

Apex



Indian Mountaineering Foundation Risk Management Unit

Newsletter * Special Edition on Accidents & Safety * April 2019



Descent from Bali Pass (4,800 m), Ruinsara Valley, Uttarakhand Himalaya



En Route Darwa Pass, Garhwal Himalaya, Uttarakhand



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President's Note

In recent years the number of accidents resulting from mountaineering, high altitude trekking and allied sports is on the rise. This is a most serious issue and it needs the attention of the entire adventure community. IMF being the apex body, in a pro-active initiative to build awareness on this imperative issue, organised the first ever Meet on Risk Management in India, at the IMF Centre, New Delhi, on 11th February 2019.

The conference was attended by about 40 delegates associated with the adventure community. The key deliberations at the Risk Management Meet are summarised in this Special Edition of the IMF newsletter on Accidents and Safety.

The volume contains articles on various aspects of Risk Management as well as select Case Studies on some of the accidents which took place recently. Along with the case studies are advisories in the form of discussions, with the intention to create higher awareness on the issues leading to the accidents.

On behalf of the IMF, I request the adventure community to give a higher level of importance to the adequate Management of Risk. I would encourage all mountaineering and trekking clubs to hold workshops on risk management and use this special edition as a body of information to initiate a substantive discussion.

I extend an earnest invitation to the entire adventure community to attend the next Meet on Risk Management in February 2020, so that we may all come together and ensure no more lives are lost needlessly.

Col. H. S. Chauhan



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How Wilderness Risk Management is handled in the US

- *K. Krishnan Kutty*

Executive Director, Hanifl Centre for Outdoor Education, Woodstock school, Mussoorie



In very general terms, to “manage” anything we need to first identify what we wish to manage. In that sense, Risk is a very subjective word as it is very much person and situation dependent. Managing risk in the outdoors is all the more challenging because it can be interpreted differently based on one’s experience level.

Documenting incidents/injuries/death, and then following up with critical questions, is the first building block of risk management. Documentation and statistics create a broad canvas from which an incident can be viewed and learnt from. The Journal of Accidents in North American Mountaineering has been published each year since 1943 and is valued for its non-judgmental style.

Historically in the USA, outdoor organizations were not comfortable with sharing information relating to injuries/deaths on their programmes. 1989 was the cornerstone of “risk management” as we know of it today. It has its roots in the death of a student on an outdoor programme where the parents of the deceased encouraged the organization to discuss best practices on a regular basis and start sharing information with other organizations.

Safety and Risk Management in a public forum began in the US in 1994 when NOLS hosted the first Wilderness Risk Management Conference (WRMC). In the run up to the conference, representatives from many organizations such as AEE, OB, NOLS, AAC, AMGA, National Parks Service etc met to form the original Wilderness Risk Managers Committee. They set an addendum that involved an examination of safety related issues and becoming an informal think tank for the outdoor industry.

The WRMC celebrated its 25th anniversary in October 2018 and had more than 600 participants from across the US, South America and Asia. The conference has evolved over the years and is now a 3-day event with parallel sessions that address issues related to Emergency Planning & Crisis Response, Field Practices, Legal & Insurance, Program Administration, Staff Training & Decision Making. Pre-conference workshops include courses in Wilderness First Aid, Kayak clinics and programme design.

IMF’s meet on Risk Management in Feb 2019 is a first step in the right direction. I hope this will become a yearly event and be held at cities across India.

Review of Accidents in 2017 & 2018

- Maninder Kohli

Head, Risk Management Unit, Indian Mountaineering Foundation

In the second half of 2018, the Indian Mountaineering Foundation (IMF) established a research team to collate both the number and reason for deaths in the Indian Himalaya. This research now allows us to better understand the key issues involved and start the process of working on ways to reduce deaths in the future. The following are the key findings of the research ;

Deaths Reported were 43 : This is for a two year period from 2017 & 2018, but as multiple deaths go unreported the actual number could be double this figure.

80% Deaths while Trekking : Bulk of the deaths happened to trekkers, which is 34 of the 43 cases reviewed. There were also 7 deaths while mountaineering and 2 deaths while skiing. In this study, deaths due to rafting and other adventure sports were not collated. Additionally, the deaths outside of the Himalaya were also not collated.

Porter Deaths : During the period of the study it was established that of the 43 deaths researched, 6 were deaths of porters.

Broad Reasons for the Deaths :

Reason for Death	Number of Deaths	%
Altitude Sickness	15	35
Stranded/ Hypothermia	8	19
Heart Attack / Fatigue	8	18
Accidental Slip	6	14
Avalanche	3	7
Rock Fall	2	5
Missing	1	2
Total	43	100

This is the first time such a study has taken place and it is giving the adventure community some input on the broad nature of issues involved. The intention of the IMF Risk Management Unit is to continue the process of collating and sharing of such data on an ongoing basis. In addition to the sharing of information the IMF Risk Management Unit will also go in-depth into some accidents referring to them as 'case studies' with an objective of issuing advisories to reduce the occurrence.

On behalf of the Risk Management Unit I would like to reach out to the adventure community for support in the following two areas :

- There is a tendency to suppress information on accidents as it is regarded as a negative issue. The other way to look at is that it is important to derive some learnings from each incident and this can only take place if accidents get reported.
- Whether you are a member of a Mountaineering Club, Trekking Club, part of an Adventure Travel Company, an Independent Guide, running an outdoor centre at a school or an outdoor enthusiast it is most critical to periodically review accidents in the outdoors, go through advisories issued by the IMF and share this information widely.

Rafting Related Accidents

- **Vaibhav Kala**

Chairman, Risk Mitigation Committee, Adventure Tour Operators Association of India

The river Ganga, the most popular location for Rafting activities, consists of largely Class 3+ rapids, with two safe Class 4 (depending on levels). Over 95% of the river is float Class 1 and 2. Majority of the river profile is non-technical, pool-drop with complete road access throughout the route, and having a relatively warm tropical environment. There is no real danger of Hypothermia and medical help is available within 30 minutes at any point. The Ganga has emerged as a huge operator hub, with the potential of industry support and the availability of equipment and manpower. All of these factors render the Ganga a very safe river for commercial rafting activities.



