Wilderness Medicine Education

How to Choose the Right Resources for Archaeology Field Programs

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ABSTRACT

Wilderness medicine classes are widely available to archaeologists and field scientists, but because wilderness medicine is an unregulated field, knowing what the various courses and products mean can be difficult. Based on the education chapter in the recently published textbook *Wilderness EMS*, this article—written by same two authors as the book—explores a number of topics relevant for the field scientist, program director, or administrator seeking to obtain wilderness medicine training for archaeologists. The article first explores the history of wilderness medicine products and certificates available to interested parties. It then differentiates between the various products available today along with their benefits and limitations for the end user. Products and trainings described include certifications (including Wilderness First Aid [WFA], Wilderness Advanced First Aid [WAFA], Advanced Wilderness First Aid [AWFA], and Wilderness First Responder [WFR]), as well as single use or continuing education trainings (including Stop the Bleed, CPR, conference courses, and field schools). Particular attention is paid to the specific and actionable needs of a field scientist in remote areas.

Keywords: wilderness medicine, expedition medicine, archaeology, field medicine, first aid, medical training, medical education

Las clases de medicina del desierto están ampliamente disponibles para los arqueólogos y científicos de campo, pero como la medicina del desierto es un campo no regulado, saber lo que significan los diversos cursos y productos puede ser difícil. Este ensayo, basado en el capítulo de educación en el libro de texto *Wilderness EMS* recientemente publicado y escrito por sus dos autores, explora una serie de temas relevantes para el científico de campo, el director del programa o el administrador que buscan obtener capacitación en medicina silvestre para arqueólogos. El ensayo primero explora la historia de los productos y certificados de medicina silvestre disponibles para las partes interesadas, y luego diferencia entre los diversos productos disponibles en la actualidad y sus beneficios y limitaciones para el usuario final. Los productos y entrenamientos descritos incluyen certificaciones (incluyendo *Wilderness First Aid* [WFA], *Wilderness Advanced First Aid* [WAFA], *Advanced Wilderness First Aid* [AWFA] y *Wilderness First Responder* [WFR]), así como entrenamientos de un solo uso o educación continua (incluyendo *Stop the Bleed*, CPR, cursos de conferencia y escuelas de campo). Se presta especial atención a las necesidades específicas y prácticas de un científico de campo en áreas remotas.

Palabras clave: medicina del desierto, medicina de expedición, arqueología, medicina de campo, primeros auxilios, formación médica, educación médica

This article reviews the current state of wilderness medical training options for individuals seeking such training. It also helps programs that are choosing to include "austere" (also known as "remote," "resource-deficient," or "wilderness") medicine in their educational curricula for field work and as part of an overall safety and risk management plan.

We define "wilderness," where such training might be relevant, using the definition repeated across multiple textbooks: "those areas where fixed or transient geographic challenges reduce availability of, or alter requirements for, medical or patient movement resources" (Hawkins 2018:21; Hawkins, Millin, and Smith 2017:1200; Hawkins et al. 2021). We note that this is a much more expansive definition of wilderness than is traditional. An additional consideration is places with potential for false proximity confidence (the belief that local organizations or communities will help in times of need, resulting in underplanning for worst-case scenarios).

Wilderness medicine (WM) training is available in myriad forms, lengths, foci, and locations. The landscape can be overwhelming. Fortunately, current trends in WM education revolve, in part, around an attempt to standardize *what* is included in common courses offerings, if not *how* they are presented. That said, WM training is an unregulated field, which from the outside appears to offer more uniformity than may actually exist on the ground. Ultimately, it is the responsibility of the consumer to investigate educational opportunities thoroughly before committing time and

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money. Key considerations for a consumer include adherence to accepted standards, qualifications of instructors, teaching methodology, relative importance of "certification," duration of certification and ease of recertification, and the extent to which the training offered matches the desired practice level.

