

MERIDIAN

Summer 2017



The Quarterly Publication of the Mountain Rescue Association

mra.org

Patient Tie-In Options

New Avalanche Information
Rocky Mountain Case Report





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RESCUE
ASSOCIATION

Summer 2017

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Cover caption: Preparing to lower over the edge. Tyler Deboodt

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President's Message Spring 2017

By Bryan Enberg, MRA president and New Jersey Search and Rescue

Greetings Rescuers,

It has been another busy summer for MRA members who are showing their courage, commitment and compassion both on and off the mountains. I know of several members of MRA teams that recently deployed to Texas in response to Hurricane Harvey and are now deployed to Florida for Irma. Good luck and stay safe.

Lister Service

This important communications tool for the membership has been down for some time now but I am happy to announce that the new MRA Lister Service is finally in development! This service will be test launched in the next few weeks with a small group to kick the tires and rolled out to the rest of the membership shortly afterwards. So be on the lookout for an email from the MRA on how to get registered.

MRA Spring Conference 2018

Plans are well underway for MRA2018 hosted by Rocky Mountain House Volunteer Search and Rescue in beautiful Nordegg, Alberta! Stay tuned for updates in the Meridian as well as on the website as details are released. We are still booked out to 2021 for our spring Conferences. If your team is interested in hosting, please reach out!

2019 - Portland Mountain Rescue

2020 - Allegheny Mountain Rescue Group

2021 - Larimer County Search and Rescue

MRA Mission Reporting

Thank you to all the teams who are regularly posting their mission statistics to the MRA Mission Map. <http://mra.org/mra-missions-to-date-2017/> This is a fantastic tool which not only helps the MRA show the value the teams of the MRA provide on a national level but can be used in in your own teams marketing efforts. So far we are reporting 857 missions.

The Face of the MRA

If you or your team is doing something, we want to share it! Post it to our Facebook or send us an article! Have a member of your team to be highlighted? Send us a name and we will do the interview! Using a cool new tactic or testing with a new piece of gear? Let us know! Have a cool mountain rescue photo? Send it our way! We want the Meridian to tell the story of your MRA! I hope



you enjoy this edition of the Meridian, yet another great benefit of MRA membership. Thank you, all, for your hard work, courage, commitment, and compassion.

Yours in service,

Bryan Enberg

President, Mountain Rescue Association

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Announcements

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Pre-conference program June 5,6,7 2018

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The mountain in the conference logo is Ex Coelis Peak above the North Saskatchewan River, named in honour of the Canadian Airborne Regiment of WWII, (*Ex Coelis* latin for "out of the clouds").

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Cliff Notes: Case Report From the Rocky Mountain Region

By Dr. Allison Sheets

"Feminine Issues"

It was supposed to be a quick, fun, overnight summer camping trip to the small alpine lake near tree line. The hike in was warm and pleasant and the night by the shore under the stars and cliff faces was serene. Now her boyfriend and two dogs were waiting on the trail while she struggled with dizziness. The abdominal cramping that she had been dealing with for a few weeks had returned this morning on the hike back to the trail head. While the pain seemed worse, it was the dizziness that was making it so hard to walk; she finally told her boyfriend "I just can't" and had him go for help.

It was just after noon when the rescue team got the page for a 25-year-old female with "feminine issues" on a popular back country trail at ~10,000 feet. The patient was about a mile in on the trail and the first responders got to her with ATV assistance in about a half hour. A paramedic from the fire department arrived about 15 minutes later. Meanwhile the mountain SAR team was responding, non-emergent, from 25 miles away. An odd complaint many thought, a few of the women responding were immediately wor-



ried.

The patient was awake and talking when the medic first got there. She was pale and complained of dizziness and lower abdominal pain. She did not know what was wrong with her but had just seen her doctor a few days before. The medic continued his evaluation. Finding severe abdominal tenderness and unable to get a decent blood pressure, he started an IV. Sensing the seriousness of the patient's condition, the medic radioed that SAR would be needed for evacuation and that more IV fluids were requested. There was no way she could ride an ATV out. A helicopter was put on standby.

