Medical direction of wilderness and other operational emergency medical services programs

Craig R Warden, Oregon Health & Science University
Michael G Millin, Johns Hopkins University
Seth C Hawkins, Western Carolina University
Richard N Bradley
Medical Direction of Wilderness and Other Operational EMS Programs

Craig R. Warden, MD, MPH, MS
Department of Emergency Medicine
Oregon Health & Science University
Portland, Oregon

Michael G. Millin, MD, MPH
Department of Emergency Medicine
Johns Hopkins University
Baltimore, Maryland

Seth C. Hawkins, MD
Emergency Medical Care Program
Western Carolina University
Cullowhee, North Carolina

Richard N. Bradley, MD
Department of Emergency Medicine
University of Texas Health Science Center at Houston
Houston, Texas

Corresponding author:
Craig R. Warden, MD, MPH, MS
OHSU Mailstop: CDW-EM
3181 SW Sam Jackson Park Rd.
Portland OR 97239

Voicemail: 503-494-4399
Fax: 503-494-4997
E-mail: wardenc@ohsu.edu

Running title: Medical Direction of Wilderness EMS

Word count: 3966

Key words: Wilderness, Emergency Medical Services, Medical Direction, Search and Rescue,
Operational Medicine
Abstract

Within a healthcare system, operational EMS programs provide prehospital emergency care to patients in austere and resource limited settings. Some examples of these types of programs include search and rescue, ski patrols, water rescue, beach patrols, cave rescue, air medical support, and tactical law enforcement response. Teams that respond as a component of a geographic region’s emergency response system should be integrated into the healthcare system and as such should have a medical director. The medical director will ensure that the care provided follows protocols that are in accordance with local and state prehospital standards, while accounting for the unique demands and needs of the environment. The wilderness EMS medical director should be qualified for the specific team that is being supervised. The medical director should train and operate with the team frequently to be effective. Adequate provision for compensation, liability, and equipment needs to be addressed for an optimal relationship between the medical director and the team.
INTRODUCTION

Operational emergency medical services (EMS) programs are specialized types of EMS that are complicated by less resources and/or environmental conditions that are more austere than typical urban EMS. In defining operational EMS, Bogucki notes, “…operational EMS comprises a body of knowledge, specially trained providers, and applied technology organized into a medical support system for personnel working in hazardous, austere, and/or tactical environments.”¹ EMS providers that work in operational environments, therefore, require specialized skills distinct from those required of other EMS providers.

Perhaps the most obvious example of an operational EMS program is one that is connected to a law enforcement tactical response unit. While it is appropriate to think of law enforcement EMS as an operational program, there are many other types of EMS programs that should be considered as operational. In their joint position statement on operational EMS medical direction, the National Association of EMS Physicians (NAEMSP) and the National Association of State EMS Officials (NASEMSO) identify all EMS providers operating in remote and/or austere conditions as being operational, specifically naming, without the exclusion of other programs that also operate in austere environments, “…ski patrols, wilderness search and rescue teams, fast or open water rescue teams, urban search and rescue teams, tactical EMS supporting law enforcement operations, fire-ground operations, and wild land fire crews.”² All of these providers should be considered as “operational” EMS providers. Therefore, wilderness EMS agencies which operate units and all wilderness providers that function within these environments whether operating within the capacity of an identified unit or as a single provider fall within the scope of the definition “operational EMS.” In addition to being austere, many of these environments are further complicated by the inability to safely get either a ground or air
ambulance to the patient, requiring providers who work in these environments to be able to care for a patient with only the equipment that can be carried without the assistance of a ground or air ambulance.

In consideration of the complex nature of wilderness operational environments, the specialized skills needed to manage patients in these environments, and the demands on the providers and agencies that function within these environments, it is essential that these agencies and providers function with medical oversight and direction. The medical director will ensure that the EMS providers are appropriately trained for the specific operational activity, and that the care provided follows a system of protocols that accounts for the demands and needs of the unique environment. In addition, the medical director will ensure that there is a program for continuous quality improvement. Finally, in order to assist with system integration and ensure that the care provided is consistent with local and state standards, important goals of both NAEMSP and NASEMO\(^2\), while at the same time being sensitive to the unique demands of the environment, the medical director for the program should be a physician with knowledge in general EMS systems and the unique nature of the specific program. This paper should serve as a resource for wilderness EMS agencies, wilderness providers, and medical directors that function within the complex environments of wilderness and other operational EMS.