Although this article is written for the professional community of field archaeologists and archaeology students, wilderness medical training is most often built around outdoor recreation. Wilderness medical education opportunities have grown in step with growth in U.S. outdoor recreation popularity. Such opportunities range in commitment, cost, and complexity from short half-day modules to training programs involving hundreds of both hands-on and lecture hours. More basic classes are intended for laypersons who have an interest in outdoor recreation or austere medical skills but who may have no other medical knowledge. They are solely interested in expanding their capacity to provide care for themselves and their companions in austere environments. These offerings may be suitable for archaeological field workers, given that training can be completed in as little as a weekend. Courses in the middle of the spectrum could be more appropriate for (1) scientists who spend long periods of time without immediate access to medical care and who want to have greater self-sufficiency or (2) a single "safety officer" or "medical officer" scientist who takes on additional training to help care for the rest of the team. At the other extreme of the spectrum would be an expedition-style science program that may have embedded health-care professionals needing wilderness training or that wants to designate a scientist to receive state-recognized health-care certification (for instance, Emergency Medical Technician [EMT] certification) with an emphasis on wilderness skills.

There is no universally recognized or mandated national standard for training WM providers, no widely utilized accrediting body, and no government agency that oversees or regulates any of the common certifications (Winstead and Hawkins 2018). Many common certifications, such as Wilderness First Responder (WFR) and Wilderness EMT (WEMT), were created on the 1970s on a framework of the Emergency Medical Services (EMS) systems, which were also being introduced then. A patchwork of state-regulated and unregulated levels of credentialing/certifications emerged. Since the origin of formal WM certifications and classes, however, industry companies, thought leaders, and regulatory bodies have worked to build consensus regarding training content (American Society for Testing and Materials 1995; Bennett 2012; Johnson et al. 2013; Weber 1996; Weil and Schimelpfenig 2016; Welch et al. 2009; Wilderness Medical Society Curriculum Committee 1999). Although this effort has not been without setbacks, it has led to unprecedented communication and cooperation between major WM education organizations as well as decreased siloing of information related to best practices around content and delivery. Consensus-generated recommendations now exist for some categories of WM *training*, such as specific WFR curricula (Weil and Schimelpfenig 2016; Wilderness Medical Society Curriculum Committee 1999). Other organizations have developed consensus guidelines for *performing* WM, such as the Wilderness Medical Society (WMS) evidence-based clinical practice guidelines and a collaborative Delphi methodology proposal for scopes of practice of various certification levels (Hawkins 2020; Millin et al. 2017).

This lack of standardization permits the crafting of specialized courses without regulatory interference that can focus on specific needs (for example, more minor-trauma training and less emergency childbirth training) or specific environments (for example, de-emphasizing or eliminating dive medicine training for a program with exclusively desert operations). The history of EMS shows that governmental regulation potentially brings with it increased bureaucracy, slowed progress, and decisions made on considerations beyond those simply of excellence in patient care.

On the other hand, archaeologists and other scientists utilizing WM in the field must still heed expert consensus recommendations and quality metrics. The absence of both widespread accreditation and regulated content and practice scopes puts the onus on the consumer to discriminate between various products and vendors. Some educational organizations, such as the Wilderness Medicine Training Center and Wilderness Medicine Outfitters, have published recommended criteria for choosing a quality WM course (DoT National Highway Safety Transportation Administration 2007; Wilderness Medicine Outfitters 2020; Wilderness Medicine Training Center 2016), but understandably, those recommendations generally steer readers toward the characteristics of the schools producing the recommendations (Winstead and Hawkins 2018). This is not to say that such recommendations are incorrect, but the benefit of a regulated or accredited educational industry is the outsourcing of approval to an outside entity.

Programs must carefully understand whether the training they are receiving is intended to be used in a regulated operational environment (such as providing care using an EMT or paramedic credential, which is the practice of medicine, regulated by a state medical board, and which requires collaboration with the license of a similarly credentialed physician) or in an unregulated fashion (such as providing medical care using a Wilderness First Aid or CPR credential). In general, all layperson trainings that do not result in a state-regulated certification might be considered as a broad legal category of "first aid," and everything else might be considered as the regulated practice of medicine, either directly (e.g., physician) or indirectly (e.g., EMT working in collaboration with a physician).[1]

The reason this is important is twofold. First, medical care that exceeds first aid must follow state medical practice and credentialing rules. Second, in some instances, medical techniques included in WM courses may exceed those in the regulated medical community. The textbook *Wilderness EMS* (Winstead and Hawkins 2018) offers the following example:

> A Boy Scout in North Carolina taking a Wilderness First Aid class approved by the Boy Scouts of America learns dislocation reductions, a skill that is outside the operational scope of practice of a Wilderness Paramedic in the same state operating under state scope of practice laws. This creates a paradoxical situation that starts to strain the concept of regulated practice of medicine unless the Boy Scout only plans to use that skill exclusively in recreational environments. However, if a Boy Scout troop wishes to assist in a rescue as a volunteer, a confusing dynamic develops regarding their educational background and how that can be applied during actual wilderness medical care [Hawkins 2018:62].

