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BRIEF REPORT

A National Survey of Wilderness Medicine Curricula in United States Emergency Medicine Residencies

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Introduction—Wilderness medicine (WM) is a growing subspecialty of emergency medicine. In 2018, we surveyed all 240 emergency medicine residencies in the United States to assess the scope of WM education in emergency medicine training programs in light of the nearly 30% increase in the number of residencies since 2015.

Methods—A survey was e-mailed to the Council of Residency Directors in Emergency Medicine listserv and individual program directors of each of the 240 residencies. The survey included questions on educational content, format, number of hours taught, availability of conference credit, offering of an elective or fellowship, and several predefined WM curricula. We evaluated differences between 3-y and 4-y residencies using the χ^2 test, where $P<0.05$ was considered significant.

Results—We had a response rate of 57% for completed surveys. Analysis showed 63% of respondent programs teach WM material. The majority (86%) partially or completely developed their curriculum, with 33% offering at least 1 of the predefined curricula. Thirteen percent taught with lecture only, 2% taught by hands-on only, and 85% used a combination of the 2. WM electives were significantly more likely to be offered by 4-y than 3-y residencies ($P=0.009$).

Conclusions—Almost two-thirds of respondent residency programs teach WM material. Of these, only one-third teach any of the predefined curricula. Four-year residencies are more likely to offer WM electives but are otherwise comparable to 3-y programs.

Keywords: education, residents, didactics, fellowships

Introduction

Wilderness medicine (WM) is a subspecialty with a growing body of literature and expanding educational opportunities. As of June 2019, there were 17 WM fellowships in the United States (14 at the time of our survey).[1] A number of curricula for WM have been published, including models focused on US Board of Emergency Medicine core content.[2-5]

A 2015 assessment of WM content in residency training reported that 45 programs taught WM as part of their curriculum, with almost all (96%) of the programs using lecture as their primary format and 51% using hands-on training.[6] Since that time, there has been a 28% increase in the number of emergency medicine residencies in the United States, from 187 to 240.

In this study, we update and expand the knowledge of the current state of WM education in the United States on a national level, including detailing the inclusion of formally available WM curricula into residency training.

Methods

We designed an 8-question survey to explore the level of WM training, availability of conference credit, and overall hours in the didactic curriculum dedicated to WM content in each residency program. Yale University's institutional review board approved the study (protocol ID #2000021632).

We developed and refined the survey instrument through discussion among the education faculty in our department. Additionally, we evaluated the use of several predefined curricula, including wilderness first aid/wilderness life

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support,[7] basic wilderness life support/wilderness first responder,[8] and advanced wilderness life support (AWLS).[9] Survey questions consisted of multiple-response or fill-in-the-blank formats and were tested among a group of residency educators for clarity.

The questionnaire employed Qualtrics software and was distributed to all emergency medicine residency program directors and assistant/associate program directors using the council of residency directors in emergency medicine listserv. All 240 of the Accreditation Council for Graduate Medical Education–accredited emergency medicine residencies were invited to participate. Programs that did not complete the survey received a second invitation within 2 mo. Finally, we directly e-mailed program directors of nonresponding programs with an invitation to complete the survey. No incentives were offered.

Survey responses were anonymously reviewed, and names of residency programs were elicited separately as identifiers only to ensure recognition of duplicate survey responses. If respondents answered "no" to Q1 ("Does your program teach wilderness medicine?"), the survey was considered complete. If respondents answered "yes" but did not answer any of the subsequent questions, the survey was considered incomplete. When specific residency programs submitted more than 1 survey response, these were checked for conflicting data and merged as follows. For questions on course format (Q3), hours spent (Q4), and type of teaching (Q6), we consolidated responses and included all answers. When programs submitted multiple, conflicting answers for either the conference credit question (Q5) or the elective offerings question (Q7), the merged answer defaulted to "yes." Here, we assumed that an affirmative response was more likely to be accurate and based on actual knowledge of the residency's WM offerings, whereas a respondent might answer in the negative simply due to lack of awareness of available options. Omitting these conflicting observations did not change result significance. One program had a conflicting entry on WM fellowship availability (Q8), which we cross-checked with the Society for Academic Emergency Medicine website on fellowships for accuracy.[1]

Data were exported to Microsoft Excel and R for quantitative analysis. We evaluated differences between 3-y and 4-y programs using the χ^2 test, where $P<0.05$ was considered significant. The 95% CIs were calculated using the Wilson interval.[10] Proportions were reported as percentages, where the denominator was the number of programs responding to each question rather than the total number of programs answering the survey. For the formal curricula (Q3), percentages do not sum to 100% because certain residencies teach multiple curricula.