Yet, as per the data available for the year 2013-14, there were 14 deaths in rafting related accidents on the Ganga. Of these 14, the maximum number of deaths, about 6, were reported to have occurred on the 'Golf Course' rapids.

The major cause of rafting-related deaths has been reported as heart attacks. Laryngospasm, a closing off of the larynx (voice box) commonly referred to as a "dry drowning" because the victim doesn't get any water in the lungs, is another common cause leading to death. Some 10-15% of drowning victims fall in this dry drowning category. Other causes include entrapment of the body, foot or boat getting pinned into undercut, strainers, foot entrapment, PFD, drowning due to poorly fitted or old PFD, head injuries, hypothermia (in colder rivers like Zanskar, Tons etc.), loose Ropes and lines. In the case of rafting-related deaths by drowning, the reasons can be attributed to the following: no use of pfd (all camp drownings occur due to this), lack of planned safety, incorrect safety set up) or slow speed of response.



Since 1996, rafting deaths have been increasing. This rise could reflect an increase in popularity and corresponding increase in the number of enthusiasts in the sport since the mid-1990s. Also, accidents are repeating because the domestic TG lacks culture of outdoors & awareness, a major Price war - with 15,000 unregulated companies, mass traffic leading to lack of monitoring, inexperienced professionals and poor guide ratios, season being stretched and even the rush for bragging rights - doing trips above ones ability, with no pre-qualification for undertaking risky stretches.

This situation is further exacerbated by the lack of accident reports, resulting in zero learning for authorities, operators and guides, the doctrine of Prevention and Good Practises being lately ignored, no central repository of data, a barrage of incorrect information available on the internet. Self regulation has been found to be on the decline and the fine line between ecotourism & regionalism is constantly being

High Altitude Medical Camps & Rescue Centres at Stok Kangri and Chadar

- **Prateek Gupta**

CEO, Adventure Sports Cover 360

Every year Lacs of tourists visit Leh for tourism and adventures. Mt. StokKangri is the most visited place for mountain climbing because of its simple approach and a descent climb. However, many mountain climber may develop altitude related illnesses because of an ill acclimatized ascent. Also, there is always a risk of accidental injuries to the climbers which may necessitate rescue and evacuation efforts. A Doctor with an emergency medical establishment at base camp of any mountain is always beneficial for the climbers as well as the organizers. Since it not only helps to negotiate any unexpected emergency situation but also boosts moral of the climbers and support staff.

Stok Kangri Medical Centre

Adventure Sports Cover 360 planned the High altitude medical rescue centre for the very basic reason of immediate medical aid to those who need it at a golden hour of treatment, helping in reducing morbidity and mortality associated with altitude related health issues. The mission was to provide Emergency Medical Care to Trekkers, Climbers, Mountaineers and Support Staff.

The Medical centre operated at the Stok Kangri Base Camp for a duration of 45 days from 27th July, 2018 to 9th September, 2018, with a Helipad built at Stok Kangri Base Camp (4,968 m) and Advanced Base Camp (5,300 m).



Objectives

- Establish a Medical Centre which will provide for Prevention, Diagnosis and Management of medical conditions which are unique to high altitude trekking and mountaineering.
- Set up a Medical unit which will have a qualified Doctor and a Paramedic who will be stationed at a particular point along the axis of the trek or climb, which will be accessible to the trekker or climber.
- Create a prevention program will be also initiated for the Trekkers/Climbers and their Guides which will help to reduce the incidence of Injuries and medical problems.
- Provide for the Basic Trauma Care, Asthma management, High Altitude Pulmonary Edema and High Altitude Cerebral Edema cases. Other treatment protocols for management of medical conditions will also be provided.
- A liaison will be established with a well equipped hospital in the nearby town/city for emergency evacuations.

The Facilities at the Medical Centre

The Centre is well equipped with medical equipment and medicines to handle all medical emergencies, including:

1. Acute Mountain Sickness
 - Dehydration treatment with IV Fluids
 - Low Oxygen level with Oxygen Therapy
 - High altitude Cerebral Oedema
 - High Altitude Pulmonary Oedema
2. Loose motions and Vomits
3. Respiratory Diseases
4. Trauma
 - Management of Fractures, Sprains
 - Surgical treatment of Wounds and cuts, including Stitching and Suturing
- 5 Pain in Abdomen and Hyper Acidity
6. Treatment of Infections with IntraVenous Antibiotics
7. Treatment of Shock Syndrome
8. Asthma Treatment with Nebuliser and Inhaled medicines



Patient Statistics

A total of 204 patients were treated and 370 were given general consultation by doctors during the 45 days of our operation. 14 patients were evacuated and descended on an immediate basis. 4 emergency patients were treated, stabilised and evacuated. Of the total patients treated, 55 were insured by ASC360 and 78 were not insured. 24 foreign nationals were treated from 14 countries. 30 female trekkers received treatment. 4 guides/porters/locals were treated for extreme sickness or injury, while 47 local Guides, porters and horsemen were given treatments. 21 patients, treated at the centre, made a successful summit post treatment. 53 patients were diagnosed with AMS and treated for. Treatment was also given to patients suffering from HAPE, HACE, Abdominal problems, Fractures & injuries, Hypertension, Pharyngitis, Sinusitis, Asthma, Dental caries, Myalgia, Ulcers, dizziness, exhaustion, burns, URTI and even Memory loss.

Pain points and Observations

Daimox Misuse: Trekkers are consuming Daimox, without any knowledge, in wrong dosage and scheduling.

Most trekkers skipping camp I – Changma, showed signs of AMS and were treated at the medical centre.

Acclimatisation trek: Many trekkers and a few guides showed a very casual approach to the much needed acclimatisation trek to the ABC, resulting in poor and uncomfortable summit ratio and higher rate of sickness.