**INTEGRATION OF WILDERNESS EMS PROGRAMS WITH THE GENERAL HEALTHCARE SYSTEM**

While wilderness EMS programs are unique, it is important that these programs are integrated with the local EMS and general healthcare systems. Integration of wilderness EMS providers and programs with the general EMS system supports compliance with state and local regulations. It also helps to ensure that EMS meets national standards given the non-standard
environment. While many wilderness programs require guides and trip leaders to have some level of emergency care training, such as Wilderness First Responder (WFR), it is ultimately those providers that are specifically assigned as an emergency responder, regardless of level of training, that need to be integrated into the EMS system and have an identified medical director.

National consensus has long supported the concept that out-of-hospital healthcare should be integrated with the larger healthcare system. The first document to support this concept was the 1966 white paper *Accidental Death and Disability: The Neglected Disease of Modern Society*. This landmark paper proposes methodologies for the management of the traumatized patient as a seamless process from initial identification of the patient to discharge from the hospital. Perhaps the most eloquent explanation for the importance of integration is identified in the *EMS Agenda for the Future*, which states “…patients are assured that their care is considered part of a complete health care program.” In wilderness and other operational settings, regardless of how remote or hostile the environment, the patient’s journey through the healthcare system begins with the first episode of emergency care. The care provided in the wilderness may be adapted to meet the constraints of an unusual environment, but must still follow national standards and state guidelines. One role for a medical director of a wilderness or operational EMS organization is to ensure an appropriate balance between adapting to the demands of a challenging environment while ensuring that the medical care is evidence-based and compliant with accepted standards.

**SCOPE OF PRACTICE**

In 2007, the National Highway Traffic Safety Administration (NHTSA) published the *National EMS Scope of Practice Model* which provides a framework for the out-of-hospital scope of practice, including the scope of practice, in all settings, including wilderness and
operational incidents. Scope of practice in EMS is based on education, certification, licensure, and credentialing. These four parameters determine the level of care that a rescuer may provide. EMS personnel are not independent providers, rather, EMS is the delegated practice of medicine. Thus, an EMS medical director must supervise all EMS care including in the operational and wilderness arena.

A complete discussion of the foundation to scope of practice can be found in the NHTSA document. A few things do warrant mention as these activities pertain to wilderness and operational EMS. The difference between certification and licensure is particularly complicated for EMS, since most states certify but do not license EMS providers. In that sense, the certifying organization is the state. This reflects the fact that EMS providers are usually considered dependent providers who operate under another provider’s license (usually a physician). The requirement for a non-licensed EMS provider to function under a medical director is especially important in wilderness and operational EMS where direct online medical control may be difficult.

The ability of a local entity or medical director to determine scope of practice for a specific type of operational environment can be both legally and politically contentious. Local or state authorities may disagree on the use of operational specific scopes of practice. On the other hand, *The National EMS Scope of Practice Model* suggests that “state regulations must be clear as to the extent to which the State’s EMS scope of practice applies to EMS personnel functioning in… non-traditional roles and settings,” suggesting that there is a role for operational specific scopes of practice within an EMS system to address the needs of specific environments. However, while there may be value to operational specific scopes of practice, *The National EMS Scope of Practice Model* has defined a national standard of four primary levels of
EMS provider certification: **Emergency Medical Responder (EMR), Emergency Medical Technician (EMT), Advanced Emergency Medical Technician (EMT-A), and Paramedic.**

**Training**

Wilderness EMS programs that implement protocols designed for their specific environment face a number of additional challenges in implementation. First, obtaining adequate training is critical; indeed, education is one of the four key components of scope of practice described earlier. Training can be outsourced or in-house. Assurance must be made that outsourced training is reputable, worth the cost and fits the operational environment. It is worth checking to determine if certifications will be recognized by local, state, specialty or other jurisdictional entities. If training is in-house, it must be confirmed to meet national standards for the specialized activities that are being considered.