The medic on scene at the same time asked if the patient was pregnant and she replied, it is possible, but that she did not think so. When the medic aired on the radio a blood pressure of 70/palp, however, everyone knew the stakes were high. The urgency increased and a helicopter response was requested.

"So, THIS is what they mean in WFR class when they talk about cyanosis", thought one SAR member as they arrived on scene and saw the patient. She was ghostly white and unable to even sit up. IV fluids were going, the patient got analgesic and antiemetic medication and was rapidly packaged, but she continued to be tachycardic and hypotensive with heart rate of 114 and blood pressure of 56/36. A wheeled litter evacuation was planned to get to the helicopter landing site in a meadow a mile away.

Rescuers quickly packaged her and headed down the trail. "We were flying", as everyone

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near the patient were worried about the “sick, sick girl”. Classic findings of hemorrhagic shock with low blood pressure, high heart rate, pallor and mental status changes were clearly evident to the rescuers. Ultimately the patient left the scene in the air ambulance 2 hours and 25 minutes after the original 911 page came in. In the air, she got more fluids, analgesic medications and was started on norepinephrine to support her blood pressure. She was flown to a level one trauma center and immediately evaluated in the resuscitation room.

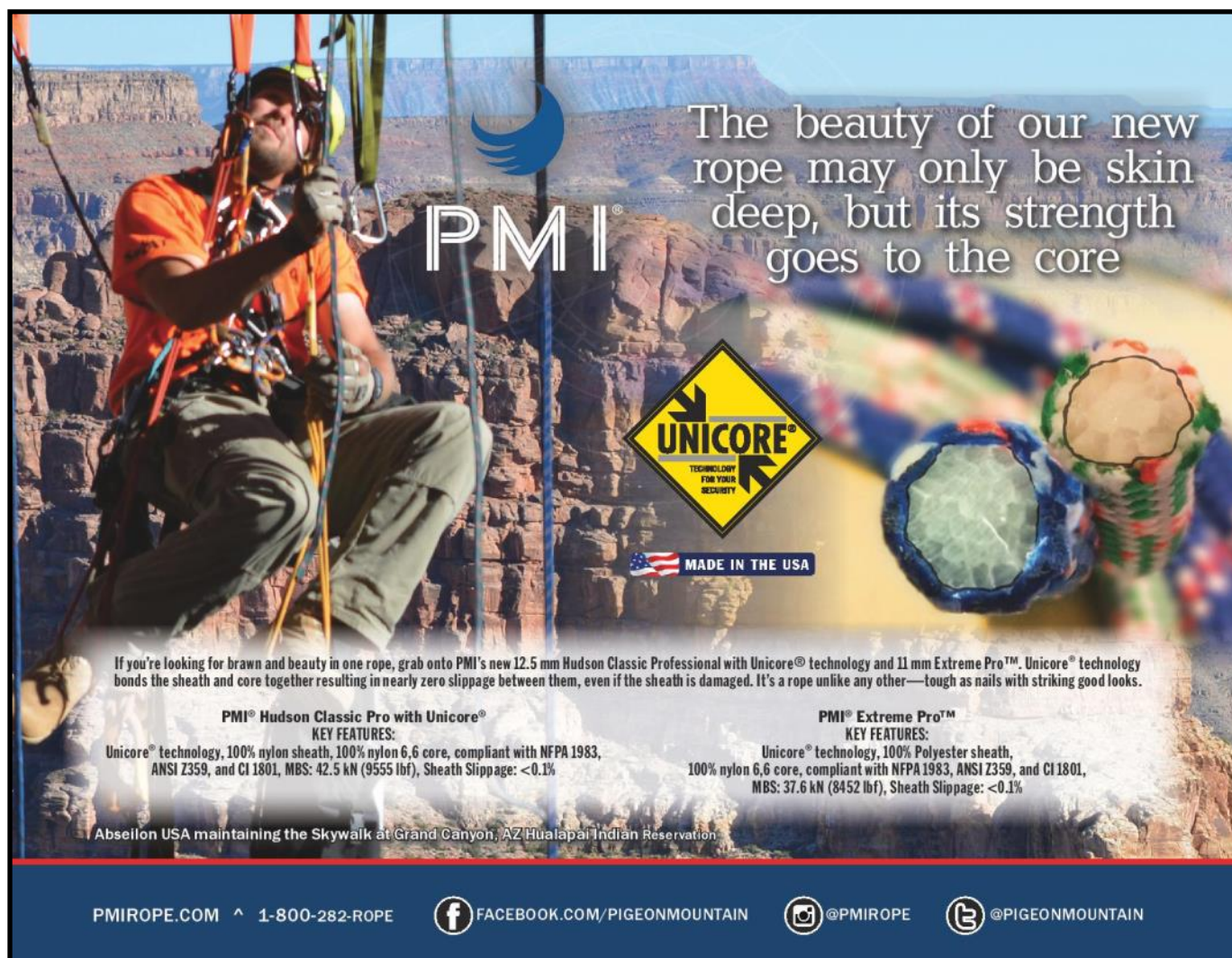
It was established quickly that the patient was, in fact, pregnant and she was prepped for an emergent laparoscopy for a presumed ruptured ectopic pregnancy. Over a liter of blood was described within the abdomen and pelvis on the operative findings. Her initial hematocrit in the hospital was 22 (37-47 normal). She was transfused three units of blood and a left ectopic pregnancy was surgically removed. She was discharged from the hospital 3 days later and has made a full recovery.