Peer pressure: trekkers were either walking too fast or too slow which resulted in higher discomfort levels and less summit ratio.

Cost control and Strict itinerary: Many trekkers compromise on good equipment, including basic gears, skip camps and do not have buffer days for a re-attempt, in case weather is not appropriate to climb.

Being Famous–Record addiction: Many trekkers climbed too fast too soon just to achieve some sort of record. Some came at an age when they are not advised to climb that high. A 9 year old child was advised to descend with his father who also developed HACE. A 70 year old was advised to stay at the base camp and not go further as per his health conditions (His motto was “If I die climbing a mountain – no problem!”)

Trekkers not listening to their guides or much worse – outside tour guides not listening to the local Guides.

Medical & Rescue Centres: Chadar Trek 2019

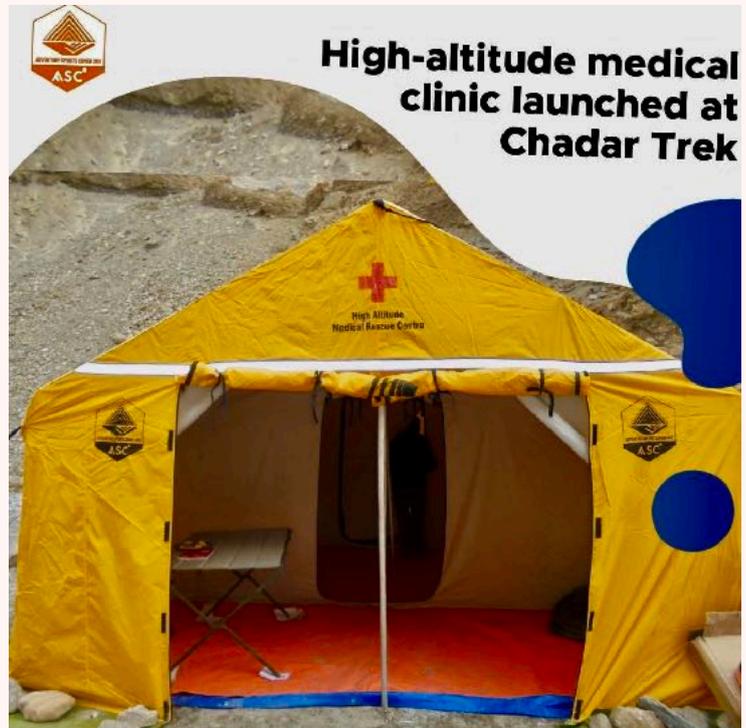
The medical & rescue centres was established for 51 days from 1st January to 20th February, with a registered office set up at Leh for 46 days. The location of the medical centre was Shingra Gongma, Chadar trek, Zanskar, while the rescue centres were positioned at Tsomo Paldar, Tibb Cave and Neyrak.

Two Helipads were established, one at Shingra Base Camp and the second at Advance Base Camp, at Tibb Cave.

Patient Statistics

Free check-up and treatment was provided 24x7 to:

All registered trekkers (Indian and Foreigners), locals, guides, porters, cooks, helpers, horsemen, trek Leaders and ASC360 Insured. Total of 1367 patients were screened, treated and consulted, and were from 25 nationalities. 950 trekkers were screened at HAMRC- Shingra. 45 trekkers were sent back by the doctors after the initial screening. None of the trekkers continued the trek, post the advice to go back by the resident doctors. A total number of 177 patients were treated, of whom 95 were trekkers and 82 were local staff. Trekkers consulted/treated at Rescue post 1, at Tsomo, were 37. Trekkers Tibb, were 154. Only 25% of trekkers completed the trek till Nerak. Majority returned from Tibb. Total number of evacuations were 33 out which 14 were critical, including 3 Air Evacuations, majorly due to Falls causing fracture, sprains and dislocations, and altitude related illness.



Pain points and Observations

Tibb cave is the camping site where trekkers spend two nights while going and coming back from Neyrak. Most of the casualties and evacuations were from Tibb only. Due to this we have posted a permanent doctor in late January till closing.

First time trekkers: There were lot of dropouts, injured or evacuated trekkers for whom Chadar was first time trek.

Sleeping bags: Many trekkers were not able to adjust properly in the sleeping bags as they didn't know the proper way to sleep in the sleeping bag and reported the next day early in the morning at HAMRC.

Some trekkers were using crampons not suitable for Chadar Trek instead of Micro spikes.

Many trekkers were only carrying Gum boots and sports shoes and not trekking shoes which are must.

Many trekkers were surprising complaint of claustrophobia in tents and sleeping bag.

There was lack of proper communication from the tour companies and guides about the amenities present at the camps.

Childrens' Camp Safety

- Sarabjit Singh Wallia

Head of Learning & Developmentt, Inme Learning Pvt. Ltd.

Managing Child Safety In The Outdoors

No other classroom plays up risks and rewards as much as the great outdoors. There is ample research to suggest that excessive restrictions on “risky, outdoor play”, hinder child development. Yet, this is not an invitation for negligence while planning outdoor experiences for children. Instead, it is a call for careful consideration to Risk Management principles in designing a well-balanced outdoor experience – one that minimizes “unnecessary” risk that induces fear and optimizes opportunities for providing meaningful risks that promote problem-solving, relationship-building, decision-making etc.