It should be evident how this confusion can extend into actions supporting field research, where first aid WM training intended for

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TABLE 1. Metrics of Different Wilderness Medicine Course Types.

Course Type	Hours	Prerequisite?
CPR	3	N
WFA	8–24	N
AWLS	20	Y
WUMP, etc.	24–48	Y
AWFA/WAFA	32–40	N (unless WFA)
DMT	~40	Y
WEMR	~70	N
WFR	~80	N
OEC	~120	N
WEMT	~250	N

ad hoc and recreational use begins to be applied to emergencies in professional environments where training has been specifically sought (potentially creating a duty to care and more characteristics of the regulated practice of medicine). To clarify these concerns in specific operations, we suggest consulting your own institutional policies, obtaining legal counsel, and becoming familiar with your state's Good Samaritan Laws.[2]

In the following sections, we will describe some of the more common certification types. Table 1 summarizes key differences in prerequisites and course duration.

CPR TRAINING

Cardiopulmonary resuscitation (CPR) is an essential skill both for laypeople as well as medical responders, and it is included in many WM training offerings. Individuals and organizations seeking CPR credentialing should inquire with their chosen provider regarding whether the CPR certification offered is "in house" or through a nationally recognized organization such as the American Heart Association or the American Red Cross, given that certain criteria may be required by credentialing or insurance providers. Traditional CPR training may need to have some wilderness-specific modifiers (Hawkins and Simon 2021).

WILDERNESS FIRST AID (WFA)

Any organization operating in a remote or austere environment should consider WFA as the minimum training for field personnel. For many environments, it might also be the appropriate level of training. It is an introduction to medical care, in general, and with a training time of only 16 hours (with some variability between providers), the time commitment is reasonable for both organizations and individuals. Curricula generally focus on recognizing medical issues in the wilderness environment, with content around management of injuries or illnesses restricted to the most common or most severe. One of the greatest strengths of the WFA level lies in the enhanced ability of graduates to anticipate issues before they arise simply because they have been exposed to a large range of injuries and illnesses inherent to the austere environment. Courses are generally delivered over two full days, and no prerequisite training is required.

WILDERNESS ADVANCED FIRST AID (WAFA)

WAFA, which also goes by Advanced Wilderness First Aid (AWFA) at some schools, is one of the less common WM training levels, but it nonetheless occupies an important space between WFA and Wilderness First Responder (discussed below). WAFA courses are generally four or five days long, and they not only orient students to patient assessment and prevention in the austere environment but also prepare them for providing medical care when resources are diminished or response is delayed.

WILDERNESS FIRST RESPONDER (WFR)

Wilderness First Responder (WFR) has long been the backbone of WM training, and it is widely considered in the professional outdoor industry as the standard level of training for trip leaders and organizations that operate in the backcountry and that are responsible for the health and well-being of participants in their activities. Courses are roughly 80 hours in length, and delivery methods are continually evolving. Many providers operate nine-day intensive training sessions, which allow learners to focus on the significant body of knowledge conveyed during a WFR course. Teaching is hands on, scenario based, and immersive. It is generally geared to take people who have no knowledge of medicine, but who have at least a background in the outdoors, and prepare them to care for both themselves and others in challenging environments. With a greater number of hours to work with than WFA or WAFA, WFR courses prepare students to not only engage in significant medical interventions but also to care for their patients for longer periods of time and to utilize teamwork in accomplishing positive patient outcomes.

Delivery methods for these courses are continually evolving, and students can now find options that involve precourse distance learning, which diminishes the amount of time spent in the "classroom," as well as semester-long courses delivered through a college or university. Distance-learning options similarly exist for WFA and WAFA courses, but consumers will need to determine exactly what they want from their training experience before selecting from the buffet of in-person, hybrid, and online course offerings.