Some organizations are large enough to generate their own in-house training certification systems. The National Ski Patrol’s “Outdoor Emergency Care” program, 5th edition, meets and exceeds all the national requirements for Emergency Medical Responder, including specialized attention to alpine and winter environments. The National Park Service, in conjunction with University of California San Francisco-Fresno’s Department of Emergency Medicine, maintains a “Parkmedic” certification that trains park rangers to a level roughly between that of an Advanced EMT and Paramedic in the traditional licensure levels, but with additional wilderness training.

**Operational Specific Protocols and Scope of Practice**

There are many considerations regarding the use of wilderness specific protocols often referred to as “expanded scope of practice.” Most importantly, it is important that state regulatory and legal practice limitations are followed. Further philosophical questions should be
clarified with whoever will be providing medical direction long before a wilderness EMS program begins training and implementation.

In general, wilderness and operational specific protocols usually involves medications or procedures that would not normally be available to a traditional EMS provider at that care level. One example would be to permit an individual to provide care of a type usually reserved for a higher level, for example, Emergency Medical Responders providing care that at the time is intended for Emergency Medical Technician, such as immobilization of a patient on a backboard and transport out of the environment.

More often, operational specific protocols involve the insertion of a skill or medication that is not typically used in the traditional EMS milieu. Procedures in this category include relocation of some joint dislocations, insertion of a urinary catheter for a patient with a suspected spinal injury, and advanced wound management. Medications in this category might include oral antibiotics and medications to treat pain, nausea, and other symptoms that are inhibiting safe extrication out of the environment. Since the National Association of EMS Physicians believes that all levels of EMS providers should have the ability to use an epinephrine auto-injector for the treatment of suspected anaphylaxis, this should not be considered an operational specific protocol, but providers should work with their medical director to ensure that the use of epinephrine or any medication is within their defined scope of practice.9

While the development and implementation of a wilderness specific, or expanded scope of practice, program may be critical to the success of the wilderness EMS team, it is equally critical that such policies be carefully considered and have the support of all appropriate regulatory agencies, the system itself, and all elements of medical direction. Ultimately, the only reason to implement operational specific protocols or expanded scopes of practice is a
demonstrated need as evidenced by improvement of patient comfort that facilitates extrication out of the environment or prevention of permanent disability/death that would otherwise not have been prevented without the use of the protocol.

MEDICAL DIRECTOR REQUIREMENTS

The minimum requirements for a wilderness EMS medical director should be current licensure to practice in the primary state of practice, board certification in a primary specialty (with emergency medicine (EM) giving the most specific post-graduate training pertaining to wilderness EMS), and adequate training and expertise in general EMS medical direction.\textsuperscript{10,11} With the recent designation of EMS as a recognized sub-specialty of Emergency Medicine,\textsuperscript{4} in the future, board certification in EMS will be a desired qualification for an operational EMS medical director. However, despite the benefit, quite often the only available physician that has interest in working with a wilderness program is a specialist in another discipline besides emergency medicine. Therefore, at a minimum, an operational EMS medical director should have specific training in EMS medical direction, which may at least be the NAEMSP medical director’s course or the newly developed course on wilderness medical direction co-sponsored by NAEMSP and the Wilderness Medical Society (WMS).

An EMS medical director must be familiar with the National Incident Management System (NIMS).\textsuperscript{12} The medical director should be familiar with the local/regional, state and federal responses to all incident types and how each operational EMS team and its medical director fit within the NIMS structure.\textsuperscript{12} The operational EMS medical director should be familiar with local and regional prehospital systems of triage. Many systems are available (START\textsuperscript{TM}, MASS\textsuperscript{TM}, ABC\textsuperscript{TM}, SALT\textsuperscript{TM}, etc.) but few if any have been tested in a rigorous fashion in order to make an evaluation of which one is best for a given situation.\textsuperscript{13-15}
The program medical director will likely be responsible for team medical support during missions. This may include advice to assure adequate nutrition and hydration for team members and strategies to mitigate weather extremes. Responsibilities will also include managing on-duty injuries, which include proper evaluation and treatment including rehabilitation and appropriate reporting to supervisor and insurance carrier. A formal return to duty and medical certification may be accomplished by an occupational health clinic since this is a complex medical, legal, and ethical process that EMS medical directors may wish to avoid.

**SPECIFIC TEAMS AND ROLES**

The duties of an operational EMS medical director are potentially very broad and dependent on the type of specialized team for which the medical director bears responsibility. All of these teams will need to address integration of all levels of providers into the general EMS system, the potential need for operational specific protocols and the appropriate method to implement operational specific training and protocols. This section will review briefly the potential roles and responsibilities of the medical director for specific teams.