Promoting Awareness

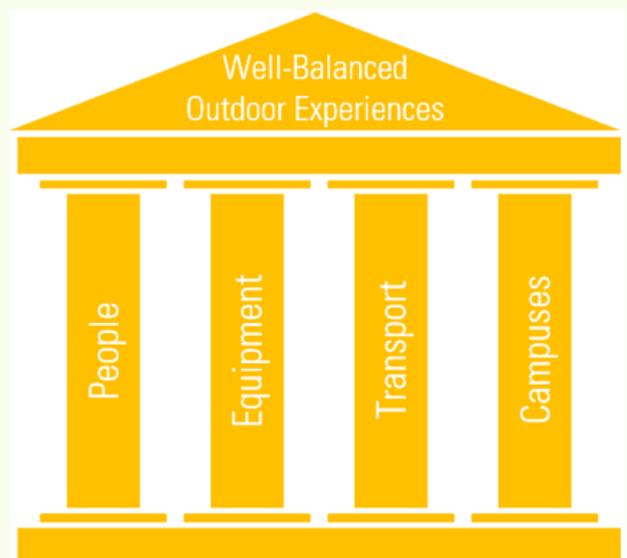
With increasing focus from mainstream media, there is growing awareness of issues and risks surrounding adventure sports. However, in absence of a concerted effort for sharing of risks, failures, challenges and learning within the industry, media reports seem to be mainly contributing to growing hysteria amongst the masses and uncoordinated, disproportionate policy responses from the government. Without doubt, we need a platform for more open sharing amongst the industry stakeholders. However, the intent of this article is to focus on steps that we, the industry stakeholders, can take beyond raising awareness.

Identifying Factors that Compound Risk

The ever dynamic risks already present in the wilderness are compounded by these four factors:

- Lack of well-trained professionals
- Inadequate logging and handling of equipment
- Insufficient consideration to road worthiness of vehicles
- Absence of child-centric physical spaces

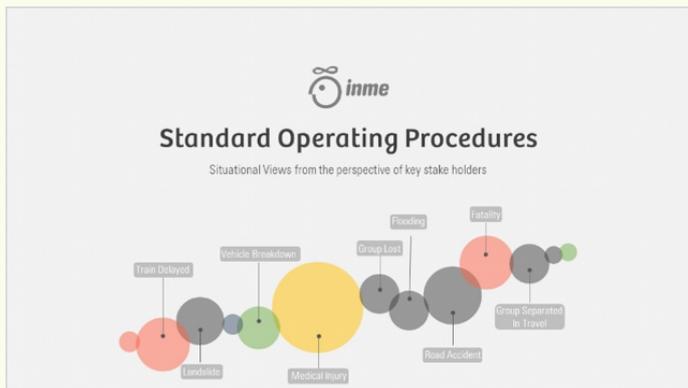
Together, these four elements represent risks in all outdoor experiences independent of factors such as the terrain, kind of participant or length of experience. In order to build sharper focus and accountability and better manage risks in these areas, the Operations and Delivery team at Inme Learning is also divided into these 4 verticals.



Analyzing Risk and Planning Risk Mitigation Strategies

Delivering an outdoor learning experience requires mastery in not just skills like rock-climbing but also in subjects like child psychology, navigation and first-aid! Unless we are armed with this knowledge, how do we propose to navigate our clients to safety in scenarios as varied as seemingly benign falls to a child who is frozen on a rock face due to fear to unexpected inclement weather? On one hand we have great institutes in India such as NIM and HMI, that impart rigorous hard-skills training. On the other hand, we have premier institutes like TISS that focus on soft-skills. Nevertheless, Outdoor Education is not an area of formal study in India and there is no single institute that focuses on imparting both the required skills needed to deliver successful experiences in the field. The issue is further compounded by social considerations such as gender-sensitivity. How do we guarantee that we have the “right kind of people” working with children in the field?

As a countermeasure, Inme borrows inspiration from two premier Australian initiatives, the Working With Children Check and Commission for Children and Young People. Given the recent spate of issues around child safety even within the four walls of our schools, the time seems ripe for government policies and regulations in implementing similar checks in India. Much like the Australian model and akin to obtaining a license for driving a car, we should perhaps mandate a “working with children check” as a pre-requisite for any kind of contact with a child – whether it is delivering an outdoor experience or taking care of toddlers in kindergarten! In the meantime, the onus of implementing “gatekeeper policies” falls on organizations engaged in the field. At Inme, we lay a lot of emphasis on on-boarding new staff. Significant time is spent on assessment and cross-training well before new staff comes into contact with children. An equal emphasis is laid on “retraining” existing staff with discounted annual trainings, performance and growth-plan assessments etc.



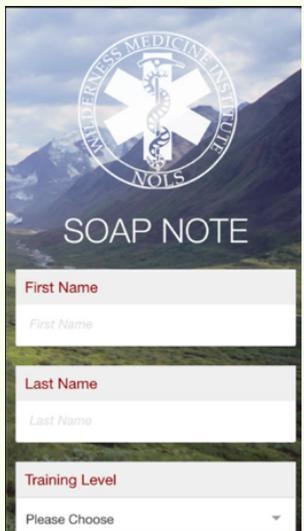
The cornerstone of Inme’s risk mitigation strategy though is the “Standard Operating Procedures” manual. Result of nearly a year’s labor, the Inme SOPs look at common scenarios like “Train Delays”, “Injuries on activity” etc. from the vantage point of multiple stakeholders – the group leaders, campus chief, head office. In a setting where resources are scarce (each situation is often compounded by multiple limiting factors like # of staff, distance to medical facilities, poor communication channels), clear protocols are often the key to swift and life-saving action.

A considerable time is spent in training new resources on these procedures and each flow in the SOP is designed assuming zero communication between parties and limited access to resources. The purpose is for all stakeholders to know

- a. What they should do and when
- b. What can they expect others to do and when

Monitoring and Evaluation

Preparation is the key to designing safe outdoor experiences. However, the work is only half-done without equal emphasis on monitoring and evaluation. Organizational procedures at Inme mandate extensive daily logging – about program experience, instructors and the children. Visits to the camp doctor are logged in detail (each on-campus program at Inme has a Doctor and each expedition has a WFR / WFA certified medic). Logs are manually reviewed by the in-office team as part of program closure to identify areas of improvement early on in the cycle. In addition to these regular logs, Near-Miss reports and Incident Logs are maintained for any unwarranted event on the camp – from an injury to a confrontation between two participants. Inme has recently started a drive to digitize its logs. The end-goal is to be able to answer questions like “How often has a twisted ankle occurred on this trekking route in 14 year old participants?” with confidence and take appropriate action in a timely manner. With an eye towards this goal, Inme has derived inspiration from NOLS’s SOAP app and is starting to work on its own offline app to capture the logs.



