical Education program accepts extern residents. The 2005 class will take postgraduate physicians, who are eligible to receive credit. This year, we received 92 inquiries for class availability, which filled to the limit of 22 students 2 months after the previous class ended (May 2003). The course is advertised through word of mouth from pre-

vious students and Web browsing; we do not solicit students or send flyers. With additional funding for release time, a second month may be offered in the future.

Faculty and didactic lectures

It was unnecessary to search for outside faculty, since many departmental faculty have had much experience in wilderness and international medicine as the result of research activities, teaching at national emergency medicine and wilderness course offerings, and backcountry activities. All instructors are emergency physicians, veterinarians, dentists, or paramedics; all are teaching faculty for the Department of Emergency Medicine and/or the EMS Academy. Three instructors are also faculty from Wilderness Medical Associates. All faculty have had expertise in their assigned topics through health care delivery in remote and hospital settings, research, or recreation. Half of the faculty members have held leadership positions as expedition planners or expedition physicians or as medical directors for wilderness-based EMS programs.

Because of our departmental affiliation, it was unnecessary to pay instructors, since participation is within the realm of general teaching responsibilities assigned by our academic institution. Course organizers were afforded some relief from clinical or administrative responsibilities from the third year of the class onward. Emergency medicine residents, in fulfilling requisite residency requirements, such as EMS, research, and community projects, participated in setting up courses or participating in scenarios and examinations (eg, the Eco-Resus Challenge). Many didactic lectures and tutorials took place in the morning, allowing for afternoon outdoor field trips. Other teaching activities, described below, would last for most of the day.

Resuscitation block and psychomotor skills

The resuscitation block historically included a week of didactic review of basic life support (BLS) and advanced life support (ALS) procedures, with tutorial cases (see below) added to illustrate certain points. Passive mannequins and moulaged volunteer “patients” were also used to enhance psychomotor skills. The resuscitation block was taught in a standardized traditional advanced cardiac life support/advanced trauma life support (ACLS/ATLS) format during the first year. During the first 2 years, a procedural ED rotation, in which each rotator was assigned to perform ED procedures such as wound care, suturing, and splinting, was performed during the 4-hour periods in the evenings when everyone in the group was in town in order to enhance the stu-

dents’ psychomotor skills. Students could also observe other skills such as ED resuscitations or participate in ambulance ride-alongs. Each student was paired with an ED technician and observed by an ED attendant (when in the ED). The procedural rotation was phased out of the third class with the addition of more outdoor mock patient scenarios and the School of Medicine’s purchase of a computerized human patient simulator mannequin.

Human patient simulator training

The School of Medicine purchased a state-of-the-art computerized human patient simulator for teaching ACLS and BLS principles to physicians, students, nurses, and EMTs, and it was made available to our rotators in 2001. A large room called the BATCAVE (basic advanced trauma computer-assisted virtual experience) is allocated for the use of mannequins, lectures, separate areas for skills sessions, and simulation computers dedicated to the steps of learning (eg, instruction, practice, assessment, competency performance).¹³ Skills and breakout areas are dedicated to basic and advanced airway techniques using passive mannequins, including the use of bag valve masks, oral or nasal airways, multilumen airways, laryngeal mask airways, endotracheal intubation, and surgical cricothyrotomies. Other breakout areas are devoted to intravenous and alternative access for fluid resuscitation, a skills station for automatic external defibrillators and monophasic/biphasic defibrillators (with rhythm strip interpretation), and a skills station for improvisational resuscitation techniques. The entire class then gathers for a didactic discussion of how resuscitations are performed emergently, highlighting ventricular fibrillation and asystole in the traumatic and medical setting. Students then separate into their assigned groups to work with the computerized mannequin-simulated resuscitations.