Hemorrhagic shock from non-traumatic causes is a rare problem in the world of mountain rescue. Even rarer is ruptured ectopic pregnancy. Abdominal pain severe enough to prompt a rescue should

always be taken seriously and an emergent response initiated until further information is available.

Ectopic pregnancy is a complication of pregnancy where an embryo implants and develops outside of its proper uterine location. It most commonly involves the fallopian tube with an incidence of 1-2% of pregnancies in developed countries. It is the most common cause of pregnancy related deaths in the first trimester. While some patients may be asymptomatic, symptoms of abdominal pain, cramping and vaginal bleeding are present in many and in the case of rupture, hemorrhagic shock can progress rapidly. Treatment for unruptured cases can be medical or surgical. In ruptured ectopic pregnancy, surgical intervention for hemostasis is needed.

Non-traumatic hemorrhagic shock can be seen in cases of spontaneous perforation of an ulcer, diverticula or other anatomic structure and can present as either peritonitis or hemorrhagic shock depending on location and timing. Other causes of non-traumatic blood loss include ruptured abdominal aortic aneurysm, arterio-venous malformation, gastro-intestinal bleeding, complications



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from cancer as well as iatrogenic effects of anti-coagulation medications and surgical procedures. Trauma can lead to blood loss either internally or externally.

The term “shock” is defined as circulatory insufficiency leading to an imbalance between tissue oxygen supply and oxygen demand. For many possible reasons, there is a lack of blood perfusion to organs and tissues causing downstream damage and ultimately multi organ failure if not reversed. The decreased delivery of oxygen and glucose from this poor perfusion leads to physiologic responses that were seen in our patient. In her, low blood pressure was from volume loss, a significant portion of her blood supply was in her intra-abdominal cavity, not in her vascular system as it should be. The increased heart rate is the cardiac response to decreased oxygen delivery: pump faster to keep whatever blood is remaining flowing to the vital tissues. The dizziness and drowsiness comes from hypoxia and low glucose in the brain from poor perfusion. Standing worsens this and more severe mental status changes can and will occur in a deteriorating patient. The pallor of her skin is the result of peripheral vaso-constriction as the body reduces blood flow to the skin and extremities in an effort to perfuse the core organs. Increased capillary refill time will be present. Some patients may compensate for blood loss with little change in their vital signs. The astute rescuer needs to have a high level of concern and be very sensitive to mental status changes as that may be all that is present initially.

Shock is not an emotional response to witnessing trauma or the inability to respond to an extreme situation. Shock is a life threatening medical condition and swift responses are vital.

