WILDERNESS INSTRUCTOR

Medical Student Electives in Wilderness Medicine: Curriculum Guidelines

Stephanie A. Lareau, MD; Michael J. Caudell, MD; Kiran B. Pandit, MD, MPH; Brian C. Hiestand, MD, MPH

From the Department of Emergency Medicine, Georgia Regents University, Augusta, GA (Drs Lareau and Caudell); the Department of Emergency Medicine, Virginia Tech–Carilion Clinic, Roanoke, VA (Dr Lareau); the Department of Emergency Medicine, Columbia University, New York, NY (Dr Pandit); and the Department of Emergency Medicine, Wake Forest University School of Medicine, Winston-Salem, NC (Dr Hiestand).

Wilderness medicine has been a part of medical student education for many years and is becoming more popular. To help standardize and improve the student experience, we surveyed current elective directors to gain an understanding of what experts in the field thought were priority elements in a wilderness medicine elective. Although there is a diversity of opinion among leaders in the field, there are multiple topics on which there is concordance on inclusion or exclusion.

Key words: wilderness medicine electives, medical student elective, curriculum, wilderness medicine curriculum

Introduction

Wilderness medicine has been a part of medical student education for many years and is becoming more popular. According to standards established by the Liaison Committee on Medical Education (LCME), medical education curricula must include electives not only to gain exposure to various medical specialties but also to “provide opportunities for medical students to pursue individual academic interests.”¹ In 2005, there were 8 medical student electives offered in the United States.² There are now at least 26 active student electives, with several more in the planning stages. The electives are offered by a mix of individual medical schools, wilderness medicine companies, and the Wilderness Medical Society (WMS). Intended participants vary from 1st- to 4th-year medical students. Some courses also are open to residents and PA students. Courses range in length from 2 to 4 weeks. Currently, unlike many other student clerkships such as emergency medicine³ or internal medicine, there is no standardized curriculum for wilderness medicine student electives.

The Accreditation Council for Graduate Medical Education (ACGME) is a private professional organization that accredits residency programs. The ACGME establishes educational objectives for residency

programs that are often reflected in medical school curriculum development, covering domains such as patient care, medical knowledge, practice-based learning and improvement, interpersonal and communication skills, professionalism, and systems-based practice. These same competencies are used by the American Board of Medical Specialties (ABMS) for maintenance of certification for practicing physicians.

Given that there is no current established core curriculum, student educational experiences may be variable. To help standardize and improve the student experience, we surveyed current elective directors to gain an understanding of what experts in the field thought were priority elements in a wilderness medicine elective. Another goal of this project is to assist elective directors with curriculum design by providing a consensus of basic topics that should be covered in an introductory elective, and ideas for other topics that can be covered. It is not meant to limit topics covered or elective experiences.

Methods

Through searching lists on the WMS and American College of Emergency Physician (ACEP) websites and e-mailing the WMS Education Committee and the American College of Emergency Physicians (ACEP) Wilderness Medicine Section, a list of all the current and recent wilderness medicine electives was created.

Corresponding author: Stephanie Lareau, MD, Carilion Clinic, Department of Emergency Medicine, 1906 Bellview Avenue, Roanoke, VA 24014 (e-mail: stephlareau@gmail.com).

Each course director was contacted and curricula or schedules were requested. All of the topics from these schedules were then compiled into a list, which was consolidated by the authors to represent all of the topics covered in current electives.

A list of experts in medical student wilderness education was compiled. Experts were defined as all of the current wilderness medicine student elective directors as well as persons who were nominated by members of the WMS Education Committee or members of the ACEP Wilderness Medicine Section as experts in student wilderness medicine education. Fifty-four people were nominated as experts.

These experts were sent a survey with the following instructions: "This survey is intended to help create a consensus statement regarding topics that 'can, should or must' be included in a 4-week wilderness medicine elective for medical students. The topics listed below have all been pulled from current curricula and syllabi. There is significant overlap between some topics while other topics are meant to be included under umbrella terms. Even if not specified, each topic is intended to be geared toward a wilderness environment with inclusion of improvisational techniques where appropriate. This survey is intended to create guidelines to help establish new electives and provide a resource for collaboration among elective directors. It is not intended to discount or discourage improvisation and flexibility which are vital in wilderness medicine."

