Implementing Wilderness Medicine-based Electives for Undergraduate and Graduate Medical Education

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Introduction

Although wilderness medicine does not have a clear definition, it involves clinical practice, instruction, and research about wilderness settings. More specifically, it is the practice of medicine within remote areas where access to medical services, support, and facilities is either limited or nonexistent. Wilderness medicine has become more necessary as more people engage in various outdoor adventure activities, including hiking, climbing, and kayaking. However, the medical skills gained from wilderness medicine are multifaceted and not restricted to outdoor adventure. Wilderness medicine has applications in disaster relief and humanitarian crises. Mountain search-and-rescue teams limit the resources they can carry during a search. Teams operate with only the supplies they have transported to a remote setting and make allocation decisions about whom to evacuate first or which patients will benefit most from access to a helicopter. In disasters, limited resources such as medications, vaccines, and airlifts are allocated via a similar thought process (7). This paper will discuss the early history of wilderness medicine, its modern-day applications, and the success rates of implementing wilderness medicine courses in medical education.

Early History and Modern-day Applications

Wilderness medicine had its beginnings when the first surgeons of the navies emerged during the early days of western civilization. The first practitioners of wilderness medicine were Greece, Rome, and the Italian-city states, (4). Despite the understanding of nature and the causes of disease that had provided a useful foundation for modern medicine in the 19th century, there still existed an enormous gap between medical theory and the real-world application of providing effective therapy. One aspect overlooked in the early history of wilderness medicine is maritime medicine, the practice of medicine at sea. In Book 4 of Homer’s The Iliad, there is a reference to a medical incident during the trojan wars, in which Menelaus was wounded by a Trojan bowman, the fleet surgeon, Machaon (son of Aesculapius, god of medicine) was called to treat the wound:

> *Without delay he drew*
> *the arrow from the fairly fitted belt.*
> *The barbs were bent in drawing.*
> *Then he loosed the plate—the armorer’s*
> *work—and carefully*
> *O’er looked the wound where fell the bitter shaft. Cleansed it from blood, and sprinkled over it*
> *with skill the soothing balsam of yore which the friendly Chiron to his father gave (4).*

Maritime medicine was revolutionized around the late 18th century by the British Navy’s Admiral Horatio Nelson. After being 1 of 380 survivors in a 1800-man expeditionary force on the San Juan River in Nicaragua, Nelson was stationed in Corsica, France where he earned a sustained laceration of his back and lost sight in his left eye during battles near the island (4). Nelson continued receiving medical attention after multiple naval conflicts until a French sharpshooter delivered a fatal-injury in Trafalgar, 1805. Medical reforms in the Royal Navy became standard because of Nelson’s full and intimate understanding of the challenges with providing effective shipboard medical care (4). What really binds a large portion of the history of wilderness medicine is military conflicts and expeditions. After the close of the American Civil War, the U.S. army engaged in large-scale fighting against native american tribes in the western territories out of pressure for land rights. Military personnel needed to learn how to extract arrows and other primitive penetrating missiles. Instruments devised as early as 500 BC for removing arrows were once again invaluable during the 1870s— basically tools that could dilate the point of entrance, widen the channel containing the arrow, and then allow passage down the channel to grab the head of the arrow to remove it (4). Wilderness medicine and combat casualty care are bound by several characteristics, which include scarce resources, environmental stressors, and limited access to healthcare; however, in the civilian world, many of the previously mentioned techniques and skills honed on the battlefield found their way in disaster medicine; however, disaster events like the 2010 Haitian earthquake—whose epicenter was located a few miles from Port-au-Prince—that cause such massive destruction may in many respects increase the size and scale of combat casualty care types of challenges, making even the most battle-hardened medic cringe (4). The Wilderness Medical Society (WMS) was founded in 1983 by three physicians: Drs. Greer, Auerbach, and Kizer, from northern California, which was mainly because of how wilderness medicine is multifaceted. Their current journal, the Journal of Wilderness Medicine, includes publications from various areas of interest including

High altitude, Dive medicine, and even Envenomation, or the process of injecting venom (4). Undeniable parallels clearly exist on close examination between “Advanced” medicine of Ancient Greece or the Roman Empire, and what we would consider today “wilderness” medicine.