The simulators can be programmed to demonstrate a wide variety of life-threatening situations as well as common disease processes. The mannequins have life-like features and the ability to simulate physiologic responses to interventions, procedures, and medications. They also have palpable pulses, audible heart and breath sounds, respiratory chest rise, eye and pupillary activity, and the ability to “talk.” Airways can be programmed to swell, simulating the difficult airway (an upgrade, simulating vomit or blood, will be available in the future). Cardiopulmonary states, hemodynamic changes (demonstrable on the mannequin or a monitor), and neurologic changes can be preprogrammed into the computer. Correct or incorrect interventions are manifested as a change in physiologic condition. Drugs can be given in the form of normal saline-filled syringes that are bar

coded for the given simulated medication (such as atropine or epinephrine). Two different scenarios are pre-programmed into the computer: one case is a skiing emergency taking place in a ski clinic; the other is a medical problem encountered during a maritime incident offshore. All scenarios are videotaped. Later, the teams are debriefed using the videotape, which allows constructive feedback and emphasizes teaching points. Each participant is graded on a scale of 0 to 2, derived from a previous methodology used in simulated critical care training¹⁴:

0. For failure to perform a proper sequence or not participating in the scenario;
1. For performing poorly or out of sequence, being only somewhat helpful in patient management, or displaying poor-to-average teamwork; and
2. For performing correctly, in sequence, or displaying good teamwork and being helpful in patient management.

An extra point is given to a student who manages to pull the team together if the outcome or process of the scenario is faring poorly or if the bystanders have been dealt with appropriately. Reviewing each scenario by videotape allows peer-led constructive criticism or encouragement, facilitated by the instructors. Additionally, leadership and teamwork are discussed within that framework.

Although the simulator is a relatively new tool in the field of medical education, the technology to simulate crisis situations has been used since the 1960s for training in commercial and military aviation, space flight, and nuclear power plant operations.¹⁵ As a teaching method, it appears to be more efficient than the standard problem-based learning format¹⁶ or scenario-based teaching.¹⁷ One explanation for this is that the experiential process, including seeing an improvement in or the consequence of a given intervention, makes the simulator a more powerful teaching tool. In a medical school setting, the development of whole-body computerized simulators also provides teachers with an evaluative tool that overcomes the limitations of more passive scenario-based training. The entire evaluation, from the initial assessment to the conclusion of the resuscitation, occurs at the "patient bedside." There is no compartmentalization of care into workstations; therefore, the scenario more realistically duplicates the conditions that students are likely to manage. Furthermore, there is no need to rely on an instructor to "tell" the students what they hear or see. The students judge the physiologic response to oxygen therapy or cardiovascular resuscitation because the parameters are displayed in real time for the

trainees to analyze and synthesize into their management plan.¹⁸

Other authors have documented the efficacy of simulators in the learning and retention of ACLS skills practiced by a group of prehospital providers.¹⁹ Many other medical institutions (eg, the University of Florida at Gainesville, the University of Rochester, Harvard, Penn State, Stanford) are accepting this cutting-edge technology in their programs. However, to our knowledge, our wilderness medicine program is the only one to date that uses this technology. We use the tool for teaching rather than evaluation, although some academic centers^{14,18} advocate its use in the evaluation of a program or as an important part of the curriculum. Students perceive the realism of the simulator to be high, and the literature demonstrates that the pattern of errors recorded by participants is similar to that in actual practice.²⁰ All of our students say that they are more confident in managing the emergent patient after using the simulator, and they think it is very relevant to the objectives of caring for sick patients in the wilderness. Successful and erroneous treatment plans can be demonstrated to their clinical finality in the eyes of the participants, leaving a more permanent impression on the student.

Scenarios

Although scenarios are not new to wilderness medicine training, they still provide a powerful teaching format²¹ familiar to wilderness medicine and prehospital trainers. In recognizing this, the first week of the 2004 class consists entirely of scenario-based education, allowing the student a Wilderness First Responder (WFR) certification through the Wilderness Medical Associates. During the wilderness outing outside Albuquerque, students participated as patients in a variety of scenarios, where group consensus and faculty input were used to evaluate scenario success. Students would constructively comment on the efforts of their peers in a problem-based learning structure, as described below. Twenty scenarios were performed in the fourth year of the course, with varying degrees of complexity, and were developed and evaluated by 4 faculty members and 1 emergency medicine intern who had previously completed the course.

