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## **Safety First: Assessing First Aid Educational Needs of Outdoor Education Participants**

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Safety First: Assessing First Aid  
Educational Needs of Outdoor Education  
Participants

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**PA599: Physician Assistant Master's Project**

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## Abstract

**Background:** Much of the general population has a lack of first aid knowledge, despite engaging in activities that might end in needing some level of medical care. Even when first aid education is gained, sometimes it is subpar or less relevant to wilderness excursions. In order to create a high quality wilderness first aid course, it should be interactive and take place in a wilderness setting. Having basic first aid skills increases confidence and reduces anxiety of participants, possibly reducing the rate of injury.

**Purpose:** This needs assessment sets out to determine the first aid needs and concerns held by outdoor education participants in order to better construct a curriculum to serve their safety needs.

**Methods:** This needs assessment was conducted during participation in the Augsburg University Boundary Waters Teacher Institute. This was an outdoor education course including 16 participants that took place in the Boundary Waters Canoe Area Wilderness. This course took place from July 9th 2023 until July 15th 2023, and consisted of three nights camping at Sawbill Campground and 3 nights in the remote backcountry. This study involved observation by the researcher of the public behavior by the participants of this trip.

**Conclusions:** Based on observations from a remote outdoor education program, this research found important topics to cover being diarrheal illness, Lyme Disease, muscle sprain, muscle strain, bone fracture, dislocation, laceration, burns, and head injury. Skills that are good candidates for an experiential component are tick removal, splinting, tourniquet tying, wound dressing, and burn care.

**Key Words:** first aid, wilderness, education, experiential, needs, outdoor, medical

## **Introduction**

In 2022, 55% of the U.S. population aged 6 and older participated in some form of outdoor recreation.<sup>1</sup> Outdoor education programs for adults and children are also growing in popularity.<sup>6</sup> However 72.1 per 100,00 participants will become injured while engaging in these activities.<sup>10</sup> This is concerning as a Cintas poll found that a fourth of Americans do not know how to administer basic first aid, and a half are not confident in their ability to administer cardiopulmonary resuscitation (CPR).<sup>3</sup> Many outdoor recreation programs do not have dedicated first aid curriculum, and in some areas education is decreasing. A 2019 census of outdoor orientation programs found that wilderness first aid course inclusion had decreased from 82% in 2012 to 60%.<sup>6</sup> Additionally, including a wilderness first aid component in outdoor education is difficult, as there is no industry standard for what these courses should include.<sup>18</sup> This makes it difficult to identify what components of a first aid course are relevant and feasible to an outdoor education course and to outdoor enthusiasts.

Despite the risk of injury during outdoor education and recreation, many programs do not offer first aid education. Due to the lack of standardization among wilderness first aid curriculum, it is important to look at what first aid skills would be relevant and feasible to teach in an outdoor education environment. This needs assessment sets out to determine the first aid needs and concerns held by outdoor education participants in order to better construct a curriculum to serve their safety needs.

## **Literature Review**

Around the world there is a lack of first aid knowledge among general populations. In an Indian study 61% of respondents reported some knowledge of first aid with only 2% having

received formal first aid training from a health care worker.<sup>11</sup> A survey of Iranian teachers found that 40.3% had passed a first aid course, but 48.5% had encountered situations in which first aid care was required. Even though there was a proportion of participants that had received training, this study found that more than 80% of those studied answered incorrectly to questions regarding the care of a child who had a fracture and one who had been struck by electricity.<sup>2</sup> Even when individuals receive first aid training, often the training is subpar, not relevant, or is not retained.

The idea that first aid training has room for improvement is supported by research. A Norwegian study of teachers' opinions on the first aid curriculum they teach their students found that the set curriculum was too vague about what students should be taught, and did not include important life-saving skills. Also, the teachers did not feel adequately trained to be first aid instructors.<sup>5</sup> Even when a first aid course is of quality, often it will not be tailored enough to be useful in a wilderness setting. One study tested the first aid knowledge of international tourists hiking the Annapurna Circuit through the Himalayan Mountains in Nepal. Though 20% of participants had medical training, on average the participants only answered 1 out of 20 questions correct. This study concluded that these deficiencies stemmed from first aid courses being targeted for urban settings, making them less useful for remote wilderness excursions.<sup>17</sup>

