ABSTRACT: The focus in recreational avalanche education has improved over the last decade with initiatives related to group communication, group leadership, safe travel techniques, proper terrain choices and improved rescue techniques. There’s little doubt that today’s avalanche instructors have helped save countless lives in the backcountry. However, one area where we need improvement is in preparing students for scenarios that could require evacuation or medical treatment of an injured person after an avalanche. In this paper we’ll draw upon case studies from professionals* and develop a basic understanding of what we should apply to modern avalanche education related to evacuation and medical treatment.

*ADDENDUM: Recreational case studies were added

KEYWORDS: medical treatment, education, evacuation, first aid

1. INTRODUCTION

Backcountry Access has a history of gathering data from professionals and recreationists who have been caught in avalanches. Prior surveys have sought information from people who have used avalanche beacons, shovels, probes and airbags in real-life avalanche situations. This data has been used to challenge existing norms in the avalanche rescue industry, develop new rescue techniques, and ultimately help improve avalanche education (see: http://backcountryaccess.com/portfolio/avalanche-research-and-papers/).

Our recent thoughts about “what to address” to help improve avalanche education turned to evacuation and medical treatment for ISSW 2016. These are subjects that are rarely discussed in avalanche courses and subjects with which we are less familiar. For years we have focused on how to avoid avalanches and what to do if caught in an avalanche, but it’s now time to address what to do after the avalanche and how to be prepared for that situation. To quote IFMGA guide Martin Volken, “…after the avalanche is when things become really interesting.”

2. SURVEY RESULTS: GENERAL DEMOGRAPHICS

BCA created and administered a survey that was completed by 165 participants. The survey was formatted in Constant Contact and dispersed through social media channels including Facebook, the BCA Newsletter, Twitter and email. The goal of the survey was to find people who had been in an avalanche situation that required medical attention or evacuation for a member of their party.

To get an idea of the survey demographics, here are some key points in italics followed by an interpretation from BCA:

-43% have been skiing/riding in the backcountry from 0 to 5 years. We consider this a “new” user group and it is the largest percentage of survey participants. In contrast, 9.6% answered “more than 20 years.”

-49% have taken an AIARE avalanche course, 37.4% have taken a non-AIARE avalanche course. The rest are split between “self-trained, online training and no training.”

-10 to 20 is the average amount of days spent in the backcountry annually. Included in these numbers is access to the backcountry via ski areas.

-93.4% of all participants travel in the backcountry with a beacon, probe and shovel. This number is slightly lower than a 2012 survey and may be so due to the large number of “new” backcountry travelers that responded to this survey.

-21% of the avalanches reported in this survey were reported to a local avalanche center. 40% of avalanches in a 2010 survey were NOT reported. The option of the answer “Don’t Know” could alter the 21% slightly in this survey.

-Of the 165 participants, 42 were “transported by snow in an avalanche, 32 were “partially buried,” and eight were “completely buried.” Completely buried is qualified by no visible body parts on the snow surface and head submerged under snow.

3. SURVEY RESULTS RELATED TO POST-ACCIDENT EVACUATION

Of the 82 participants who were involved in avalanches, we wanted to look at their injuries and find out if they were able to leave the backcountry under their own power:
Four of the participants were evacuated by helicopter. Two of these respondents were from Canada, one from Austria, and one from the United States. Injuries sustained in this group included broken ankle, dislocated knee, revival from CPR, and “upper body damage, including abdomen.”

Seventeen of the participants who sustained injuries were able to leave the backcountry under their own power. These injuries included broken arm, dislocated shoulder, badly bruised groin, hernia and broken ribs.

There were three fatalities captured in the survey. These were reported by people who were involved in the accident or part of the group that experienced the accident. All three bodies were recovered by helicopter.

Fifty-eight people left the backcountry under their own power after being caught in an avalanche. These people had minimal to no injuries.

**4. SURVEY RESULTS RELATED TO MEDICAL PREPAREDNESS**

“Do you feel adequately prepared to provide medical attention to someone who has been injured in an avalanche?” Results:

-46% yes  
-30% not sure  
-24% no

One participant pointed out that this question was too vague. It could have been better phrased as “Do you feel capable of splinting a broken leg in the backcountry?”

Related to carrying a first-aid kit:

-81% of participants carry a first-aid kit  
-15% do not  
-4% chose not to respond

When asked if the participants were familiar with the contents of their first-aid kits, the responses were these:

- Basic Familiarity 41%  
- Advanced Familiarity 32%  
- Expert familiarity 17%  
- No familiarity 10%

The results related to medical training were strongly weighted toward “trained” versus “untrained”:

-55% of participants had Basic First Aid and CPR training.  
-29% had Wilderness First Aid training. This is advanced medical training that requires a seven-day course with re-certification every few years to stay current.  
-8% had Paramedic training or a medical license.  
-8% had no medical training.