We chose the words "should" and "must" to be in accordance with the standards set forth by the LCME: "Use of the word 'must' indicates that the LCME considers meeting the standard to be absolutely necessary for the achievement and maintenance of accreditation. Use of the word 'should' indicates that compliance with the standard is expected in the absence of extraordinary and justifiable circumstances that preclude full compliance."¹ Although the LCME context of these words applies to accreditation of medical programs, we used similar terminology for the context of a medical student elective, with the addition of the words "can" and "should not" to assess and codify expert opinion on the subject matter.

We asked the surveyed experts to rank each topic on a Likert scale as 0, should not; 1, can; 2, should; and 3, must. Data were compiled in an Excel (Microsoft Corp, Redmond, WA) worksheet. Using Stata (v.11.0; Stata-Corp, College Station, TX) the mean scores and standard deviation were calculated for each topic. We also established the set of all topics that at least one expert ranked as a "must" and also created a list of topics that at least one expert ranked as a "should not" be taught. The ACGME core competencies in each topic were also determined by the authors.

Data

Of the group of 54 experts, 35 responded to the survey. It was clear based on comments from one respondent that he or she did not understand the instructions so his or her responses were excluded as outlier data, leaving 34 sets of responses available for analysis. Seventeen were current or past elective directors with an average experience of 5.7 years, ranging from 1 year to 15 years. Thirty-one of the respondents were WMS members, 18 of whom were also ACEP Wilderness Medicine Section members. Twenty-eight of the respondents were associated with academic institutions, and 6 were associated with private wilderness medicine organizations.

Table 1 shows the number of respondents who chose "should not," "can," "should," and "must" and the average and standard deviation of each topic. With the exception of swift water rescue, cave rescue, high angle rescue, and wildland fire, every topic was rated as a "must" by at least one respondent. These exceptions are considered to be nonmedical wilderness skills, which might be why some respondents said they should not be taught.

Conversely, the following topics were rated as "should not" be taught by at least one respondent: high angle rescue; wildland fires; cave rescue; hyperbaric medicine; swift water rescue; avalanche; natural disaster; low angle rescue; seafood toxidromes; mass casualty; dive injuries; environmental ethics; trip planning; medical futility; clothing gear selection; orienteering, maps, and global positioning systems; ear, nose, and throat; and gynecology and genitourinary. Unfortunately, based on the design of the survey, reasons for ratings were not obtained.

Each topic was also evaluated and assessed for relevance to the ACGME Accreditation Council for Graduate Medical Education core competencies (Table 2). There are 6 core ACGME competencies.

- 1) Patient Care: "Identify, respect, and care about patients' differences, values, preferences, and expressed needs; listen to, clearly inform, communicate with and educate patients; share decision making and management; and continuously advocate disease prevention, wellness, and promotion of healthy lifestyles, including a focus on population health."
- 2) Medical Knowledge: "established and evolving biomedical, clinical, and cognate (eg, epidemiological and social behavioral) sciences and the application of knowledge to patient care."
- 3) Practice-Based Learning and Improvement: "involves investigation and evaluation of one's own patient care, appraisal and assimilation of scientific evidence, and improvements in patient care."

Table 1. Numbers of responses to each topic according to ranking of importance to curriculum