Though there is room for improvement in first aid education, there are aspects that can make it more effective. A Chinese study found that after testing three different first aid learning models, an interactive training model produced the highest test scores.<sup>14</sup> This is supported by Kureckova et al., which found a “remarkable difference” in the knowledge, skills and competency in the participants who had received experience-based training, when compared to those who took a “standard first aid course.”<sup>13</sup> Additionally, when adults provided feedback on a pilot first aid course, they indicated that the interactive discussions and demonstrations were one

of the most helpful aspects of the class.<sup>12</sup> It is evident that including interactive or experiential aspects to a first aid course are important for information retention and student satisfaction.

Not only is it beneficial to make first aid courses interactive, but studies have also shown that they are more effective when the learning environment more closely resembles the practicing environment. Rushton et al., proposed that conducting nurses' Basic Life Support (BLS) training in an unfamiliar environment improved emotional resilience as it mimicked the discomfort felt when practicing these skills in real life.<sup>20</sup> Chirico et al. echoed this idea, asserting that in order for a medical simulation to be useful, the teaching environment must be "realistic and immersive".<sup>7</sup> These ideas support the sentiment that a wilderness first aid course would be best delivered outdoors.

Experiential medical training also increases confidence and decreases anxiety. Bailey et al. found that high fidelity simulation increased the confidence of nursing students.<sup>4</sup> Another study on seizures found that first aid education decreased families' anxiety over possible medical events and improved comfort with the thought of handling these situations.<sup>16</sup> Kulangara created a first aid curriculum for older adults and collected data on performance and attitudes after the course. Students of the course reported feeling better prepared for emergencies and empowered to be proactive in preventing poor outcomes.<sup>12</sup> First aid education gives individuals the tools to take charge of their health and safety, soothing fear in the process.

The management of anxiety over medical concerns is important on an outdoor excursion, as research has shown stress increases the possibility of injury. A study of collegiate dancers found associations between stress levels and injury frequency.<sup>21</sup> Also, Finilson et al. conducted a study of injuries on a multi day wilderness event and found that participants with low levels of stress were 98% less likely to be injured.<sup>9</sup> Even if not many injuries are expected on an outdoor

trip, there are benefits to increasing confidence and reducing anxiety through first aid coursework.

Much of the general population has a lack of first aid knowledge, despite engaging in activities that might end in needing some level of medical care. Even when first aid education is gained, sometimes it is subpar or less relevant to wilderness excursions. In order to create a high quality wilderness first aid course, it should be interactive and take place in a wilderness setting. A medical event may not occur on every outdoor education trip, but having basic first aid skills will increase the confidence and reduce anxiety of participants, possibly reducing the rate of injury.

## **Methods**

This needs assessment was conducted during participation in the Augsburg University Boundary Waters Teacher Institute. This was an outdoor education course including 16 participants that took place in the Boundary Waters Canoe Area Wilderness. This course took place from July 9th 2023 to July 15th 2023, and consisted of 3 nights camping at Sawbill Campground and 3 nights in the remote backcountry. This study involved observation by the researcher of the public behavior by the participants of this trip.

## **Field Notes/Results**

This needs assessment explores the researcher's personal observations and reflections while attending an experiential outdoor education excursion. By sharing the researcher's personal experience and the observed experience of others, this assessment looks to assess the

medical needs and concerns of outdoor education participants, and consider the benefits of integrating first aid education into the curriculum.

At the beginning of the trip many participants shared their concerns about medical emergencies. The most common concerns voiced were animal attacks, fatal injury, and ankle sprains. The leaders of the trip addressed these concerns by explaining animal safety, emergency SOS protocol, and ankle support options. Specifically, preventative measures for electrocution by lightning and trauma injury due to a fallen tree were taught. They also went over where medical supplies would be kept and who on the trip had medical training. The excursion was designed to include two guides with knowledge of wilderness safety and a Wilderness First Responder.

Despite addressing medical concerns at the beginning, participants still voiced concerns throughout the trip. I also observed through my experiences many possible sources of injury. Participant past experiences, concerns, and my observations are organized based on type of injury or medical concern.