All scenarios are scripted, and actors are given the scripts before the scenario to learn their parts. The use of a printed script with the chief complaint highlighted gives the actors and evaluators a more objective means of documentation. A description of the medical problem, any information pertinent to the medical history of the patient, and a description of the scene such as the location, terrain, and weather are given.¹² The physical examination is noted on the script, although many of the

findings are moulaged when possible. A checklist of vital actions is provided, which facilitates evaluation and discussion. Each scenario is performed by a group of 2 to 4 students, depending on the complexity. Moulaged students are coached in acting out the scenario before the exercise commences in order to add realism to the scenario.

What experience taught us about scenarios

Participants must go into scenarios with good basic skills to get the full benefit from the experience. This may explain why, despite the existence of a procedural ED rotation or an increase in scenarios, most medical students (except for those with previous EMS or wilderness guide experience) did not appear confident in procedural skills, which would possibly translate into inferior care for a real patient in the backwoods. Although most had an excellent grasp of physiologic concepts and could express the correct interventions, many of the students had difficulty with psychomotor skills such as initiating intravenous lines, constructing splints, and transporting patients. Although not tested for statistical significance, this problem did not appear to be a function of educational level, training, or grades; those with EMT or wilderness EMT training fared better. The instructors felt that successful performance in scenarios depends as much on good prehospital care skills as on scenario experience.

Thus, the next course will include a 5-day hands-on scenario-based introduction that emphasizes prehospital skills. Students will also be coached for a few hours on managing scenarios. Each scenario will be preceded by a 20-minute didactic session on a teaching point that will be covered in the scenario. Although students are not expected to have mastered these techniques early in their careers, we have anecdotally found that many physicians are also not adept at such procedures, despite an apparently good knowledge base²²; therefore, those days will be well spent in acquainting the student with wilderness medicine, not merely on an intellectual level, but also on a skill level.

Problem-based learning

During the past 30 years, problem-based learning has become prominent in effective medical education.²³ The basis of problem-based learning is that group learning, as opposed to individual learning, improves understanding, retention, and the transfer of concepts to new problems.²⁴ In this format, collective brainstorming, hypothesis testing, and learning issues (the identification of issues that the learners are unfamiliar with) are the activ-

ities that permit a better learning experience. Three tutorial-based cases precede major sections (high-altitude/dysbarisms, trauma/orthopedics, infectious diseases/medicine in the developing world, or envenomations/survival strategies).

Students are divided into groups of 5 or 6 students, with a faculty member who acts as a facilitator and who may or may not have had experience with the particular case. The case presented to the group provides the overall environmental circumstance and location of an incident, the history and physical details of an incident, and other details of an incident that might affect the outcome of that case. During the group meeting, all students are expected to participate, identify the limits of their knowledge base with respect to the case, and form "learning issues," which means a running list of issues that students would like to further research on an individual basis before a second group meeting. Facilitators are not to "lead" the students into an answer; the power of the problem-based learning methodology arises from students becoming active learners. Facilitators may, however, help groups analyze and learn from their behavior during a meeting. This activity is a process identified by Schmidt²⁵ in which the group defines a problem, analyzes the problem, brainstorms, formulates and tests hypotheses, formulates learning issues, and shares knowledge.²⁶ Students have 1 week to research their given learning issues, using any personal, library, or multimedia sources available. In the second meeting, all learning issues are discussed in front of the facilitator. These issues might include expedition preparation, particulars on the arrival or navigation of a given expedition route, assessment of other team members' skills and health, and elaborations on patient findings. Finally, a cogent treatment and evacuation plan for definitive care is discussed.

At the end of each session, the facilitator conducts a debriefing. This allows students to summarize their findings and to analyze how well they or other members of the group have learned the material. Peer interaction, attitude, and cooperation are also discussed. Students are further evaluated on their willingness to facilitate the learning experience of others; however, they are not encouraged to become moderators or to dominate tutorial discussions. Lastly, all groups come together during a third meeting to discuss the case and to "teach" the other groups. None of the groups has the same case, which makes the session more interesting. Faculty members familiar with the subject material are also present to clarify misunderstandings and to evaluate each case for completeness. A final debriefing at the end allows the students and facilitators to evaluate one another.