For rescuers in a wilderness environment, treatment options in these difficult cases are few. IV access, fluid resuscitation, supplemental oxygen, protection from cold and rapid evacuation are the cornerstones of treatment. Airway interventions may be needed. Analgesia and antiemetic medications can be given by advanced providers for symptomatic relief but are not life-saving. Blood pressure treatment goals in the field are poorly defined with no specific mean arterial pressure established. If the patient is mentating adequately, hypotension may be acceptable until bleeding can be definitively addressed, generally in the operating room. The use of aggressive fluid resuscitation to increase blood pressure may worsen the bleeding and disrupt clot formation. This concept of permissive hypotension remains controversial.

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A Comparative Contrast of Rescue Litter Patient Tie-In Systems

By Dana Jordan, Cascade Rescue Company

Dana Jordan is the President and owner of Cascade Rescue Company since 1999. He was a member of the Alpentel Ski Patrol, Schweitzer Ski Patrol and several SAR teams in the Pacific NW and has been a contributor to several trade and technical rescue publications and has consulted with numerous SAR, Fire/Tech Rescue Units and Ski Patrols worldwide.

It should be noted that this article was written simply as an overview of available options by a manufacturer of litters. Cascade Rescue Company is a reseller of all the above mentioned products, but does not make any of the devices mentioned other than basic four strap systems installed as a standard item on their litters.

Overview

There are many “patient tie-in” systems in use today. This article explores the most commonly used systems, their components and provides perspective of these systems from a leading manufacturer of litters. All systems reviewed are of exceptional quality and can be adapted for use on a backboard.

We distinguish these tie-in systems in two categories.

Complete Systems: These systems tend to be a bit more complex, but are made to be intuitive and provide integrated features allowing the rescuer to handle many different rescue situations without adding to or improvising.

Simple Systems: These systems range from pre-rigged, specialized application uses like basic immobilization, to simple single or double section webbing or standard horizontal straps.

Complete Systems

Two widely used complete systems are listed below in order of most to least used, followed by a chart highlighting features, strengths, etc. A third system that has been recently introduced will also be discussed.

1. CMC Patient Tie-In System - \$253 (Does not include seat harness)



CMC Patient Tie-In System for two piece litters - \$575 – (Including Pelvic Harness)



(Photo courtesy of ©CMC Rescue, Inc.)

This system is widely used and in its most basic form can be ordered in versions designed for one or two piece litters. It is comprised of two long lengths of 1" tubular webbing of differing colors that form a cross pattern over the patient from head to toe. One end of each of these lengths is fixed to the foot of the litter and the strap is then threaded through a ring located at the center section of the litter. It has two "floating" rings positioned between the bottom fixation point and where the strap is ultimately threaded through a metal ladder lock buckle at the head of the litter. On the opposite side of the litter of these two floating rings is a short strap with an upward facing hook. All hooks have a section of padding beneath them to protect the patient. When a patient is ready to be placed into the litter, the rings are unhooked, each section of different colored webbing is then laid outside the litter on the sides. Tying the patient in is then a simple matter of pulling the webbing over the patient, snapping the rings into the hooks and tensioning the system by pulling the end of the strap at the head of the litter through the ladder lock buckle.

Pros:

- Provides a means for fast patient restraint
- Very simple, easy to use and lightweight (2.9lbs)
- Padding underneath hardware for patient comfort
- Good for basic immobilization in a horizontal orientation

Cons:

- User must select between a one or two piece litter design.
- As a base product, there is no way to restrain the patient for vertical applications. Vertical operations require either the purchase of the optional Pelvic Harness or improvisation with other webbing or harnesses and it has no foot stirrups.
- Expensive – compared to other options, we felt the total utility the system offered was lacking given the price point
- Other than a rating for the webbing (4,000lbs), there are no other hardware strengths rating provided. CMC indicates the entire system will "hold" a 500lb load.

2. PMI FAST Patient Restraint System - \$291.25 (does not include seat harness)



We definitely consider this system to be a "complete" system for use in both horizontal and vertical operations right out of the box. However, because it is more fully featured, it is more complex and somewhat less intuitive for operator use. Instead of two long lengths of webbing that form the main component of the system, it uses four lengths. These lengths then thread through a ring attached to the litter secondary railing. Instead of using a series of hooks to snap rings into, this system uses a series of adjustable plastic/metal Duraflex buckles, (each rated to 500lbs). The system also includes two adjustable straps that cross over the patient's chest and shoulders, effectively securing

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them to the litter if a “head down” situation occurred as well as an addition strap to attach to a harness. Properly secured, the litter can be oriented in virtually any position without the patient sliding more than an inch in any direction.