Although the number of training hours can be daunting, WFR courses are relied on around the world to prepare individuals who will be working in a professional capacity to care for others in austere environments. Individuals and programs considering WFR training should thoroughly investigate the various options to see which training format and provider best suits their needs.

WILDERNESS EMERGENCY MEDICAL RESPONDER

Whereas First Responder (FR) was originally an EMS credential, national nomenclature changes replaced it in 2007 with the credential Emergency Medical Responder (EMR; DoT National Highway Safety Transportation Administration 2007). Since 2007, EMS systems across the country have been migrating to the new

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terminology (Brown 2011). EMR requires more hours of training than the old First Responder credential did, and it offers a significantly updated curriculum. Although most WFR courses will likely retain that moniker along with the original (and separately evolving) WFR curricula, some WM schools are moving toward incorporating the EMR title in a new and more EMS-oriented WEMR credential. The evolving difference is that WFR courses will provide unregulated and unaccredited content that positions itself in a "first aid" category, whereas WEMR courses provide (for the nonwilderness portion) an accredited curriculum that results in a state-regulated credential. In the future, WEMR will be the EMS credential, and it will be the best choice for individuals or organizations that desire both the practical training in medical care, as well as an official, government-recognized credential. This may be beneficial for permitting or insurance purposes, or for individuals who seek to provide formal care as part of a rescue squad or response team. WFR will likely remain the standard for guides and outdoor programs whose primary role is not medical care. The number of training hours for the EMR portion varies between states, but generally it is around 70 hours, and training providers may add eight or more hours for the wilderness portion.

WILDERNESS EMT (WEMT)

Similar to WEMR, WEMT combines a WM module with state- or nationally recognized EMT certification. EMT is a recognized credential in every U.S. state, and the required training hours for EMT now usually exceed 200. Additional wilderness medicine modules and field training bring the average course to around 250 total hours. Although the most common way to acquire EMT training is through a semester-long course through a community college, many independent providers offer intensive programs spanning three to four weeks. WM providers often add an additional week for training specific to the austere environment. EMT courses in nearly every state require "clinical" experience, which involves student time in an Emergency Room or in an ambulance. These experiences are critical for providers looking to become more comfortable with handling emergencies, and they often translate into greater confidence and efficacy for participants. As with EMR, WEMT courses are an important consideration for organizations or individuals that desire or require both practical wilderness training and official credentialing. For programs considering in-house trainings, WEMT is also often (but not necessarily) a minimum prerequisite for teaching WM in the outdoor education industry.

ENVIRONMENT-SPECIFIC TRAINING

One strength of the WM training options outlined above is their relative generality, and consequently, portability between environments. There are, however, locations and activities where field personnel might require more specialized training to meet hazards unique to that environment. Several commonly available curricula exist for more "common" specialized austere environments. Outdoor Emergency Care (OEC) and Outdoor First Care (OFC) are owned and operated by the National Ski Patrol, and they include specifics related to the alpine and ski environment. Similarly, Dive Medic Technician has been approved by the National Board of Diving and Hyperbaric Medical Technology (NBDHMT) as a training program for the underwater environment. For surface aquatic activities, the Starfish Aquatics Institute (SAI) and Landmark Learning Wilderness LifeGuard program offers a combination of lifeguarding and medical training for the austere environment. For other specialized environments, many training providers can adapt training to meet archaeologists' needs.

Some field researchers in other disciplines are collaborating with medical practitioners to develop trainings and protocols to address hazards specific to their field contexts. One independent zoologist is launching a company (Conservation Field Safety Expeditions) that provides, among other things, wilderness medical training for field scientists that includes certification in Wilderness First Aid (Duffey 2020). A working team that includes authors in this journal issue (Eifling and Hawkins) has been established to develop WM training curricula specifically for archaeology field sites. This curriculum builds off of research assessing the medical needs of archaeology field camps (Eifling and Klehm 2019, 2020).

In addition, topically specific training is available, including the American College of Surgeons "Stop the Bleed" campaign and state-specific epinephrine training courses (American College of Surgeons Committee on Trauma Stop the Bleed 2020; North Carolina State Legislature 2020). These are all generally taught at the layperson level.