Implementing Wilderness Medicine-based Course Electives

The hallmark of the evolution of wilderness medicine is its ability to facilitate “outside the box” thinking relative to the existing medical infrastructure. There has been an unprecedented interest amongst healthcare workers and trainees regarding global health. The Association of American Medical Colleges (AAMC) documented that 45 US medical schools have some sort of global health component in their curricula, with 29.9% of graduating US medical students stating they have had a “global health experience” (2). Approximately ⅓ of students seem increasingly interested in studying and working in a non-traditional setting; however most students do not travel with adequate training to prepare themselves in an unfamiliar environment. Reports describe injuries to medical trainees, often preventable—motor vehicle accidents, noncompliance with medical prophylaxis for endemic diseases, and increased risk-taking behavior (2). Even though there exists a clear consensus regarding the documented risks of living in a resource poor area, few institutions have described any effort to prevent such life-threatening risks. According to some medical schools, a wilderness medicine elective course could help provide students the adequate training they need. Cornell University’s Weill School of Medicine has advocated for such an elective course as part of their Global Health Curriculum. The curriculum is based on the experiences of the institution’s Wilderness Medicine (WM) program that teaches lessons of self-reliance and the delivery of medical care in austere and unpredictable environments (2). The curriculum includes courses that encourage both a coursework and hands-on approach, concluding with a course that prepares senior medical students for global health. The Global Health Curriculum is listed (2):

1. Introduction to Global Health: A Case-Based Approach (Year 1)
2. Foundations in Global Service (Year 1)
3. Global Health Clinical Skills for Resource-Poor Environments (Year 4)

Unique medical electives have also been proposed with the goal of teaching senior medical students high-yield clinical skills, self-sufficiency, and an ethical mentality with which to work meaningfully in resource-poor settings (1). Experimental courses have also been proposed by The Wilderness Medical Society for third and fourth year medical students, where they are also taught at the University of Massachusetts Medical School and other partner institutions. A course description:

> *During the course, approximately 16 medical students live in a wilderness setting in central New Jersey for 2 weeks in January. Their days and evenings are devoted to didactic lectures, demonstrations, and practical applications in the various areas of wilderness medicine (1).*

The implementation of a wilderness medicine elective course is not limited at the graduate level. The Wilderness Society of King’s College London Student Union runs a faculty supported Fellowship in the Academy of Wilderness Medicine Curriculum (FAWM) approved WMS training course. WM courses already part of a medical school’s curriculum act as elective courses to take; however, they tend to be costly and do not run in conjecture with undergraduate timetables (6). A study conducted by Shulz et al tested the effectiveness of WM teaching, and how the course can be improved for future sessions. The study also evaluated the need to have basic clinical medical knowledge to help students achieve relevant learning outcomes. The results illustrated that students were interested in WM before taking the course (4.0/5.0) but disagreed on what the career would involve (2.8/5.0) ; after the course, student interest (4.3/5.0) and understanding of wilderness medicine (4.5/5.0) increased by a standard deviation of 0.6-0.7 (6). The study illustrates a framework for the successful implementation of a WM course for undergraduates not just in the U.K, but also in the U.S. A study conducted by Joy et al. designed a 2 week course at the CU School of Medicine that focused on backcountry medical training and exposure to health careers The two major aims are listed (3):

1. Students learned basic WM care, which included patient assessment, evaluation, stabilization, and management;
2. Participants gained meaningful exposure to core medical lectures, hands-on scenarios, ultrasonography, physician shadow- ing, admissions processes, and discussions on a wide range of healthcare-related careers.

Surveys were given out on a daily basis to evaluate difference parameters, including topic relevance, presentation quality, and enjoyment of the

material. 30 students attended each course. They reported significant gains in knowledge related to EM (9.5/10) and WM (9.6/10). In addition, they reported gaining understanding about the practice and profession of medicine (8.4/10), demonstrating the success of the WM course in influencing students to consider careers in medicine (3). Regardless of whether an individual is a senior in medical school or a fresh undergraduate, courses in Wilderness medicine are beneficial for preparing students for careers in medicine, whether it is through global health or emergency medicine.

Conclusion

This paper discussed the early history of Wilderness medicine compared to its modern-day applications to draw parallels between wilderness medicine then versus now. Then, the paper discussed potential WM course programs at both the undergraduate and graduate level, which both have received positive receptions from older and younger students. Based on the findings of the listed studies, a course in wilderness medicine has a positive impact in influencing a student's career aspirations in the field of medicine, as well as providing suitable training for global health pursuits. Implementing WM course electives is strongly encouraged for opening up students to new career options relevant to healthcare and medicine.

Works Cited

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