Treatment

Despite having these checks and balances, stuff happens! Just recently, a child fell while walking to the zipline and fractured their forearm. As per Inme’s internal process, the L&D team triaged the issue to understand the root-cause and while the accident itself may not have been preventable, we did find opportunities to tighten supervisory care. The learning has since been institutionalized and resulting process changes have been shared with the delivery team.

Adventure Sports Operators and Legal Risk Management

- Jiten Mehra

Advocate & Trekking Enthusiast

Adventure sports is quickly gaining a foothold as a leisure activity and as a serious pursuit among many in India. However, there has also been a rise in the number of adventure sports related accidents leading to exposure of operators to legal risk and liability.

Broadly speaking, legal liability of an Operator arising out of an accident, can be either Civil or Criminal. Under Civil law, an Operator owes a 'Duty of Care' to its Clients at all times while conducting any adventure sports activity. Simply put, a duty of care is an obligation on the part of the Operator to take all steps to prevent any reasonably foreseeable harm or injury to its Client. It is what the law presumes a reasonable person would do in the given circumstances to prevent any foreseeable harm from occurring to a person. With respect to an adventure sports operator, this duty may manifest itself in many ways for e.g:- adherence to safety norms; employing skilled, trained and certified guides; informing Clients of all risks prior to undertaking the activity and getting their informed consent; utilizing good gear/ equipment which conforms to all prescribed standards; operating all equipment within its prescribed range/ operating standards; regularly inspecting all gear/ equipment; having a well thought-out rescue plan in place for emergencies/accidents etc.

A Client, or his legal representatives in the case of his death, who suffers any loss/damage due to any negligence on the part of an Operator can file a civil suit against the Operator for compensation and/or damages. A Client can also approach a Consumer Court under the Consumer Protection Act, 1986 and file a complaint for 'deficiency in service' against the Operator. An Operator can defend himself by proving that there was no breach of duty of care on his part or that there was contributory negligence on the part of the Client or that the accident was an act of god, in which case no amount of exercise of ordinary care, caution or skill on the part of the Operator could have prevented the same.

Under Criminal law, The Indian Penal Code, 1860 (IPC) provides for situations where a rash and negligent act can result in criminal liability. Section 304A provides that whoever causes the death of any person by doing any rash or negligent act not amounting to culpable homicide, shall be punished with imprisonment of either description for a term which may extend to two years, or with fine, or with both. Sections 337 and 338 IPC provide for a rash or negligent act resulting in simple or grievous injury to any person. 'Negligence' under criminal law is the gross neglect and failure to exercise a reasonable and proper care and precaution to prevent death or injury.

Operators can take some steps to mitigate legal liability and risk. They must take care while drafting their respective liability waiver/ risk assumption declarations, which must be clear, precise, unambiguous and tailored to meet the demands of their specific adventure sports activity. Operators should maintain adequate insurance cover, which can reduce their monetary liability in the case of an unfortunate accident. The policy should cover their clients as well their guides/ instructors and staff. Operators should adhere to all statutory guidelines/ internationally accepted best practices while conducting any activity. Operators should conduct their business through a corporate form and not as a proprietorship so that liability can be limited. It is also advisable to conduct legal risk audits at regular intervals to minimize any foreseeable legal risk. Operators can also opt for arbitration as a dispute resolution mechanism in the contractual engagements with their Clients.

Safety Equipment for Treks and Mountaineering Expeditions

- IMF Risk Management Unit

The number of people travelling to the high altitude regions has risen exponentially in the past 10 years. The areas with the highest mountains are also the areas with the poorest facilities, especially for medical care. Climbers and trekkers must therefore understand the effects of altitude on their bodies (hypoxia, cold, and dehydration), the processes of acclimatisation, and prevention and treatment of altitude illness.

Symptoms of AMS must be taken seriously and subjects must go no higher until the symptoms resolve. If the symptoms do not resolve the patient should be brought down on a stretcher. Often a descent of only 500 m or so will greatly improve symptoms. There are also some easily available and comparatively cost effective pharmacological devices and tools which can help.

Portable Oxygen Cylinder Kit

It is always essential to carry oxygen equipment on expeditions to altitudes near 5,000 feet, which is the Hypoxic zone (low oxygen area). These refillable, light weight, easy to use portable Oxygen Cylinders come highly recommended.

The approximate weight of a 750 Litre cylinder is 6 Kgs, with a height 28 inches. They are lighter than steel, rust free (made from aircraft grade aluminium alloy), very easy to operate and store and low maintenance. The kit delivers 99% pure oxygen, with a regulator to adjust flow rate from 0.5 up to 25 ltr/min.

The kit, costing approximately INR 13,000/- is easily available online and includes a Cylinder with valve (pre-filled with medical oxygen), regulator, mask and a carry Bag.



Oximeter

The pulse oximeter is a small, clip-like device that attaches to a body part, like toes or an earlobe. It is most commonly put on a finger. Pulse oximeters are easy to use, noninvasive tools for the assessment of individuals at high altitude.

This small pocket friendly device is able to tell the person's oxygen saturation levels along with the heart rate. Though not 100% accurate, the oximeter is useful in predicting acute mountain sickness (AMS).

It is easily available online, costing approximately INR 1000/-.



Portable Foldable Stretchers



There are two options of light weight, foldable, portable easy to store stretchers, which can be used to shift immobile conscious or unconscious people to safety.

One, in which the frame is made of light weight aluminium alloy and metal, with a body of textron fabric, and with grippers for better handling. A stretcher weighs about 9 kgs and can carry a load of up to 159 kgs. Costing between a range of INR 6,000/- and 8,000/-, each stretcher comes with a carry bag.



Another option is the foldable soft stretcher with belts. The handles are non-slip rubberised grips, allowing for easy movement of patients in narrow areas. Made of durable waterproof PVC material with nylon straps and side buckled belts, these stretchers can carry weight up to 130 kgs. Online cost – INR 3000/-.