Pros:

- Can be ordered pre-installed if ordered with a new litter
- Works for one or two piece units
- Very versatile and full featured with no need for expensive add-ons
- Includes tie-in for seat harness
- Includes wide, easily adjustable foot stirrups

Cons:

- Somewhat complicated, less intuitive and challenging to install initially
- Does not include Pelvic/seat harness
- At 3.75lbs it is a bit on the heavy side
- Buckles – work well, but an upgrade could be made and buckle padding added for patient comfort.



3. Rock-N-Rescue Patient Packaging System - \$215 (Does not include seat harness)



(Photo courtesy of ©CMC Rescue, Inc.)

A relatively new product from RNR, this system offers some substantial upgrades from the typical “X pattern” tie in system. The system is comprised of two longer lengths of webbing that thread through a ring on each side. Unfortunately this means it is suitable for one piece litters only unless you are willing to un-thread and re-thread webbing from loops and buckles. However, the system features very nice ISC “Cobra” style adjustable buckles rated over 3,500lbs and the rings are lightweight, exceptionally strong (4,400lbs) machined aluminum. Because the rings are thicker, tensioning the system is much easier and smoother than other systems.

Pros:

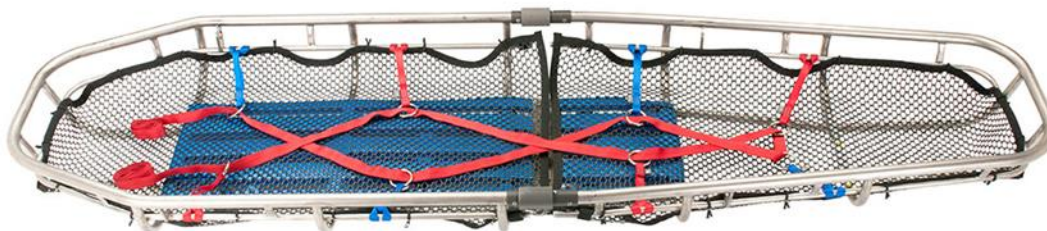
- Exceptional value – better buckles, rings and stronger webbing
- Includes easily adjustable, wide foot stirrups
- Includes rigging for Pelvic/seat harness
- Intuitive and easy to use
- Lightweight (2.9lbs)

Cons:

- Not the best solution for two piece litters

Simple Systems

1. CMC Fastloops Litter Straps - \$71



Fastloops are not a system unto themselves, but are comprised of four blue and four red straps with rings on the ends. These straps can be girth hitched to the litter – four on each side. The loops serve as an easy way to thread one long length of webbing through and easily tie-in a patient and tension the system.

Pros:

- Simple and lightweight (12.9oz – not including 20' webbing)
- Intuitive
- Relatively inexpensive
- High breaking strength (1500lbs)

Cons:

- Does not come with the 20 foot section of 1" webbing required to complete the system
- Requires "threading" of the webbing through the loops for each use
- Webbing must be tied to the litter to complete tensioning

2. Standard four horizontal buckle/strap systems – (\$Included w/ most litters)



Generally speaking, every litter purchased today will come with four straps affixed to the secondary railing. These straps may then be fastened horizontally across the patient or in a simple "X" pattern. The buckles range from basic spring loaded "tourniquet" style buckles to upgraded "pass-through" styles.

Pros:

Included with litter at no additional charge

Effective for basic stabilization in a horizontal configuration

All buckles/straps exceeded 500lb breaking strength

Cons:

Patient may experience greater side to side or end to end movement

May not be strong enough for more challenging situations

A word about buckles

There are a plethora of buckles available for fast rigging of patient tie-in systems. Here are our opinions on the subject.