<i>Topic</i>	<i>Should not (0)</i>	<i>Can (1)</i>	<i>Should (2)</i>	<i>Must (3)</i>	<i>Mean</i>	<i>Standard deviation</i>
Patient assessment	0	0	2	33	2.94	0.24
Spinal cord injuries, improvised immobilization, and assessment	0	0	4	31	2.89	0.32
Fractures, dislocations	0	0	4	31	2.89	0.32
Cold injury and illness	0	0	4	31	2.89	0.32
Soft tissue injuries (wounds, burns, blisters)	0	0	5	30	2.86	0.36
Heat illness	0	0	5	30	2.86	0.36
Sprains and strains	0	1	5	29	2.8	0.47
Altitude illness	0	0	7	28	2.8	0.41
Head injuries	0	0	9	26	2.74	0.44
Allergy and anaphylaxis	1	2	2	30	2.74	0.7
Improvised patient transport	0	0	9	26	2.74	0.44
Introduction to wilderness medicine	0	3	4	28	2.71	0.62
Blunt trauma	0	0	10	25	2.71	0.46
Waterborne illness	0	0	11	24	2.69	0.47
Lightning injury	0	1	11	23	2.63	0.55
Submersion, drowning, and near drowning	0	1	12	22	2.6	0.55
Penetrating trauma	0	1	13	21	2.57	0.56
Snake envenomations	0	0	15	20	2.57	0.5
Arthropod bites/stings	0	0	15	20	2.57	0.5
Respiratory emergencies/dyspnea	1	2	8	24	2.57	0.74
Neurologic emergencies/altered mental status	1	3	7	24	2.54	0.78
Abdominal pain/GI illness	1	3	8	23	2.51	0.78
Wilderness first aid kits	0	5	10	20	2.43	0.74
Teamwork and communication in the wilderness	0	4	13	18	2.4	0.69
Cardiac emergencies/chest pain	1	4	10	20	2.4	0.81
Survival skills	0	4	13	18	2.4	0.69
Risk management/judgment in the wilderness	0	6	10	19	2.37	0.77
CPR in the wilderness	0	3	16	16	2.37	0.65
Eye injuries/pain	1	3	16	15	2.29	0.75
Nutrition and hydration	1	4	14	16	2.29	0.79
Search and rescue	0	6	13	16	2.29	0.75
Poisonous plants	0	4	18	13	2.26	0.66
Wilderness vs urban medicine	0	9	10	16	2.2	0.83
Diabetes	1	7	12	15	2.17	0.86
Documentation	0	8	15	12	2.11	0.76
OB/GYN/urogenital	2	4	17	12	2.11	0.83
Dental pain/injury	1	5	18	11	2.11	0.76
Wild and domestic animal attacks	0	9	14	12	2.09	0.78
Ears, nose, throat	2	4	18	11	2.09	0.82
Orienteering/map reading/GPS	3	7	10	15	2.06	1
Clothing and gear selection	3	8	8	16	2.06	1.03
Marine envenomation	0	11	11	13	2.06	0.84
Medical futility	2	6	16	11	2.03	0.86
EMS and wilderness medicine coordination/interface	0	10	15	10	2	0.77
Mental health	1	7	18	9	2	0.77
Expedition medicine	0	13	11	11	1.94	0.84
Medical legal issues in wilderness medicine	0	11	16	8	1.91	0.74
Trip planning	2	10	13	9	1.8	0.93
Pediatrics	1	12	16	6	1.77	0.77
Rope safety and knots	1	12	16	6	1.77	0.77
Environmental ethics	1	13	15	6	1.74	0.78
Travel medicine	0	13	18	4	1.74	0.66

Table 1 (continued)

Topic	Should not (0)	Can (1)	Should (2)	Must (3)	Mean	Standard deviation
Dive injuries	1	14	14	6	1.71	0.79
Geriatrics	1	16	13	5	1.63	0.77
Mass casualty	1	15	15	4	1.63	0.73
Seafood toxidromes	2	16	11	6	1.6	0.85
Tropical medicine	0	20	12	3	1.51	0.66
Natural disaster	1	22	8	4	1.43	0.74
Low angle rescue	3	19	9	4	1.4	0.81
Hyperbaric medicine	1	23	9	2	1.34	0.64
Avalanche rescue	2	22	10	1	1.29	0.62
Swift water rescue	2	21	12	0	1.29	0.57
Wildland fires	1	27	7	0	1.17	0.45
Cave rescue	2	25	8	0	1.17	0.51
High angle rescue	5	21	9	0	1.11	0.63

CPR, cardiopulmonary resuscitation; EMS, emergency medical systems; GI, gastrointestinal; GPS, global positioning system; OB/GYN, obstetrics and gynecology.

- 4) Interpersonal and Communication Skills: “that result in effective information exchange and teaming with patients, their families, and other health professionals.”
- 5) Professionalism: “commitment to carrying out professional responsibilities, adherence to ethical principles, and sensitivity to a diverse patient population.”
- 6) Systems-Based Practice: “Actions that demonstrate an awareness of and responsiveness to the larger context and system of health care and the ability to effectively call on system resources to provide care that is of optimal value.”