BRIDGE TRAINING FOR TRADITIONAL HEALTH-CARE PROFESSIONALS

Some archaeology programs may have access to traditionally trained health-care professionals who are interested in applying their training in austere environments to support a scientific project. Several WM schools offer wilderness training modules for such traditional health-care professionals, with terminology such as Wilderness Upgrade for Medical Provider (WUMP) and Advanced Wilderness Life Support (AWLS). Such students come with a wide range of experience, and this is an environment in which the "caveat emptor" imperative for matching programs with needs is even more pressing. Courses range from two to six days, and content can be quite variable. These courses often offer continuing education credits, which can be useful for health-care professionals during their own recredentialing process.

Such clinicians can play an important role in field medicine. Indeed, the American Board of Medical Specialties identified EMS (systematic field medicine) as a board-certified medical subspecialty in 2010. The first EMS board certifications were issued in 2013 (American Board of Emergency Medicine Emergency Medical Services 2020). Although field medicine is now a board-certified subspecialty, physicians from a broad range of specialties, as well as APRNs and PAs, could be highly functional in a field environment.

MEDICAL OVERSIGHT

With increasing portability of equipment and sophistication of training, non-first-aid wilderness medical care has become a reality in the twenty-first century, in ways never contemplated when WM was first being formalized in the second half of the twentieth century. All non-first-aid wilderness medical care should

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be done under the oversight of a physician. In addition, it is best practice for all provider types to collaborate with a physician, including dependent certifications such as paramedics, PAs, and advanced-practice RNs (APRNs). Even basic wilderness medical care—perhaps to an even greater degree given the lower number of training hours for basic practitioners—deserves physician-level medical oversight. All programs anticipating medical training and medical operations should consider having a formal medical advisor or medical director. This could be a physician, or a PA or APRN working in collaboration with a physician (Millin et al. 2017; Warden et al. 2012).

TRAINING/CREDENTIALING IN-HOUSE INSTRUCTORS

Some scientific programs, such as universities or large agencies, may choose to offer in-house training, either for certification or simply for educational benefit.

Organizations wishing to grant formal credentials, such as WEMT, based on regulated EMS certification types need to keep in mind that EMS education is strictly regulated on a state-by-state level. Organizations such as the National Association of EMS Educators provide widely recognized instructor training courses that are structured around meeting instructor training requirements in numerous states. In general, this pathway will be most successful for organizations such as universities that already have a department or division teaching EMS credentials with credentialed instructors.

Non-credentialed in-house WM training will be much less regulated. Prospective instructors should consider existing content recommendations for WFA and WFR when crafting their local curriculum (Johnson et al. 2013; Weil and Schimelpfenig 2016; Wilderness Medical Society Curriculum Committee 1999). They should also consider the expected operational environment of scientists and level of preexisting medical sophistication of those scientists.

There are no industry recommendations for selecting and vetting instructors, which is generally left up to the employment and quality management programs of each WM school. Because training for instructors varies by company, this is one area that consumers should thoroughly investigate in choosing an external school. Similar rigor should be applied to selecting in-house trainers. Some companies place a higher value on wilderness expedition experience for their instructors, whereas others place a higher value on clinical patient care experience (Winstead and Hawkins 2018). Both of these are important criteria for choosing scientific medical support trainers, as is a strong background in teaching. Instructor training courses range from a couple of days (or less) to a couple of weeks. As with any learning environment, a good instructor can make all the difference, especially in retention and comprehension (Winstead and Hawkins 2018). One important consideration is whether externally recognizable and consensus-compliant certification is desired, such as Wilderness First Responder, and whether the chosen in-house instructor can deliver that. Ideally, an in-house instructor combines actual clinical experience, external certification, and teaching skills that provide students with a solid and reproducible ability to perform skills in a challenging environment.

Some scientific field organizations have more explicit arrangements with universities, either internally or externally, to receive medical support and with mutual benefit. For example, the Massachusetts General Hospital (MGH) Wilderness Medicine Division at Harvard University collaborates with multiple external scientific organizations. One example is the Woods Hole Research Center for field work in Siberia and Alaska (Bohonak 2013). The MGH team—including professors, resident physicians, and post-graduate Wilderness Medicine Fellows—provides pretrip risk mitigation and joins the research crews in the field. While providing medical support, the MGH medical team also conducts their own research—for example, in the case of the Woods Hole collaboration, work on climate change testing mercury levels in remote tribes near the Arctic Ocean (Harper and Harris 2008).