All plastic Duraflex style buckles: We're not a fan of these. While they work well for many applications, they don't usually come with any weight rating, can be difficult to release and tend to crack in cold weather or when stepped on.

Tourniquet buckles: Better than plastic, but are subject to rusting/binding if not maintained. Strength ratings vary from none to about 400lbs depending upon size and manufacturer.

Pass-through style buckles: If equipped with a quick release strap/tab, these buckles tend to be as strong as the webbing they are attached to (2,000 to 4,000lbs). They are often included as a stock component of litters, are lightweight and generally easy to use. The downside is that the pass-through component can come off the strap and be lost, rendering the buckle useless. They also are somewhat less intuitive than other buckles.

Metal/plastic Duraflex™ buckles: These buckles have metal internal components with a plastic outer shell. They work well and are much stronger than the all plastic variety (500lbs). However, they can crack or be crushed if stepped on and suffer the same cold weather issues due to the outer plastic shell. They work, but we feel better options are available. This is a trade-off – better buckles are more expensive.

Cobra™ style buckles: In terms of strength and general ease of use, this type of buckle is an excellent choice. The downside is that they are often quite expensive and are much heavier than others. A nice compromise are those offered by ISC™. They feature an aluminum outer shell and steel internal mechanism. They are also less expensive than the traditional Cobra™ style offered by AustiAlpin™.

Hooks: Are usually very fast and efficient but can be prone to snagging other rigging, clothing, brush, etc. Can also be difficult to remove rings with gloved hands. We've not been able to locate breaking strengths for the most commonly used devices.

Cam-Lock buckles: These buckles are not generally used in patient tie-in systems. While strong and light, they can be difficult to thread and may slow overall packaging. However, they could very well be used in traditional "X" pattern systems in place of tying knots. A cam-lock buckle could be attached to a short loop of webbing girth-hitched to the bottom of the litter. The entire system could then be tensioned by pulling the straps taught through the buckles.

The bottom line.....

For vertical work: The PMI FAST System is our choice if the majority of your rescues include high incline work where the requirement of the rescue may put the patient in many different orientations. As is, it is a complete solution for all orientations. Adding some form of simple seat harness adds to patient comfort and security, but is not an absolute necessity. While requiring a bit more training due to its complexity, this system does it all. If you want a more simple system, the foot stirrups, chest "cross straps" and harness strap can be easily removed. It is suitable for both one and two piece litters.

For basic immobilization: We like the RNR Patient Packaging System. This system won our vote because it does the job required of most rescue situations and includes superior hardware at an excellent price. It is also feature rich enough that if required can be used in some vertical operations with a minimum of additional rigging to better secure the patient. The downside is that it is really designed for one piece litters. If you want a more simple "all in one" type system, we recommend the PMI FAST System and remove some of the components to improve simplicity.

If you know vertical is a remote possibility.... The CMC Fastloops are great for those who really like to have a basic interlaced "X" pattern system. If you need more, a more comprehensive "Complete" system should be considered. If you have this system and need to go vertical, improvised webbing and a seat harness could be used if rigged appropriately. It is also priced competitively.

*Unless noted, all photos courtesy of Cascade Rescue Company

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New Avalanche and Snow Burial Practice Guidelines Released

By Wilderness Medical Society

Avalanche avoidance is still key, but new technology may play an increasingly important role in survival, according to the latest issue of Wilderness & Environmental Medicine

The Wilderness Medical Society has issued new practice guidelines to help medical professionals, as well as the public, understand the latest techniques and recommendations for avalanche risk management and rescue protocols.

To create the guidelines, an expert panel was assembled and led by Christopher Van Tilburg, MD, Chair of MRA MedCom and member of Crag Rats, Hood River Oregon. He included 3 other members from MRA MedCom and two members of ICAR MedCom in the 11-author panel.

An avalanche accident presents a unique set of challenges for rescue workers. Asphyxia is the most common cause of mortality in avalanche victims, accounting for 75% of deaths. Time plays a crucial role in survival rates. If completely buried, a victim has a greater than 90% survival rate if they are found and extricated within about 15 minutes, but only a 30% survival rate if the rescue time stretches to 30 minutes. Data from the US and Europe indicate that trauma is the primary cause of death for approximately 25% of avalanche fatalities.