Results

The survey was sent to 240 programs and received 189 responses, 16 of which did not identify their program by name and were therefore excluded from the analysis. Of the remaining 173 responses, we excluded 16 as incomplete. There were 38 duplicate responses attributable to 17 programs, which we resolved using the rules outlined earlier. This left a total of 136 complete surveys, giving a response rate of 57%. Table 1 summarizes the results.

Analysis of the data showed that 85 (63%) respondent programs have some form of WM training as part of their residency curriculum. Subsequent results analyze these 85 programs. Sixteen (19%, 95% CI 12–28) taught basic wilderness life support/wilderness first responder, 16 (19%, 95% CI 12–28) taught wilderness first aid/wilderness life support, 9 (11%, 95% CI 6–19) taught AWLS, and 73 (86%, 95% CI 77–92) at least partly developed their own curriculum, with many programs offering a combination of these curricula. Twenty-eight (33%, 95% CI 24–43) programs offered some formalized curricula as part of their teaching.

Among programs specifying hours spent teaching the subject matter (n=82, 60%), 40 (49%) taught ≤5 h, 22 (27%) taught between 6 and 10 h, and 20 (24%) taught >10 h cumulatively over the course of an academic year. Forty-nine (58%, 95% CI 47–68) offered conference credit for WM material.

Eleven (13%) taught with lecture only, 2 (2%) taught by hands-on only, and 72 (85%) used some combination of the 2 modalities. Thirty-one (36%, 95% CI 27–47) programs offered a WM elective, and 10 (12%, 95% CI 7–20) offered a WM fellowship.

Comparing 3-y and 4-y programs, there was no significant difference in teaching WM ($P=0.547$), the inclusion of at least 1 of the formal curricula versus own curriculum only ($P=0.962$), or offering of a fellowship ($P=0.104$). Four-year programs were significantly more likely to offer an elective in WM ($P=0.009$).

Discussion

The majority (63%) of respondent residencies offer some level of WM training as part of their curriculum, predominantly as a combination of lecture and hands-on teaching. In comparison to 2015,[6] residency program numbers overall have increased from 187 to 240 (+28%), and programs offering WM education have increased from 45 to 85 (+89%). Although WM content has always been part of the model of the clinical practice of emergency medicine[11] and thereby an expected component of the educational curriculum of any residency, the increasing amount of WM education reported

Table 1. Survey questions and compiled responses

	Total		*3-y programs*		*4-y programs*		*P*
	n	%	*n*	%	*n*	%	
Q1 Does your program teach WM?							
Yes	85	63	61	61	24	67	0.547
No	51	38	39	39	12	33	
Q2 What type of residency is your program?							
3 y	100	74		n/a		n/a	n/a
4 y	36	27					
Q3 What level of WM is being taught?							
Own curriculum only	57	67	41	67	16	67	0.962
Some formal curriculum[a]	28	33	20	33	8	33	
BWLS/WFR[b]	16	19	10	16	6	25	n/a[a]
WFA/WLS[c]	16	19	11	18	5	21	
AWLS[d]	9	11	8	13	1	4	
Q4 How much time (in cumulative hours) is spent over the academic year on teaching WM?							
≤5 h	40	49	27	45	13	59	0.148
6–10 h	22	27	15	25	7	32	
>10 h	20	24	18	30	2	9	
Q5 Does your program offer conference credit for any WM courses or teaching?							
Yes	49	57	33	54	16	67	0.291
No	36	42	28	46	8	33	
Q6 What format does your program teach by?							
Lecture only	11	13	7	12	4	17	0.562
Hands-on only	2	2	2	3	0	0	
Both	72	85	52	85	20	83	
Q7 Does your program offer a WM elective?							
Yes	31	36	17	28	14	58	0.009
No	54	64	44	72	10	42	
Q8 Does your program offer a WM fellowship?							
Yes	10	12	5	8	5	21	0.104
No	75	88	56	92	19	79	

[a]Subcategories showing number of programs teaching each curriculum do not sum to 100%, and a *P* value is not calculated because multiple options were possible.
[b]basic wilderness life support/wilderness first responder.
[c]wilderness first aid/wilderness life support.
[d]advanced wilderness life support.

by respondents may suggest a growing interest in, and recognition of, unique WM didactic content.