As seen in Table 2, the wilderness medicine curriculum is able to address each of these 6 competencies throughout many of the topics covered.⁴

Discussion

Wilderness medicine encompasses a very broad subject matter with many components, most of which cannot be mastered in a 4-week elective. Many of the topics could alone easily consume an entire 4-week course. Student electives are typically designed to give students a general overview of the core components of a field of interest, and wilderness medicine is no exception. In the electives reviewed and from expert comments, an overview elective is favored over a focused elective that just covers one niche within wilderness medicine.

Electives in wilderness medicine are unique in that they are offered in many different locations, which lend themselves to different opportunities. For example, learning about avalanche rescue could be practical for a course based in Utah or Colorado, but less appropriate for a course

based in Florida or Georgia. Course directors also have varied experiences and skill sets and therefore may design courses to emphasize their individual priorities that they have developed in their wilderness medicine practice.^{5–7}

By examining the data it is clear that there are varied ideas among experts about what should and should not be covered in an elective. This survey did not delve into methods for teaching these topics, which can also vary greatly. We believe that the diversity in both geographic settings and medical elective types (academic vs private) adds value to our survey and validity to the information obtained.

The purpose of our survey is not to limit the topics covered, or force electives to adopt a uniform curriculum. Instead it is hoped that this information will assist new directors in creating curricula and help establish a minimal basis of knowledge that could be expected of students who have taken a wilderness medicine elective. Our process also provides a roadmap toward fitting a designed curriculum within the ACGME core competencies.

We suggest that the next step would be to actually obtain consensus among leaders in the field as to optimal curricular content, using the data presented here as a starting point for the discussion. Strategies such as a Delphi approach could be used to refine and align diverse opinions to generate a truly consensus-based core medical student curriculum.

This study has several limitations. The study was only advertised to members of the WMS Education Committee and the ACEP Wilderness Medicine Section. The individuals surveyed were selected by peer nomination and self-nomination, so there may be instructors or other highly qualified individuals who were not surveyed. The sample consisted mostly of elective directors so they

Table 2. Relevance of topics to Accreditation Council for Graduate Medical Education core competencies

<i>Topic</i>	<i>Patient Care</i>	<i>Medical knowledge</i>	<i>Practice-based learning and improvement</i>	<i>Interpersonal and communication skills</i>	<i>Profes- sionalism</i>	<i>Systems- based practice</i>
Patient assessment	X	X	X	X	X	X
Spinal cord injuries, improvised immobilization, and assessment	X	X	X	X		
Fractures, dislocations	X	X	X			
Cold injury and illness	X	X	X			
Soft tissue injuries (wounds, burns, blisters)	X	X	X			
Heat illness	X	X	X			
Sprains and strains	X	X	X			
Altitude illness	X	X	X			
Head injuries	X	X	X			
Allergy and anaphylaxis	X	X	X			
Improvised patient transport	X	X	X	X		X
Introduction to wilderness medicine		X	X	X	X	X
Blunt trauma	X	X	X			
Waterborne illness	X	X	X			
Lightning injury	X	X	X			X
Submersion, drowning, and near drowning	X	X	X			X
Penetrating trauma	X	X	X			
Snake envenomations	X	X	X			
Arthropod bites/stings	X	X	X			
Respiratory emergencies/dyspnea	X	X	X			
Neurologic emergencies/altered mental status	X	X	X			
Abdominal pain/GI illness	X	X	X			
Wilderness first aid kits			X			
Teamwork and communication in the wilderness				X	X	X
Cardiac emergencies/chest pain	X	X	X			
Survival skills				X		X
Risk management/judgment in the wilderness	X	X	X	X	X	
CPR in the wilderness	X	X	X	X	X	X
Eye injuries/pain	X	X	X			
Nutrition and hydration	X	X	X			
Search and rescue	X			X	X	X
Poisonous plants	X	X	X			
Wilderness vs urban medicine		X	X	X	X	X
Diabetes	X	X	X			
Documentation	X	X	X	X		X
OB/GYN/urogenital	X	X	X			
Dental pain/injury	X	X	X			
Wild and domestic animal attacks	X	X	X			
Ears, nose, throat	X	X	X			
Orienteering/map reading/GPS			X	X		X
Clothing and gear selection			X			X
Marine envenomation	X	X	X			
Medical futility		X	X	X	X	X
EMS and wilderness medicine coordination/interface		X	X	X	X	X
Mental health	X	X	X			