The guidelines address three sections. Prevention includes airbags and artificial air pocket devices. Rescue discusses both companion and large group rescue. Resuscitation largely adopts the ICAR guidelines.

[Link to article "Wilderness Medical Society Practice Guidelines for Prevention and Management of Avalanche and Nonavalanche Snow Burial Accidents"](#)



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to find the MRA?**



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<http://twitter.com/MtRescueassoc>



<http://mtrescueassoc.blogspot.com>

Photos



Pickoff training. Tyler Deboodt



Sometimes the straw hat is necessary while overseeing edge protection. Tyler Deboodt



A recent rescue on Three Finger Jack, OR. Corvallis Mountain Rescue Unit and Eugene Mountain Rescue with the National Guard successfully rescued a pair of stranded climbers off route. CMRU/EMR

Editor's Note

Hello Rescuers,

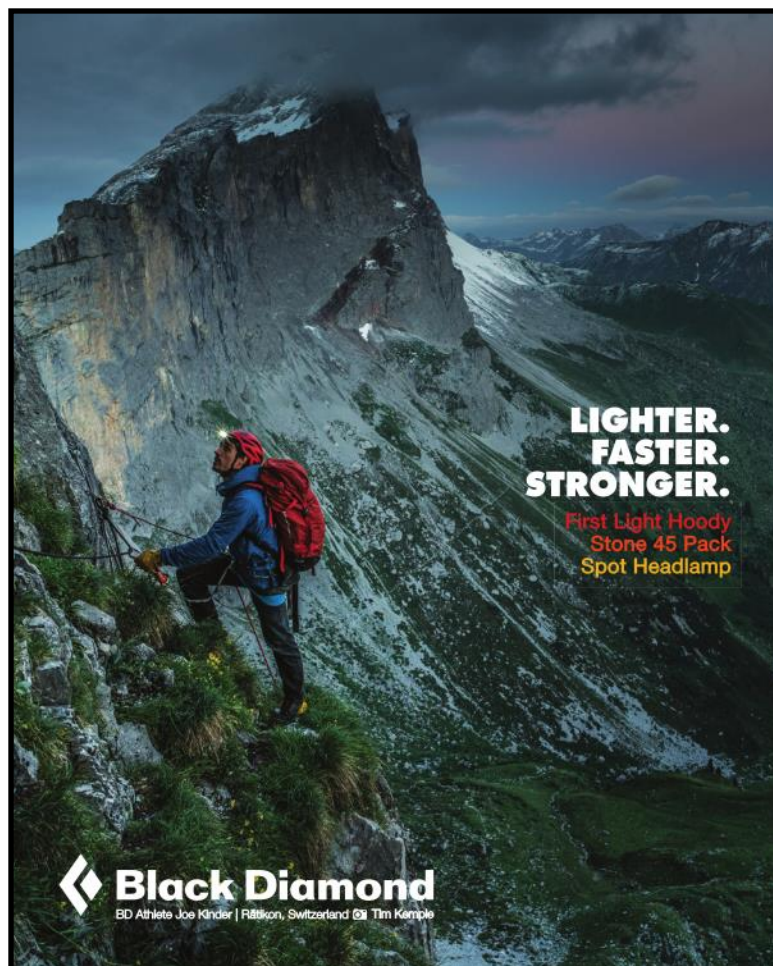
Well, the summer has left in the Pacific Northwest and I've been hearing similar sentiments around the region. In Oregon we had prepared extensively for the Solar Eclipse and thankfully it was not nearly as chaotic as predicted and SAR resources were available where needed. I hope other regions similarly enjoyed the eclipse (where visible) without incident.

Thank you very much to Dana Jordan of Cascade Rescue Company for his opinions on various patient tie in systems. There are a lot of options out there and I'm sure an honest overview such as his will be good food for thought for all of us.

As the days get shorter and we start to hope for a great snow year I hope you'll read the recent avalanche information that is highlighted in this issue and was spearheaded by Chirstopher Van Tillburg.

Todd Lemein

MRA Meridian Editor



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