As water quality is a concern when on a trip in the wilderness, the leaders provided education on the degree of risk associated with drinking lake water and the filtration practices used in order to produce safe drinking water. Despite this education, I observed a range of participant concerns over water quality. There was a participant who refused to consume the filtered water for 24 hours, citing concerns over water safety and chances of resulting illness. There were a few participants who voiced less concern over consuming unfiltered lake water. Some cited drinking it in the past and willingness to do so again on the current trip. Many participants cited concerns over the possibility of diarrheal illness and did not know what to do if it occurred. A few participants shared instances on past wilderness excursions where diarrheal



illness occurred due to the drinking of unfiltered water. Due to these observations, it appeared there was a wide range of knowledge on water quality and the possibility of diarrheal illness resulting from unsafe drinking water.

Insect bites and resulting illness was another frequent topic of discussion. Participants were provided education on procedure for checking for ticks and the importance of doing so to prevent Lyme disease. The procedure for removing a tick was not discussed but many participants noted having removed a tick before. Signs and symptoms of Lyme disease were discussed among participants, but there was varying ability to identify a main sign of erythema migrans. There was an instance of misidentifying an insect bite as this rash. Insect bites were the most common medical concern on the trip, but all participants successfully self-treated with hydrocortisone cream and preventative measures.

There were many concerns over muscle sprain and strain throughout the trip, as it included a high level of physical activity. There was a higher probability of medical injury for certain individuals due to past circumstances, including muscle strain and joint dislocation. These medical concerns were addressed by adjusting activities, such as other participants carrying certain gear so others did not have to. The possibility of bone fracture was discussed and established procedures were delineated.

The possibility of lacerations and subsequent infection was brought up at multiple occasions. Most participants felt confident on the treatment of minor lacerations, but major ones were a cause for concern. Most participants did not know how to tie a tourniquet in the case of an injury that would not stop bleeding. Natural medicinal remedies for hemostasis, such as yarrow, were also discussed.

There were a few sources of illness and injury that were not discussed by participants, but that I personally identified. The first is the possibility of burns. A campfire was lit one to two times a day, and a camping stove was utilized creating the possibility for burn incidents. The second is the possibility of head injury. Portaging on the trip involved traversing uneven, rocky, slick and inclined terrain, usually while carrying a canoe or a heavy pack. This created numerous chances for head injury to occur.

From these observations, I have determined important topics of education for integrated first aid would be the prevention and treatment of diarrheal illness, Lyme disease, muscle sprain, muscle strain, bone fracture, dislocation, laceration, burns, and head injury. Specifically skills that would be feasible to experientially learn on the trip would be tick removal, splinting, tourniquet tying, wound dressing and burn care.

## **Discussion**

There is no regulating body for wilderness first aid courses. Schimelpfenig et al. conducted an evidence based review of the 16 hour Wilderness First Aid course, which is widely attended and copied for other wilderness first aid curriculum. They found that of the 54 practices assessed, only 5% had high quality scientific research to back up their recommendations. Additionally, 13% did not receive a grade, as no relevant research had been completed on these topics, making the evidence entirely based on opinion.<sup>18</sup> Therefore, it is not always prudent to copy other wilderness first aid courses when attempting to create a new first aid curriculum. This needs assessment was conducted as a first step in developing a wilderness first aid curriculum for outdoor education trips. It assessed the medical needs and concerns of participants in order to

make relevant recommendations as to what would be most useful to include in a wilderness first aid course.

Some of the observations of the needs of this program's participants matched existing research available about prevalence of injuries. It was observed that many participants had concerns over musculoskeletal injury. A survey of long distance hikers on the Appalachian Trail found that 61% of respondents reported musculoskeletal injury.<sup>8</sup> Flores et al. recorded U.S. outdoor recreational injuries, and found fracture, sprain and strain to be the most common injury reported.<sup>10</sup> A cohort analysis of a residential summer camp found that musculoskeletal injury was the second most common reason to visit the infirmary and was the condition most frequently escalated. That same study found skin disruption—including lacerations, burns, and bites—to be the most common type of injury reported.<sup>19</sup> This matches observed participants' concerns as well, as lacerations and bites were a main concern for many on the trip.

