

TACTICAL COMBAT CASUALTY CARE: TRANSITIONING BATTLEFIELD LESSONS LEARNED TO OTHER AUSTERE ENVIRONMENTS—Keynote Lecture

The Symbiotic Relationship Between Operational Military Medicine, Tactical Medicine, and Wilderness Medicine: A View Through a Personal Lens



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There are direct and indirect linkages and a form of symbiosis between operational military medicine from World War II and present wilderness medicine, from the beginnings to contemporary practice, and the more recently evolved field of tactical emergency medical support. Each of these relationships will be explored from the historical perspective of the Department of Military & Emergency Medicine, Uniformed Services University of the Health Sciences from 1982 to the present.

Keywords: operational medicine, military operational medicine, tactical emergency medical support, tactical combat casualty care, counter narcotics tactical operations medical support, Department of Military & Emergency Medicine

The topic for this article was suggested by Brad Bennett, who also provided an article by Basil Pruitt published in *The Journal of Trauma* titled “The Symbiosis of Combat Casualty Care and Civilian Trauma Care: 1914–2007.”¹ The article provides a guide to the history of battlefield surgical research during this period, largely ignoring the civilian side of the relationship. I decided to approach this article from my experience as the chair of the Department of Military & Emergency Medicine (MEM) at Uniformed Services University of the Health Sciences (USUHS), “America’s Medical School,” from 1982 to 2002. The evolution of the department—its curriculum, centers, research, and various other activities—parallels and demonstrates aspects of the symbiosis mentioned in the title of this article.

While preparing this piece, I realized that Brad’s activities while assigned to MEM in the 1990s provide an example of this interaction. He became my vice-chairman,

directing 2 courses (Overview of Military Medicine and Military Applied Physiology [MAP]); participating in research in the Human Performance Laboratory (HPL); and contributing to 2 major publications: *The Navy SEAL Physical Fitness Guide* and *The Navy SEAL Nutrition Guide*, each of which is equally applicable to military tactical athletes, civilian tactical officers, and wilderness expedition and sports enthusiasts. Brad also completed emergency medical technician-paramedic (EMT-P) training and then became an instructor in our EMT-Tactical course and a member of the tactical emergency medical support teams we provided to several federal SWAT and state and county tactical law enforcement teams. At my suggestion, he began the medical student wilderness medicine (WM) interest group and developed 2 student electives in WM. Brad touched all 3 areas of symbiosis while in MEM, and in retirement he has continued his involvement and leadership as president of the Wilderness Medical Society (WMS), a member of the Committee on Tactical Combat Casualty Care (CoTCCC), and an instructor of multiple WM and operational medicine courses. He has also found time to publish related research and studies in the peer-reviewed literature. With this in mind, I thank Brad for the opportunity to address the symbiotic relationship

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between operational military medicine (OMM), tactical medicine, and WM.

The MEM and its section on operational emergency medicine began when emergency medicine (EM) was not yet a specialty—there were only 5 other full-time departments of EM in existence, none of which included a required undergraduate clinical clerkship, which was and remains a major element of the MEM curriculum.² The approval and acceptance of specialty training in EM in 1980s by the civilian and military clinical communities provided both residency-trained faculty and opportunities for student clerkships in busy civilian emergency departments. The discipline of military medicine in the broadest sense was seen as a vastly expanded form of occupational medicine, “dealing with the diseases and injuries resulting from working in military occupations and operational environments,” and embracing a body of knowledge that cuts across all major specialty areas in medicine and surgery.³ A major subset of this, OMM, did not have a foundational specialty until EM was defined and established. To me, EM also is the foundational medical specialty of WM. Much of the scientific base for both military medicine and WM was and continues to be derived from the same research on physiologic responses to environmental extremes. Funding for this research often comes from the military (as was the work reported in *Physiology of Man in the Desert* by Adolph⁴) or carried out in military research laboratories such as the United States Navy Cold Weather Research Laboratory or the United States Army Research Institute of Environmental Medicine. This shared knowledge base created by civilian and military investigators continues to inform both military medicine and WM. These same comments apply to the recently defined and developed subspecialty of EM, tactical emergency medical support (TEMS), which relies upon the specialty of EM and prehospital emergency medical services (EMS) personnel for its application.⁵ In this way, TEMS is similar to both OMM with its prehospital focus and employment of medics/corpsmen, physician assistants, and physicians and to WM with its focus on both professional and para-professional medical providers.

Like Paul Auerbach in the most recent edition of *Auerbach's Wilderness Medicine*,⁶ I choose not to attempt a definition of WM. I could not improve upon the detailed and lengthy definitions provided by Backer in 1995⁷ or Sward and Bennett in 2014.⁸ Each reflects the expansion of content and practice of WM during the past several decades. My personal introduction to this topic was a slim volume I purchased in 1965, *Exploration Medicine*, which was written primarily by United Kingdom Royal Army Medical Corps physicians

and civilian physiologists working on related problems for the Ministry of Defense.⁹ In a simplistic handbook style, it focused on many of the same core topics covered in the multiple editions of Auerbach's magnificent and monumental textbook of WM. Reviewing contemporary and equally weighty textbooks of EM, the overlap and merging of the 2 disciplines becomes apparent. Several recent EM publications now make specific reference to tactical EM and WM—a trend also reflected in the growth of fellowships within EM residency programs.

In the area of military medicine, the weight, volume, and number of textbooks has grown exponentially since 1990. There are now 26 published volumes of the *Textbooks of Military Medicine*. The latest, *Combat Anesthesia: The First 24 Hours*, published in 2015, has in my opinion the best concise overview of prehospital battlefield care demonstrating the application of tactical combat casualty care (TCCC) and the principles of damage control resuscitation.¹⁰ The textbooks are published by the Office of the Surgeon General, United States Army, and are available from the US Government Publishing Office in Washington, DC. Of specific relevance for WM are 5 volumes: *Medical Aspects of Harsh Environments* (Vols 1 and 2 [2002]), *Military Preventive Medicine* (Vol 1 [2003] and Vol 2 [2005]), and *Military Quantitative Physiology in Military Operational Medicine* (2012).

Returning to my personal lens for viewing this symbiosis: my experience over 2 decades with the Department of MEM. Medical school departments have 3 missions: teaching, research, and practice, which require appropriate curriculum development, opportunities for scientific investigation, and access to specialty-specific clinical practice. The Department of MEM and the Department of Physiology developed the MAP course, dealing with many of the topics covered in WMS educational programs and fellowship programs.¹¹ In addition to didactics linking it to the human physiology course given in parallel, the MAP course was linked to environmental, hypo- and hyperbaric chamber rides, and a 10-day field exercise with students living in tents and subsisting on field rations. The course also included care of simulated casualties, cross-country movement and land navigation, small unit (squad and platoon) leadership, field preventive medicine, and emergency rapid reaction and improvisation drills. Many of these elements are similar to training exercises for tactical law enforcement and TEMS personnel and for wilderness rescue teams and expeditions.

MEM created 3 centers to develop research programs and evidence-based policies in support of its curriculum and OMM and TEMS: The HPL, focusing on exercise physiology and nutrition; the Center for Disaster and

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