*Wilderness search and rescue (SAR)*

Wilderness SAR teams function in remote conditions that are inaccessible to traditional EMS response. In fact, team members often have to carry personal and rescue supplies for a multi-day mission into the wilderness. Most wilderness SAR teams consist mostly of volunteers including the medical director. An ideal relationship would involve the medical director being a working member of the team, going on as many missions as possible and providing oversight of the medical training for the team.

*Urban Search and Rescue (US&R)*
USAR teams can be nationally sponsored Federal Emergency Management Agency (FEMA) teams, state sponsored programs, or organized by a single fire service. US&R teams are utilized to search for and extract people trapped within collapsed structures. Scenarios include earthquakes, landslides, and explosions. These teams will function in conditions that are inaccessible for varying lengths of times depending on the severity of the incident. The team’s medical personnel’s primary responsibility is for the well-being of rescue personnel and then for entrapped and rescued patients. Due to these responsibilities, the teams need to be advanced life support (ALS)-capable and due to the austere environment they need to be self-sufficient for at least 72 hours of operation. The team members assigned to medical duties may or may not have additional US&R training and rotate to other rescue activities.

*Ski patrols*

Ski area operations are unique in that they are often remote, affected by cold weather, and challenged by vertical or near vertical conditions. The unique environment of ski area operations requires specialized skills. Medical direction will ensure that ski patrollers are adequately trained and that the medical care provided accounts for the unique demands of the environment. All patrollers, regardless of paid or volunteer status, should be considered as a member of the EMS community, responsible to the appropriate EMS regulatory authority. The Federal Charter of the National Ski Patrol does not exempt local patrollers from following state guidelines and regulations. Medical direction is a necessity to ensure that ski patrollers are adequately trained to manage patients in this complex environment, the care follows an acceptable standard, and there is a quality improvement process in place to continuously improve the care delivered to the skiing public.

*Water rescue*
The environmental conditions of all types of water rescue create hazards that are quite different from typical urban EMS. It would be helpful for the medical director to be trained in water rescue, but this may not be possible for many teams. The medical director should have a thorough knowledge of water related injuries to both rescuers and patients. Frequent issues that come up are field management of hypothermia, appropriate use of personal flotation devices for both rescuers and the patient, when to fix (or not) a patient to a backboard, when to discontinue rescue operations and transition to recovery efforts and when to refer patients to hyperbaric chambers for decompression injuries.21

**Flight operations**

Due to remote locations, wilderness EMS programs are often supported by air medical operations. While most air medical transports are equipped with resources found in a typical urban ambulance, if not an emergency department, the physiology of flight and the inability to land at will dictates a need for specialized medical direction and an understanding of the wilderness environment.22 Helicopter flight programs are particularly helpful in remote locations, potentially providing a higher level of care and decreasing transport times to receiving hospitals. A flight program’s medical director needs to be familiar with the additional risks and costs associated with air medical care and transport of patients.22-25 Flight programs that use nurses and/or physicians as staff often have scopes of practice that may not be familiar to all ground transport agencies or hospitals. The medical director is responsible for establishing protocols for appropriate utilization of air medical services and the determination of and training for air medical scopes of practice.26 Pre-event communication between ground and air programs is critical so as to minimize rescuer injury and maximize the utility of air medical support.

**Fire-Ground Operations and Rehabilitation**
Fire-ground operations, including wild-land fire, requires the medical director to have thorough understanding of regulations and methods for fire rehabilitation as outlined by standards with the National Fire Protection Agency (NFPA). On the fire-ground, the most common injuries are musculoskeletal, the most common cause of death remains cardiac-related, and there may be toxic exposures, emphasizing the need for medical surveillance of firefighters. In addition, wild-land fire camps often expose workers to acute respiratory illnesses, including common respiratory viruses, necessitating the medical director to have an understanding of common procedures for infection control within group camps.