Portable Hyperbaric Bag/Chamber

The consequences of rapid ascent in unacclimatised individuals fall into three broad categories: acute mountain sickness (AMS), high altitude pulmonary edema (HAPE) and high altitude cerebral edema (HACE). Descent remains the definitive treatment for high altitude illness. However, in high altitude settings when immediate evacuation is not feasible, a lightweight, portable hyperbaric chamber is recommended for the treatment of high altitude disorders.

Portable Hyperbaric Bags are portable hyperbaric chambers used to treat AMS. It is a simple cylindrical apparatus that consists of a bag large enough to accommodate a lying patient. The patient is placed inside and the bag is inflated with air, using a foot pump, to increase the concentration of oxygen. The inflatable bag simulates descent to lower altitude. Within minutes, the effective altitude can be decreased by 1000 to as much as 3000 meters depending on the elevation. After two hours in the bag, the person's body chemistry will have "reset" to the lower altitude. This acclimatisation lasts for up to 12 hours outside of the bag which should be enough time to get them down to a lower altitude and allow for further acclimatisation.

Several portable hyperbaric chambers are now available, such as the HAPO bag, PAC (Portable Altitude Chamber) and the GAMOW Bag. They all are all similar to the extent that they are air-impermeable bags that completely enclose the patient, and are inflated to a significant pressure above ambient atmospheric.

The PAC HAPO chamber, with pump, hose, manual, repair kit and storage bag, weighs in at about 8 kgs., and can cost upto INR 2,50,000/-.



Personal Locator Beacons

- *Wing Commander (Retd.) Sudhir Kutty*
Leading Mountaineer

Personal Locator Beacons (PLBs) are tracking transmitters which aid in the detection and location of boats, aircraft, and people in distress. A PLB is a personal safety device designed to alert search and rescue services and allow them to quickly locate a person in the event of an emergency, on land or sea.

When activated it transmits a coded message on the 406 MHz distress frequency which is monitored by the COSPAS-SARSAT satellite system. The alert is then relayed via an earth station to the nearest Rescue Coordination Centre (RCC). As the satellites are in a polar orbit they offer true global coverage – with a PLB one can summon help from any point on the planet, no matter how remote.



A PLB is registered to a person and so can be carried with you wherever you are – at sea, hiking, mountaineering or in any remote location or situation where you may require rescue. PLBs are subscription-free devices, so have no cost of ownership after the initial purchase.

Most beacons are brightly coloured and waterproof. PLBs vary in size from cigarette-packet to paperback book and weigh 200 g to 1 kg (½ to 2½ lbs). The units have a useful life of 6–10 years, operate across a range of conditions –40 to 40 °C, and transmit for 24 to 48 hours.

Cost of PLBs available in India range from Rs 30,000/- to Rs 45,000/- and are available for purchase on online platforms like Amazon.

MONITORING OF BEACONS IN INDIA

Indian Mission Control Centre (INMCC) provides Search And Rescue support through space segments using LEO,GEO satellites to users those who carry radio beacons, operating on 406 MHz which are approved by COSPAS-SARSAT.

Any distress received on land will be routed to concerned Rescue Coordination Centre (RCC) and will deploy the SAR force to the distress location for rescue operation.

INMCC also facilitates and maintains 406 MHz beacon registration database for Indian Users for fastest SAR operation during real distress scenario. During registration, emergency contact number is to be given which can be contacted 24X7 for passing distress messages. All beacons are to be registered online on ISRO website https://inmcc.istrac.org/Registration_406_MHz.html

New Delhi and Kolkata Rescue Coordination Centres (RCC) are the SAR agencies responsible for the Indian Himalaya region.

Case Reports

&

Discussion

*- As developed
by the IMF Risk Management
Unit*

Case Report 1

Death of Climber en route Bhagirathi II (6512 m)

Bhagirathi II is one of the major peaks in the Bhagirathi group of peaks in the Garhwal Himalaya, Uttarakhand, with Bhagarathi I & III being the others. The nearby towns in the area of the peak are Rudraprayag and Karnaprayag.

The trek to Nandanvan is through Gangotri, across the Gangotri glacier, Bhojbasa and Gaumukh. The approach to Nandanvan includes steep ascents, slippery sections and moraine. The Base camp at Nandanvan is a beautiful meadow, lush with Alpine flowers.



The expedition team of 5 climbers started out from Bangalore and reached Uttarkashi on Day 1. On the second day, the team moved up to Gangotri. They trekked onwards to Bhojbasa (3610 m) the third day, and finally set up base camp at Nandanvan (4350 m) on the fourth day. The fifth day was a rest day at the Nandanvan camp. The team members began undertaking load ferries to the Advance Base Camp on the sixth day and returned to Nandanvan.

On the seventh day, the climber began to feel unwell. The move to the Advance Base Camp was delayed as a result. By the same afternoon, heavy sounds could be heard emanating from his chest. Consequently, the entire team began their trek down, but was unable to cross beyond Gangotri Glacier, and could only move down by 150 metres. On the eighth day, the team finally crossed Gangotri Glacier and descended down, reaching Bhojbasa at 6 PM. Early next morning, on Day 9, the climber passed away at 2 AM.

Discussion

It is clear that the team moved too quickly to Nandanban (4350m), reaching in two days from Gangotri, which is very quick and this itinerary was pushed by members as they were keen to reduce the number of days on the entire trip. The onset of HAPE came on suddenly and the team was not able to determine this prior to the afternoon of Day 7. The only possible sign was tiredness/ fatigue of the climber on the morning of Day 7 which could have been used as a trigger to look at making a descent. This could have been confirmed if an oximeter was in place, which was not available with the team at that point. The symptoms of HAPE became clear only towards the afternoon and it was not possible to cross the Gangotri glacier after dark.

On the morning of the following day in the absence of a stretcher the climber descended on his own, which according to medical experts should be avoided as they add's on to the stress which the body is already under. Under these circumstances, oxygen support would have been useful but there was no oxygen cylinder with the team either. The member was able to reach Bhojwasa but unfortunately the doctor manning the location was not available and towards midnight the member passed away.