Additional information: we asked participants to share what additional medical/rescue tools they carry in the backcountry. The percentage listed is out of the total number of 165 respondents: rescue sled (5.9%), bivy sack (37%), splints (24%), painkillers (54%), stove (17%), none (26%).

**5. POST-AVALANCHE RESCUE AND INJURY PROTOCOL AT THE PROFESSIONAL LEVEL**

In interviewing IFMGA, ACMG and AMGA guides about professional medical treatment and evacuation in the backcountry, all agree that each incident should be addressed with the resources available. These vary widely by region and the discussion of helicopters as a rescue tool was prominent but broken into three categories: helicopters being widely available, somewhat available, and hardly available. All agreed that contacting an outside resource to provide a helicopter should be a first priority if the immediate injuries were obvious, but not a priority if the injuries sustained were less serious and could be addressed in the field.

The basic protocol for trained guides in an injury situation is this:

1. Determine that the area is safe.  
2. Determine the level of injury.  
3. Determine the mechanism of the injury.  
4. Stabilize the injured person if necessary.  
5. Make sure the injured person is comfortable.  
6. Determine if an outside rescue source is needed and/or possible.  
7. Manage others in the group appropriately and utilize their strengths if necessary.  
8. Remain flexible and willing to improvise if needed.

Trained guides are currently carrying several types of communication devices depending on the area and resources available in the region of travel. If contacting an outside rescue source, UTM and/or LAT/LONG coordinates are mandatory along with an elevation estimate. This is an example of the main communication devices that are being utilized at the professional level:

1. Cell phone
2. VHF radio
3. inReach (two-way satellite tracking and messaging device)
4. Satellite phone

Guides also tend to carry several additional pieces of specific equipment in case they have to evacuate a client. Again, these items vary by region and terrain but include:

1. An inflatable, lightweight sleeping pad that also provides insulation.
2. A rescue sled. Specifically mentioned multiple times was the "Guides Tarp" produced by Alpine Threadworks. This rescue sled also doubles as a bivy sack or a shelter that can accommodate four to five people.

A note on rescue sleds: these are not often used to pull an injured person out of the backcountry. Instead, they are more commonly used to relocate an injured person to a safe area where a helicopter can land or where a SAR team can access the victim.

Lastly, back to helicopters. There are regions where helicopters can’t land or simply don’t exist. Depending on the type of injury sustained, the bottom line and lingering fear among guides is that death could be the outcome in a remote region if they can’t utilize outside resources.

6. POST-AVALANCHE RESCUE AND INJURY PROTOCOL AT THE RECREATIONAL LEVEL

One of the largest issues avalanche educators face today is that their courses are packed with information including group communication, group leadership, safe travel techniques, proper terrain choices and avalanche rescue. These are not light topics and the amount of time allotted to teach these courses is limited. But what’s lacking from current avalanche educational curriculum is addressing post-avalanche or backcountry injury evacuation. What should be presented in basic avalanche courses in ten minutes or less, is this:

General Acceptance Reminder:

1. Accept that traveling in the backcountry could result in death.
2. Accept that traveling in the backcountry could result in an injury.

Medical and Topographical Skills Required:

1. At least basic first aid and CPR. Ideally Wilderness Medical Training.
2. Knowledge of location whether using a map or GPS. This information is needed in case an outside rescue source is required.

Equipment Required:

1. Communication device. Cell phone, inReach, two-way radio, satellite phone. Choosing these depends on the region and its remoteness. Cell phones are the obvious default and an inReach should be considered as an additional tool.
2. Rescue Sled: used to transport the victim to a safe location for helicopter pickup or evacuate the victim entirely (much lower chance).

Practical Skills:

1. Knowledge to assess location safety.
2. Knowledge to determine severity of the injury.
3. Know when to determine if outside rescue sources are needed.
4. Be able to provide location to outside rescue sources.
5. Know what’s in the first aid kit and how to use it.
6. Know how to use the rescue sled.

7. CONCLUSION

Teaching evacuation and medical treatment for an injury sustained in the backcountry is a multi-day course unto itself. However, integrating a ten-minute discussion in basic avalanche courses that outlines the skills and equipment needed to perform a rescue can go a long way. Ideally, basic students will go on to advance their evacuation and medical skills just as they are encouraged to advance their skills in group communication, group leadership, safe travel techniques, proper terrain choices and avalanche rescue.

Special thanks to IFMGA guides Rob Coppolillo, Larry Goldie and Martin Volken for their input.