Though assessing participant concerns was helpful in learning about their current first aid knowledge, these concerns should not be the only information used when deciding topics covered in first aid curriculum. Sharfenberg et al. found that trekkers had more knowledge about “unusual and impressive” first aid topics, rather than more relevant topics that are more likely to occur.<sup>17</sup> In the researchers' observations this effect can be seen as well. Participants were more initially concerned about dramatic events, such as a bear attack. Meanwhile a very common and possible injury, such as a burn, was not mentioned at all. This stresses the fact that outdoor education participants are not always focused on the most relevant information, and first aid education needs to stress the importance of smaller, more common, topics.

First aid education is not only important to teach information, but to correct false beliefs. In this research, it was observed that participants held false beliefs on multiple occasions. This is

not uncommon, as shown by Sharfenberg et al.. In their study, most participants rated their first aid knowledge as ‘satisfactory,’ but most participants did poorly on the assessment.<sup>17</sup> Sometimes false beliefs arise from standards that have been changed. For example, historically the first aid measures for a venomous snakebite included a recommendation to tourniquet the affected limb in order to stop the flow of venom throughout the body. However, newer recommendations suggest applying a compression bandage instead to restrict lymph flow. Despite this change, Mahmood et al. found that 60% of respondents still believed a tourniquet to be the correct first aid measure.<sup>15</sup> If someone gained their first aid knowledge a long time ago, they may not be aware of new advances in research.

First aid recommendations can also change based on region. Referring back to the snakebite example, if someone learned how to treat a snakebite in a different country, they may incorrectly treat a snakebite due to the differing characteristics of snakes from different regions. For example, though a compression bandage is the recommendation for certain snakebites, it is controversial to use for North American bites as this method could potentially enhance cytotoxic effects from certain North American snakes.<sup>18</sup> So, even if an individual has learned correct information for their region, that information may be false in the area where they are participating in an outdoor experience. It is important for a first aid course to cater its curriculum to the region relevant for the outdoor course it is paired with.

Research has shown that including experiential components to a medical course can increase its efficacy.<sup>14, 4</sup> Conducting parts of the course in a setting close to the actual practicing environment is helpful also.<sup>7, 20</sup> For these reasons, observations made in this research should be used to assess the practicality of conducting first aid education while on a similar outdoor education trip. The experience studied in this research included a portion where participants

paddled and portaged through the Boundary Waters backcountry, where packing lightly was essential. First aid educational experiences in remote places should be limited to those that do not require heavy materials. It is for this reason the researcher recommends tourniquet tying, splinting, tick removal, wound dressing and burn care as good skills to teach in remote areas, as they do not require heavy supplies. Skills such as CPR, that require heavy mannequins for effective simulation, would not be a plausible task for an experiential component of learning first aid in a remote area. However, skills requiring more or heavier materials could easily be learned on a less remote outdoor education trip.

### **Limitations**

A major limitation of this study is the narrowness of its scope. Due to the personal observational nature of the research, only one outdoor education program was studied. Although this gave in depth insights on the needs of those on this particular trip, it may or may not be generalizable to other programs. More research of this nature will need to be conducted in programs of greater length and size in order to reach solid conclusions. Additionally, programs in regions with different predators and weather conditions may need to adjust content to be more relevant to their region. This study was also qualitative in nature. In future research it may be useful to collect quantitative data on the first aid knowledge of participants, and how that translates on an outdoor excursion. Finally, this study only assessed needs due to concerns, feelings, and observations. If a first aid curriculum is instituted, further research should be conducted in order to reassess needs after a curriculum is in practice. This will test the practicality of some of the suggestions contained within this paper, and allow leaders to tailor a course closer to their needs and resources.

## **Conclusion**

All outdoor education programs come with a possibility of injury. Many participants are ill-prepared for a medical emergency, as first aid education of the general public tends to be inadequate. This possibility can cause concern, stress and anxiety for participants. So, building first aid education into an outdoor education curriculum is important, but with no standard available for wilderness first aid, creating an appropriate curriculum can be difficult. Based on observations from a remote outdoor education program, this research found important topics to cover being diarrheal illness, Lyme disease, muscle sprain, muscle strain, bone fracture, dislocation, laceration, burns, and head injury. Skills that are good candidates for an experiential component are tick removal, splinting, tourniquet tying, wound dressing, and burn care. Experiential first aid should be integrated into outdoor education curriculum in order to create an environment of confidence and safety.

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