Case Report 2

Death of Two Climbers on Kolahoi Peak (5425 m)

The two climbers were part of a team of mountaineers, undertaking an expedition to Kolahoi Peak (5425 m), in September 2018. The peak is located in the Lidder Valley, within the South Kashmir district of Anantnag, Jammu & Kashmir Himalaya, about 30 kms from the popular tourist town of Pahalgam. Kolahoi Peak is a pyramid-shaped peak, rising from the Kolahoi Glacier, with ice falls and ice fields at its bottom. Kolahoi is known to be full of crevasses. The easiest route to climb Kolahoi Peak is its south face via Aru, Pahalgam leading to a 21 kilometres high-altitude alpine trek to the glacier.



The team, having successfully climbed Kolahoi peak, began descending towards the glacier. The weather packed up on their way down, with heavy snowfall and strong winds. The climbers reached their campsite in low visibility. The weather and visibility had not improved by the next morning, with icy winds and the team decided to wait. By afternoon, the conditions seemed better, with good visibility, and the team immediately roped up to descend. They cleared the rocky pass and regrouped into two ropes as they approached the glacier patch of the wall. The first rope cleared the descent, zigzagging through the gradient of the ice wall. As the second rope readied to follow, there was a massive rock fall, as the boulders of the rocky pass cracked and fell, with the second rope in their direct path, tumbling down with the debris of rocks and boulders.

One of the climbers was hit on the head by a rock and died on the spot. The other climber was badly injured and pinned down under a huge boulder, breathing his last soon thereafter. A third member was badly injured, with a broken rib and Hemopneumothorax. Heli rescue was arranged but it was getting dark. The team took the decision to continue descending in single rope, along with the injured climber, and reached the glacier snout by late night, where locals had gathered to help them. The weather continued to deteriorate and the bodies could finally be airlifted back two days later.

Discussion

This is a freak case of rock fall in a gully after persistent snowfall in the previous day. It is a known fact that gullies are crossed early in the day as the melting of the snow will tend to disturb rocks. The same logic holds good when it is snowing.

In these circumstances one of the options which the team could have looked at, was holding the crossing for a day, provided reserves in terms of food were in hand. One of the other strategies used by teams crossing gullies is to put a spotter at a location from where the upper reaches of the gully is in view. Also 4 members passing together increases the risk.

Case Report 3

Death of Porter on Bali Pass (4953 m)

Bali Pass is an old trekking route from the Tons river valley to the Yamuna river valley, made popular by Jack Gibson, a teacher at The Doon School in the late 1940's. It continues to attract trekkers post the monsoon season when the snow melts. The pass is approachable from Har ki Dun Valley where the gradient is small, providing enough time to acclimatize to the altitude. The trek starts from Sankri village in Uttarakhand, passes through pine forest of Govind National Park, ending at Janki Chatti, with a day or two of camping above 4000 m.



The terrain covered during this challenging trek includes tricky steep sections with loose stones and rocks, snowfields, rocky sections of mountain wall with no path, even vertical walls leading into deep valleys.

The team undertook this trek during May 2018. The trekkers, accompanied by porters, reached Bali Pass and began their descent down the risky rocky slope. While descending, one of the porters slipped and fell, sustaining head injuries. The porter succumbed to his injuries shortly thereafter and his body was taken down to Janki Chatti.

Discussion

It is believed that the porter in question was from the foothill area and was new to taking on porter work to earn extra money in the summer months. It thus cannot be assumed that all mountain people can take on the work of a porter and be completely sure footed while carrying heavy loads and moving on tough/ steep terrain which is there in Bali Pass when descending towards the Yamnotri side.

It is also not known what kind of shoes/ clothes the porter was wearing. Additionally it is not clear if the porter was given a proper tent to sleep in and was given proper nutrition on the trip which could have had an overall affect on the porter's ability to traverse difficult sections. In the last 2 years there have been 6 porter deaths which illustrates that porters are in high risk category.

Case Report 4

Death of Trekker en route Hamta Pass (4270 m)

Hamta Pass lies in the Pir Panjal range, near Manali in Himachal Pradesh. The Pass connects the Kullu and Lahaul valleys and has emerged as a highly popular trek among adventure enthusiasts. It is an easy to moderate trek, with a variation of dramatic terrain from open pastures, meadows to glaciers and sections of snow, and a spectacular pass crossing. Sections of the trek are quite slippery and rocky,



The team of 12 trekkers, along with a cook, a porter and a guide, undertook their trek during April 2018. The group had reached the midway point to Hamta Pass that day and had been trekking for about 4–5 hours, when one trekker suddenly, and for no apparent reason, decided to descend back to Manali, apparently by himself. He handed his phone to another trekker and started back. When he failed to rejoin his fellow trekkers at the base camp and they realised he was missing, the matter was reported to the local administration.

A search operation was launched with over 40 trekkers, comprising police, locals and trekkers of the Atal Bihari Vajpayee Institute of Mountaineering and Allied Sports, who were involved in the rescue operation. Two Indian Air Force choppers also carried out search in the snow-covered hills.

The trekker's bag and trekking stick were traced a few days later and the next day his body was found lying in a deep trench near the Chhalet area of Prini village, Manali. He had been missing for 7 days. There were no injury marks on his body.

Discussion

It is not clear if additional support was available to escort the member down but it seems that the member set off on his own. At some point it seems the member left the trail, possibly taking a short cut, and may have slipped or lost the way and was then not in position to get back on the main trail.

As a rule it is not recommended to let anyone travel alone in mountain terrain precisely for the reason that if there is a fall or accident, the other team member can get help. In the current low cost trekking model being offered in some popular trails, the ratio of guides to members is going down, increasing the exposure to members, specially when there is deviation from the plan, like a member wanting to break away from the group and come down.