**Tactical EMS**

Providing medical care in the tactical environment requires knowledge of the effects of this hostile situation on the victim and the tactical team including the medical director, allowing a safe extrication. There are several types of tactical teams and possible incidents that the operational EMS medical director may have to deal with. In some law enforcement systems, EMS personnel are inserted into the law enforcement organizational structure on tactical EMS (TEMS) teams that support SWAT or other specialized tactical teams. In other law enforcement systems, the law enforcement personnel are inserted into the EMS organizational structure, serving as first responders for EMS under a medical director’s supervision. With or without specialized relationships, all systems need to consider law enforcement-related medical scenarios, such as bomb/biological/chemical threats and various civil disorder scenarios. Medical directors need a thorough knowledge of LEA procedures for various ballistic, explosive, chemical, and civil disorder threats and the role they will play in a particular incident.

Some tactical EMS medical directors may be reserve officers who carry weapons and conflicts may occur switching between roles. The medical director is responsible for maintaining
the occupational health of team members including appropriate hydration, nutrition, and rest and need to be prepared to manage potential injuries in the use of bullets, tear gas, pepper spray, beanbags, noise/flash diversionary devices and conducted energy weapons such as the TASER. The tactical EMS medical director should train as much as possible with LEA officers to further understanding of requirements and to team build. LEA team members will have similar requirements for medical surveillance, occupational health evaluations, evaluation of injuries, and fitness for duty issues as firefighters.34 The Counter Narcotics and Terrorism Operational Medical Support (CONTOMS) course has been the standard for TEMS training.35,36

Animal care

Wilderness EMS medical directors may have to take care of injuries associated with using search and rescue animals. Wilderness, urban, tactical and avalanche SAR may use horses and/or dogs. Veterinary help may not be readily available and the medical director and medics may need to temporarily care for animals used with the teams.37,38 In addition, the medical director may have to care for team members that may become injured by animals involved with the operational event. Therefore, medical directors that work with animals should be familiar with appropriate care for animals and animal related injuries. The American Red Cross and the Federal Emergency Management Agency both sponsor courses in field first aid for animals.

RESPONSIBILITIES OF THE PROGRAM

A good working relationship between the medical director and the program requires that expectations are discussed in advance and performance by both parties measured and evaluated. The operational agency and the EMS medical director should execute a contract or memorandum of understanding to clarify roles, responsibilities, compensation and insurance issues in order to prevent confusion and loss of team effectiveness.
In a US nationwide sample, 75% of EMS medical directors, including those from operational programs, are paid. A portion of the operational medical director’s professional time will be devoted to specific EMS duties, foregoing other professional activities and compensation. Therefore, the medical director should be compensated at an appropriate rate, given the resources of the agency. However, organizations that do not have regular support from public funds, and whose members are mostly if not entirely volunteers may need to rely on the pro bono service from the medical director.

Wilderness EMS medical directors should be able to safely operate in the field in order to enable the organization to deliver the highest quality of care. This allows the medical director to provide real-time evaluation of the care delivered and provides an ongoing opportunity to understand the unusual environment of the specific program. There is some retrospective data on improvement in EMS patient outcome with direct physician care and supervision, although these studies did not specifically focus on operational situations. The basic requirements for an operational EMS physician includes a uniform, badge and/or ID card, pager or other means of notification, radio/cell phone for ongoing communications, and other gear appropriate for field work.

Wilderness EMS organizations must also ensure that the medical director has adequate liability insurance. Since a physician is exposed to potential liability during medical director activities, the organization should ensure that these risks are adequately covered. Medical director’s liability insurance should cover administrative duties, civil complaints, and medical malpractice for duties performed or advice given as a medical director. A medical director’s liability coverage may be purchased as a personal policy with reimbursement from the program.
or the cost of the policy may be covered directly by the program. Regardless, it is not reasonable for a medical director to assume personal liability on behalf of the organization.

**CONCLUSION**

Although published evidence to support the specific roles of the wilderness and operational EMS medical director is lacking, the need for supervision is often mandated by regulation. Furthermore, the NAEMSP, NASEMSO and the consensus of experts in the field of operational EMS believe that operational wilderness EMS teams should optimize the involvement of a medical director. Wilderness EMS providers and programs that have a formal role in emergency response should be integrated into the local and state EMS system, regardless of the level of training of the providers and the number of patients seen in a given calendar year. This integration will serve the patient population by ensuring that standards are met and patients receive safe, quality healthcare. A primary role for a wilderness EMS medical director is to ensure the best possible medical training, preparing the team to manage traumatic and medical illness for the public and team members.
REFERENCES