PUBLICATIONS

Numerous publications also exist for self-study and reference. We recommend using publications that follow evidence-based medicine principles (Evidence-Based Medicine Working Group 1992; Sackett et al. 1996). A nonexclusive list of suitable WM textbooks is presented in Table 2.

As with all scientific disciplines, peer-reviewed journals offer vetted content that meets scientific review criteria. The primary peer-reviewed journal for WM is *Wilderness & Environmental Medicine* from the WMS.

WMS also offers peer-reviewed and evidence-graded clinical practice guidelines on a variety of WM topics, which provide consensus conclusions on best practices for field medical providers (Cushing 2020). *Wilderness Medicine Magazine* publishes layperson summaries for these clinical practice guidelines, and it is both a useful and reputable resource for nonmedical professionals seeking WM information (Hawkins 2020). Both publications are freely accessible online, although membership with WMS is recommended to support this work.

KNOWLEDGE RETENTION

Because giving medical care in a backcountry setting is likely to be a low-frequency, high-acuity task, it presents providers with a challenge for knowledge and skill retention. Investigations of skill retention in WM trainees paint a mixed picture of how much knowledge is retained (Houghton et al. 2016; Schumann et al. 2012; Simon 2016). It is probably not a stretch, however, to suggest

TABLE 2. Recommended Wilderness Medicine Textbooks.

Auerbach's Wilderness Medicine, 7th ed. (Auerbach 2017)
Medicine for the Outdoors: The Essential Guide to First Aid and Medical Emergencies, 6th ed. (Auerbach 2016)
NOLS Wilderness Medicine, 6th ed. (Schimelpfenig 2016)
Vertical Aid: Essential Wilderness Medicine for Climbers, Trekkers, and Mountaineers, 1st ed. (Hawkins, Simons, et al. 2017)
Wilderness and Rescue Medicine, 6th ed. (Isaac and Johnson 2012)
Wilderness EMS, 1st ed. (Hawkins, ed. 2018)
Wilderness Medicine: Beyond First Aid, 7th ed. (Forgey 2017)

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that WM knowledge deteriorates significantly during two- or three-year recertification cycles. To address this challenge, many WM schools are now offering newsletters, website content, and curriculum supplements designed to engage students and remind them of key concepts. Text supplements, such as field guides and smartphone apps, are also increasingly available to aid responders. It is incumbent upon course graduates, as well as their programs or employers, to recognize retention challenges and to put in place systems to foster knowledge utilization when it is required.

RECIPROCITY

Reciprocity between providers is a significant hurdle facing the WM industry. For those credentials not regulated by the state (e.g., WFA, WFR), providers self-define which other providers' certifications they are willing to accept for recertification. There is no central list of which providers recognize which others, so some research is recommended on the part of the consumer prior to purchase. If the goal is a WFA or a WFR, a good place to start is investigating whether the curriculum offered conforms to the scope of practice established by the WMEC (Schimelpfenig 2016).

SUMMARY

Three pathways exist to build medical support for archaeologists: (1) obtaining wilderness medical training for existing personnel, (2) deploying already trained (and potentially certified) personnel who are part of the team, or (3) adding personnel with existing health-care credentials to the team and obtaining specific WM training for them. The field of WM has grown by leaps and bounds in the twenty-first century, and vast resources are now available. This is still, however, a largely unregulated industry (although in some ways this is changing), so programs should choose their training and affiliation with care. One thing remains clear: a robust risk management program will include some degree of training and deployment of individuals trained to deliver field medical care for remote scientific sites or those with minimal access to a strong EMS system.

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Data Availability Statement

No original data were used in this article.

NOTES

1. The Wilderness First Responder (WFR) credential is an interesting case study in the threshold between first aid and regulated medical care. This situation is discussed below in the section entitled "Emergency Medical Responder."
2. Recreation Law maintains a helpful summary of each state's Good Samaritan Laws here: https://recreation-law.com/2014/05/28/good-samaritan-laws-by-state/.

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