The task of the instructor (acting as a tutor) is to guide

students through this learning process. Instructors are not to provide the answers, but rather, to give the student an active self-learning opportunity. Nonetheless, a problem-based learning tutor is not simply to be withdrawn or inactive during the learning process: tutors must have the ability to facilitate a group with questions, probes, encouragement, critical reflection, suggestions, and challenges.²⁷ The facilitator is the catalyst for discovery. We feel that the facilitator need not necessarily be an expert in the content of a given tutorial, although this is controversial in the problem-based learning literature.²⁸ Yet the facilitator must be an expert in the process of individual learning (using the problem-based learning method) and know when to interject, when to hold back, and when to participate equally with the students.²⁷

Wilderness improvisation

Improvisational techniques, which are not new to wilderness medicine training, are taught during the first week to provide a framework for subsequent scenario-based training. An entire day is spent at a local ski lodge, where 4 instructors teach students improvisational skills. In addition to airway and breathing improvisation, hemodynamic stabilization, splinting, and transport of an ill patient are taught. A hypothermia laboratory session is performed in which 3 volunteers are cooled outside (usually in near-freezing temperatures) by ice water and are rewarmed improvisationally. This session consistently receives high ratings.

Survival training and the “Eco-Resus Challenge”

A very important component of our curriculum is personal and group safety, including preparation for unexpected situations. The first weekend of the course is devoted to wilderness survival and land navigation, which evolved from a 4-hour classroom gathering to a 2-day field trip in the New Mexican high desert. Shelter, matchless fires (flint and steel, bow and drill, and several other methods), water procurement, filtration, food, and weather prediction are covered during the first day's session. Three instructors teach 3 groups of 6 to 7 students in 3 stations covering the above topics. The second day consists of training on the use of a map and compass, a primitive means of route finding, and ways in which to measure distance and time; a 3- to 5-mile exercise session completes the second day's activities. The course continues with a nighttime land navigation course, using a compass or the stars as a directional indicator. This field trip is consistently rated as one of the most valuable in the course; students feel more confident in dealing with a survival situation, both physically and psycho-

logically, and feel that the skills are transferable to how they would treat a patient.

The survival and land navigation training (as well as the medical and leadership aspects of wilderness medicine taught during the month) culminates during the day-long timed exercise called the Eco-Resus Challenge. Students are randomized into groups with an equivalent distribution of ability, gender, and physical conditioning. Each participant is given a general orientation to this grueling event, which takes place in a rugged area outside Albuquerque. All backpacks are examined for items that are deemed contraband (eg, prefabricated improvisational materials, GPS units, food, water). Students are staggered into groups that are evenly matched in terms of physical and navigational abilities. These teams must navigate their way to a patient care station and stop to treat and/or transport that patient. Students are given a topographic map for navigational purposes and are provided compasses and knives if needed. Groups must navigate their way through the desert into a mountainous forest, encountering several patient care stations that must be completed, or through obstacles that must be overcome before continuing to the next objective. Areas where students can find food or water (either natural or cached) are indicated on the map. Each group must fill out log sheets pertinent to patient encounters in standard SOAP (subjective objective assessment plan) format. Simulated patients are to be treated in an appropriate manner for the existing conditions; patients may also need transport to the next station. At the end of the course, participants are to use a signal device to facilitate efforts to be “found.” To ensure safety, each group is accompanied by an instructor familiar with the course who does not offer assistance, except when a team is lost or cannot find food or water. Instructors communicate with one another via walkie-talkies in case of emergencies and to apprise one another of student progress.