Table 2 (continued)

Topic	Patient Care	Medical knowledge	Practice-based learning and improvement	Interpersonal and communication skills	Professionalism	Systems-based practice
Expedition medicine	X	X	X	X	X	X
Medical legal issues in wilderness medicine		X		X	X	X
Trip planning				X	X	
Pediatrics	x	x	x			
Rope safety and knots				x	x	x
Environmental ethics				x	x	x
Travel medicine	x	x	x	x	x	x
Dive injuries	x	x	x			
Geriatrics	x	x	x			
Mass casualty	x	x	x	x	x	x
Seafood toxidromes	x	x				
Tropical medicine	x	x	x			x
Natural disaster	x	x	x			x
Low angle rescue	x	x	x		x	x
Hyperbaric medicine	x	x	x		x	x
Avalanche rescue	x	x	x	x	x	x
Swift water rescue	x	x	x	x	x	x
Wildland fires		x	x	x	x	x
Cave rescue	x		x	x	x	x
High angle rescue	x		x	x	x	x

CPR, cardiopulmonary resuscitation; EMS, emergency medical systems; GI, gastrointestinal; GPS, global positioning system; OB/GYN, obstetrics and gynecology.

may have bias about what should be covered based on their own courses.

The curriculum suggested is only a list of topics. The mean scores obtained for each topic resulted in a rank list of topics reached by consensus and indicates those topics thought to be most appropriate for a student wilderness medicine elective (Table 1). There are no objectives within each topic, so different instructors may cover different breadths and depths of material for the listed topics. However, we believe that faculty should develop these objectives in accordance with the LCME's objectives of knowledge, skills, behaviors, and attitudes.¹ We suggest that at least an overview of the topics should be covered and the depth can be left up to individual course directors based on the mechanics of their course.

This study is also limited to curricula and topics for medical student courses. Although this information could be applied to resident and fellow curricula, this study did not delve into curricula for these groups.

Conclusions

There is an increased demand for wilderness medicine educational experiences among medical students. This

article presents a survey of expert opinion on which topics should be taught in a wilderness medicine student elective. Although there is a diversity of opinion among leaders in the field, there are many topics on which there is concordance on inclusion or exclusion. Future efforts should focus on generating a consensus-based curriculum that is in alignment with established medical curricular goals.

Acknowledgments

We would like to thank the following individuals for their help in data gathering and support of the project: Julio De Pena Batista, MD; Scott Evans, MD; Corina Tatar Freitas; Andrew Park, DO; Shana L Tarter; and Carl Weil.

References

1. LCME Standards and Publications. Functions and structure of a medical school: standards for accreditation of medical education programs leading to the M.D. degree, May 2012 (for schools with full accreditation surveys in 2013–2014). Available at: <http://www.lcme.org/publications.htm>. Accessed August 25, 2013.

2. McGraw D, Gluckman S. The perceived benefits of a medical school course in wilderness medicine. *Wilderness Environ Med.* 2005;16:106–110.
3. Tews MC, Wyte CM, Coltman M, et al. Developing a third-year emergency medicine medical student curriculum: a syllabus of content. *Acad Emerg Med.* 2011;18(suppl 2): S36–S40.
4. Accreditation Council for Graduate Medical Education. ACGME Common Program Requirements. Available at: <http://www.acgme.org/acgmeweb/Portals/0/PFAssets/ProgramRequirements/CPRs2013.pdf>. Accessed November 19, 2013.
5. Macias D, Rogers K, Alcock. Development of a wilderness and travel medicine rotation in an academic setting. *Wilderness Environ Med.* 2004;15:136–145, discussion 135.
6. Fielding C. Introducing medical students to wilderness medicine. *Wilderness Environ Med.* 2011;22:91–93.
7. Lemery J. Wilderness medicine in academic medical education. *Wilderness Environ Med.* 2008;19:221–222.