Approximately one-third of programs teaching WM used some predefined course format, such as AWLS, whereas the majority (86%) at least partially developed their own teaching content. Almost half (49%) taught ≤5 h of content over the course of an academic year, an increment chosen to reflect the equivalent of 1 full conference day or less for most emergency medicine residency programs. There was no significant difference in the hours taught, format taught, or fellowships offered by 3-y versus 4-y programs. Four-year programs were significantly more likely to offer a WM elective, as would be expected considering they generally incorporate more elective months into their residency format.[12]

It should be noted that only 4 of the 14 programs offering WM fellowships[1] at the time were nonresponders, for a response rate of 71% in this subgroup. This could suggest a response bias favoring programs that are more invested in WM education and a possible overestimation of the percentage of programs teaching WM.

Published curricula for WM medical student electives, resident tracks, and fellowships are available,[2-5] but no specific residency curriculum other than the model of the clinical practice of emergency medicine[11] exists in the United States. We queried the use of 3 widely available and commonly known teaching curricula,[7-9] but others exist and could be included in future studies. Although the queried curricula are intentionally accessible to a nonprovider audience, they are familiar

to most WM-interested emergency physicians and, in the absence of a national curriculum, are a source of structure in teaching WM content.

Our study shows that there is a range of WM education formatting, in terms of hours, didactic style, and use of formalized courses, with no singular format predominating. Although independently customizing their curricular content allows programs to adjust to resident needs and available resources, a more widely accepted national consensus and educational practice guidance may result in a more consistent educational experience. One barrier may be the cost of acquiring educational materials, along with the lack of local expertise or familiarity with formal curricular options. The number of hours taught is rather low, but it reflects the amount of WM content included in the 2016 emergency medicine model[11] and therefore its representation in the US board of emergency medicine in-training and qualifying (written) board examinations.

LIMITATIONS

We did not define the term "wilderness medicine" in our survey introduction. Our intention was to capture data on what respondents believed was included under the heading. This may have led to under- or overreporting of content, especially because the emergency medicine model includes this under the heading of "environmental disorders."[11] E-mailing residency program directors was not a perfect proxy for responses directly from WM education faculty; program directors may not necessarily have been aware of the exact details of the WM educational format at their institution. Unfortunately, no national listing of all residency WM educational leaders exists.

Another limitation was a possible response bias: Programs that are invested in WM content may have been more likely to complete the survey. Increased survey participation by programs enthusiastic about WM could inflate our estimate of programs teaching WM content. If none of the nonresponding programs taught WM, then only 35% of the total 240 residencies would be teaching WM. Although it is difficult to increase survey response participation, it is worth mentioning the limitation of our response rate of approximately 50%. We excluded 16 survey responses that did not identify their program by name because we could not otherwise ensure avoiding the duplication of program information.

We chose not to include several potentially interesting questions in the survey, in the hopes of increasing our response rate by limiting survey length. Future work could allow respondents to detail specific topics covered in their curriculum so as to further identify areas of strengths and weaknesses in the national WM education landscape and could ascertain the availability of a WM "track."[2] Categorizing programs geographically would also have helped determine whether residency programs in more rural or isolated areas are more likely to teach WM content, given the relevance to their practice location.

Additionally, an element of our survey design may have led to underreporting of WM curricular content: The instructions for completion of the survey did not specifically clarify that the questions allowed respondents to select multiple answers, possibly leading to underreporting by programs using multiple curricula. When asking about curricular content, 1 option was "development of own curriculum." An additional free text box to describe the curriculum would have allowed for enhanced data collection.

Conclusions

WM education is rapidly growing as a regular part of emergency medicine residency training. Almost two-thirds of respondent residencies offer WM training as part of their curriculum. Four-year programs are more likely to offer WM electives but are otherwise comparable to 3-y programs. Only one-third of residencies teaching WM use one of the predefined courses as part of their teaching, suggesting there may be an opportunity for greater standardization of WM curricula.

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