This type of exercise has recently gained popularity because of similar opportunities offered through the Wilderness Medical Society (WMS)-sponsored “Medwar” (Medical Wilderness Adventure Race) competition,^{4,29} with shorter courses offered thorough WMS conferences and other groups. Our first course in 2000 was a 4-hour event, but with more help and experience from past events, the Eco-Resus Challenge has become more elaborate. Some state chapters of the American College of Emergency Physicians have asked for help developing similar courses for physicians (in a shorter format) during annual statewide physician continuing medical education conferences in order to teach physicians improvisational skills and teamwork. We believe that, while this is possible, more in-depth training in wilderness

medicine and its philosophy is also needed, which would be difficult to carry out in a short day.

Field trips

Half- and full-day field trips near Albuquerque are educational as well as recreational. These trips are introductions to various types of activities, which also allow instructors to evaluate group strengths and weaknesses, in order to customize the longer trip. A half-day mountain biking trip incorporates approximately 10 mini-lectures with patient scenarios during rest stops. A day of rock climbing instruction is usually performed nearby, where the basics of climbing, rappelling, anchors, knots, technique, and safety are practiced. A white-water rafting day takes place in the Taos Box Canyon, where safety and rescue scenarios are performed while rafting down the class III to IV rapids. Although New Mexico lacks an ocean, the excellent Albuquerque Aquarium is available as a classroom. Diving emergencies, marine envenomations, and marine biology are very popular subjects taught there. Professional divers (who staff the aquarium) demonstrate scuba diving equipment, mock dysbarisms, and marine envenomations. Land envenomations are taught at the New Mexico Poison Control Center as well as at the Albuquerque Rattlesnake Museum. Excursions to some local ski areas (Sandia Peak and Taos Ski Valley) have been venues for our wilderness improvisation courses, ski clinics, and avalanche awareness courses. Snow camping in Taos gives students opportunities to build snow shelters, enjoy backcountry skiing, snowshoe, and experience high-altitude activities.

The 7- to 9-day trip covered many different and interesting areas, but the agenda made backpacking difficult. A few hours on most mornings were devoted to scenarios, although one day was spent on an elaborate series of scenarios in Carlsbad Caverns National Park in New Mexico, where the difficulties of caring for and transporting an ill or injured patient were highlighted. We recommend, however, that travel time on longer trips be kept to a minimum.

Evaluation of the participants

Evaluations are weighted as follows: participation (40% of total grade), Eco-Resus Challenge (24%), BATCAVE human patient simulation laboratory (12%), tutorials (12%), and final written examinations (12%). Of the above activities, participation is the most important, since we believe that, while not all in the class perform equally (those with EMT or previous wilderness experience might do better in some exercises), the quality of the learning experience depends on the desire to partic-

ipate. This evaluation, made throughout the course, is based on the following:

1. Attendance;
2. Attitude and helpfulness to one's own learning experience as well as that of others;
3. Leadership and ability to face challenging situations; and
4. Personal demeanor/professionalism.

Attitude is evaluated on the basis of the effort put into learning sessions, the overall interest in sessions (unless sessions received poor evaluations), and the completion of assignments. A good learning attitude is also reflected in skill improvement and mastery of studied topics. Leadership is evaluated on students' ability to make good decisions that affect the group, demonstrate good listening skills, and support the group over individual goals. The ability to organize one's priorities (such as gathering personal items needed on a trip and fulfilling one's responsibilities) is also integral to this category. Lastly, attendees are expected to show a respect for others that is consistent with the expectations of the participant's career.

The Eco-Resus Challenge is graded in terms of the following:

1. Individual and team participation and attitude;
2. Appropriate patient assessments and treatment plans;
3. Accurate communication through SOAP notes and verbal reports to a base camp (via walkie-talkie);
4. Appropriate psychomotor skills; and
5. Proper implementation of survival and navigational skills.

These subevaluations are graded on a 0 to 4 scale, with 4 being the highest grade; most observers following a particular group are familiar with this scale, which is akin to an A to F grade. Participation is given as an individual and group grade, including those qualities previously described, but is separate from the aforementioned grade. Diagnoses and treatment plans are similarly graded, recognizing that such plans are necessarily derived from group consensus. Use of a list of critical actions to be performed makes the grading more objective. Communication of reports verbally is integral to a prehospital setting and is evaluated for organization and accuracy. Psychomotor skills are also part of an individual grade, which includes evident skill with a particular improvisational technique, ability to overcome an obstacle, and transport of patients. Lastly, survival and navigational skills depend on each group's ability to adapt to imposed situations (such as finding sustenance) and to navigate from one objective to the other. Lost groups

are not penalized if they find their way back to their objective.