Case Report 5

Death of trekker on the Chadar trail (4270 m)

The Chadar trek is a frozen river trail trek in the Zaskar valley of Ladakh Himalaya, undertaken in the winter months when the Zaskar river is frozen. Formerly, the Chadar route used to be taken by the natives of Zaskar Valley to source their basic supplies from main towns during peak winters. Today it is one of the most challenging, yet wildly popular treks in the Indian Himalaya. The trek begins from Chilling, in the Leh district, moving higher till Nerak, the return point of the trek.



The conditions during the trek are extremely inhospitable with the temperature hovering around -10 degree Celsius during the day, and between -20 and -25 degrees Celsius during the night. The route spans 105 kms of frozen terrain, with chadar or ice sheets, frozen ice slides, waterfalls and caves on the way. Ice forms and breaks on the river after every few hours. And, in some places, the chadars or ice sheets do not even form. Trekkers need to be exceptionally fit, with 15–16 kilometres to be covered on a daily basis.

The trekker undertook the Chadar trek in January 2018. He had a pre-existing heart condition, which flared up due to the stress of the trek, the high altitude and the inhospitable winter cold.

He was moved down to the Medical Centre and provided treatment, but died of a massive heart attack.

Discussion

This is possibly a case of a trekker with an undetected ailment, coming on a tough trek. The Chadar trek is marketed as a beginners' trek, but in reality the exposure to cold, altitude and some technical sections makes it a difficult trek.

In the year 2019, the medical test prior to start of the Chadar has been introduced which is a welcome sign. The medical test would assist in detecting ailments. For trekkers who have a pre existing condition, the combination of altitude, exposure to cold and the physical exhaustion can aggravate the ailment, leading to a medical situation like in this matter.

Appeal for Action

We at the IMF are in the process of developing a repository of data on the accidents and causalities in mountain climbing and other related aero and water sports, including skiing.

We request you to share / report such incidents to ***Dr. Hari Mohan***. You may call him or WhatsApp at ***+91-9810310203***. Or email him at ***nharimohan@gmail.com***.

He would compile all the relevant information for further analysis. This would help in developing advisory guidelines for concerned persons and departments.

Thank you!

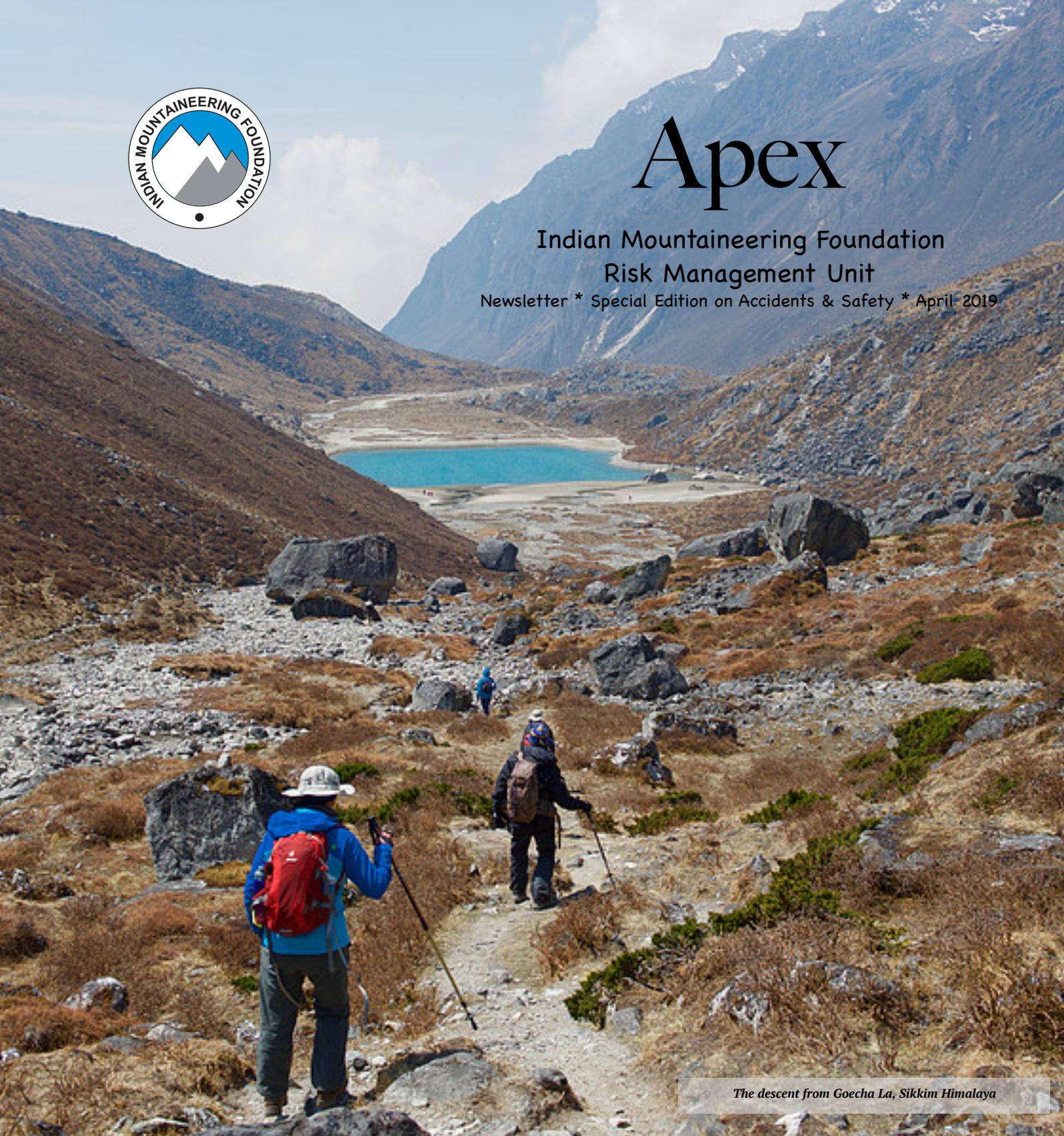




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The descent from Goecha La, Sikkim Himalaya

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