The tutorial grade is based on the following:

1. Identification of learning issues; and
2. Cogent and accurate assessment and treatment of the particular problem given.

Both of these are group grades, given on a 0 to 4 scale. The group must identify critical learning issues and assessment plans previously derived by instructor consensus, which provides the basis for the grade. Attitude is assessed in the overall "participation" grade of the individual so as not to augment or detract from the tutorial grade.

The final written examination, which used to compose 50% of the grade, now makes up less of the grade. It consists of 50 written essays, pictographs, and multiple-choice questions previously validated by the instructors for comprehensibility, understandability, and accuracy.

Student evaluations

At the end of the course, students were asked to evaluate each didactic, laboratory, tutorial, or outdoor experience. Each session was evaluated by the student on a 100-mm linear analog scale from 0 to 10, with 10 ("excellent") being the highest mark, and 0 ("extremely weak") being the worst. The evaluations were based on the following:

1. Speaker's presentation style (which included the ability to interest listeners, demonstration of clear learning objectives, and efficacy in operating audiovisual or multimedia aids);
2. Speaker's knowledge of subject;
3. How well subject material was learned;
4. Applicability to course; and
5. Whether or not the subject or lecturer was recommended for subsequent classes.

A separate "Comments" section under each session heading allowed the student to provide more detailed feedback. Of the 19 faculty members currently teaching, 87% consistently average a score of 8 or higher, and 75% consistently receive a score of 9 or higher in the above categories. Of the remaining 13%, only 2 received a score lower than 6 (both from organizational and content deficits). These courses were subsequently modified, and now, the score is in the 90th percentile.

Laboratory, tutorial, or outdoor experiences were evaluated on the basis of the above criteria and whether or not the experience was interesting or stimulating. The overall course was also evaluated on the choice of speakers, the experiences provided (tutorials, BATCAVE, Eco-Resus Challenge, and trips), and whether the course

merited recommendation to others. These categories consistently receive scores of 9.5 and higher, although the organization of trips received several ratings of 8.5, with a spread of ± 1.5 . Future evaluations will be performed on our Web site for ease of database management and to allow the student to give feedback any time after a given session.

Sponsorships and funding

Our main sponsor has been our ED and medical school. Meeting space is provided by our department and the EMS Academy. The rotation is offered through the emergency medicine department, where audiovisual equipment, computers, syllabi, and copying services are generously provided by the department. Administrative assistant support is also provided through our department. These organizational responsibilities, although distributed throughout the year, focus on December through April, requiring an average of 5 to 10 hours weekly during those months. Most of the financial support came from the department during the first 2 years, with the exception of room and board, travel, and incidental costs, which were covered by the student.

Partnerships have been of immense value in covering expenditures. In exchange for training their prehospital provider-trained staff, the Albuquerque Aquarium, Rattlesnake Museum, Sandia Peak Ski and Tramway, Taos Ski Valley, and Carlsbad Caverns/National Park Service amply donated exceptional venues and passes for their activities. Costs are kept low because of the program's academic affiliation and the enthusiastic support of our department, our dean of the School of Medicine, our offsite hosts, and, most importantly, our instructors, who make themselves available for this great endeavor.

Summary

Wilderness medicine courses tend to teach similar topics, but they can differ with respect to philosophy, teaching methods, and financing. Our not-for-profit course is academically based and is similar to other programs with regard to presentations of didactic material and outdoor training, but there are also important differences in teaching methodology that are not used by other programs to date. Innovative methods, such as problem-based learning and use of the human patient simulator, which are unique to our program, have been successful in our courses and may be of use to wilderness medical education. We hope that sharing information about our program will help make wilderness medicine training more standardized and uniform.

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