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No disclosures

Case 1: Disaster at 25,000 ft



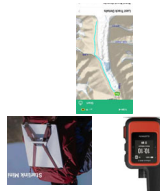
- Avalanche at 25K Feet at 4PM
- 35 yo male Sherpa falls 500 ft
- Reporting "right leg broken"
- Darkness falling
- 4 other Sherpas within 2000 vertical feet
- Nearest tent at 23K feet
- What's the plan?

Rescue and Management



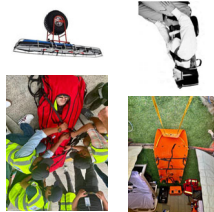
- Communication
- Rescue devices
- Rescue and Evacuation Protocols
- Managing medical and traumatic immobilization
- Issues in remote environments: Cases!

Communication



- Phones:
 - Cell: sometimes they work and sometimes... more reliable, expensive
 - Satellite: more reliable, expensive
- Radio: fine of sight, good if open terrain
- In Reach: dependent on global network of satellites, reliable messaging and 911 feature, tracking anywhere in the world...
- Stunlike backpack: remote access

Rescue Devices



- Litters: improvised or purchased
- SLED
- Sled
- Stretcher
- One wheel stretcher
- PLUS: Cervical spine
- On-gon upright or
- Improvised

Helicopter Rescue



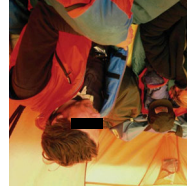
- Landing zone not available due to terrain or altitude
- Long line rescue (lines, flight bag, rescuer harness)

Evacuation Protocols

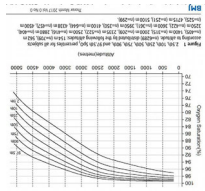
Severity	Location	Protocol	Notes
Severe	High altitude	Helicopter rescue	Requires landing zone
Critical	High altitude	Long line rescue	Requires flight bag and harness
Severe	Low altitude	Evacuation by ground	Requires transport vehicle
Critical	Low altitude	Evacuation by ground	Requires transport vehicle
Severe	Low altitude	Evacuation by ground	Requires transport vehicle
Critical	Low altitude	Evacuation by ground	Requires transport vehicle

- Protocol based on injury type/severity, location of accident
- Critical contacts: "911", hospital, Embassy/consulate

Case 2: Winded



- 56 yo with cough, SOB, chest tightening and "crackling" sound when breathing
- 68% sat at 5000m
- Normal sats at altitude?
- Differential?



Differential?

- Pneumonia
- CHF
- Asthma/COPD exacerbation
- PE (more common at altitude)
- High Altitude Pulmonary Edema (HAPE)

HAPE

- Hx: SOB at rest
- PE: Crackles diffusely
- Treatment:
 - Oxygen
 - NO donor: tadalafil, sildenafil OR
 - DESCENT AND REST
- Re-ascend after recovery?
- Prevention?



Case 3: Purple hands

- 24 yo male prolonged stay above 7000m in snowstorm while climbing in Nepal.
- On arrival to B.C., cyanotic, painful, blistering, swollen digits on both hands
- Next steps?



Frostbite Management

- Rewarming: Do not allow refreezing
- Debride ment clear blisters
- Grade moderate: extent of cyanosis/blisters and angiography if >blvs (days)
- All: ASA, Ibuprofen and topical abso
- Topost (Gr 3 or higher or multiple digits)
- Inoculypus (Grade 4 and/or abnl angiography)
- No early amputation

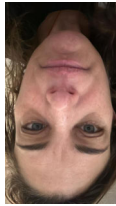


Differential

- Migraine
- Allergic reaction/anaphylaxis
- Coronavirus sinus thrombosis (increased thrombosis/vascular occlusion at altitude-VTE, TIA, CVI)
- High altitude facial edema

High altitude facial edema

- Hx: excessive retri-alkalosis
- Na retention → edema (correlates with AHA due to impact of anti-diuresis on acclimatization)
- Tx: Ibuprofen, acetamin, descent, careful observation.
- Potential evacuation for MRI or CT
- Hx: resolved, facial swelling improved with treatment and descent after 1 day



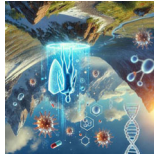
Case 5: Skin infection

- 33 yo female with impetigo at nasal introitus noted at 14k feet
- →worsening at 16k feet
- Treatment?



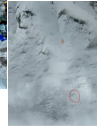
Altitude and the Immune System

- T cell function and numbers impaired
- Increased risk of bacterial infections
- Cold and dry environments impair ciliary function
- Tx: mucrocin infective, Oral cephalixin with slow resolution



Back to Case 1: Avalanche at 25K

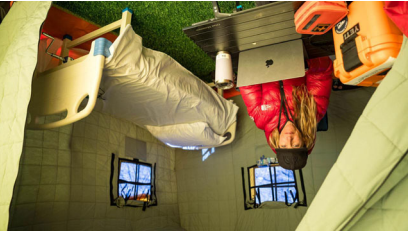
- 35 yo Sherpa, 500ft fall in avalanche at 25,000 feet
- Radio report: "Broken leg"
- Rescued by helicopter, vertical ascent
- Hypothermic at 23k feet: shiber in tent, warm water bottles



Major trauma: evacuation

- 28 hour overland evas with sled/liter, "EMT" made given ibuprofen and pericocil, acetamin pm
- PE at 17k feet: 75% RA, HR 180s, T 36, 120/90, P/ox 84%, RR 18
- Tx: remove wet clothing, hydration, pain control, spinning, oxygen
- Further evacuation with fresh team





Priorities

- Oxygen
- Stop active bleeding (tourniquet)
- Protect spine during evacuation to MD
- Avoid intubation if possible
- Bleedwade decompression kit chest, distal
- Painmed- ketamine
- C/DN: fluo resuscitation/permissive hypotension, TXA and platelet binder
- DIO for "burn table" cranio-cervical
- E/D: minimum splints for spine and limb stabilization
- ESCUATE TO HIGHER LEVEL OF CARE by helicopter

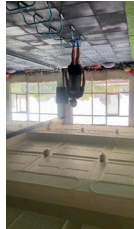
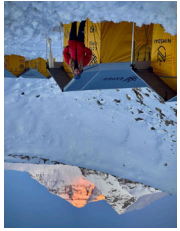
Summit Team: EMS



Photo: 2022 Apr 14:16:44:20

Final Thoughts

- Advanced preparation key:
- Medical kit
- Communication
- Evacuation protocol
- "Slow is pro" - avoid badness when possible
- Be ready to do heroic procedures... that you feel comfortable doing



- 44 yo male fall during descent from summit at 23K feet
- Hail long line from 23K **OR** lower to Camp 1 (21K) and MD heli to Camp 1
- **ABCDE:**
 - Airway
 - Breach (tracheal pull), brnk upper leg wound bleeding
 - Circulation, capitus left chest
 - Disability
 - Exposure
- **ABCDE:**
 - For stabilization
 - Hail long line from 23K **OR** lower to Camp 1 (21K) and MD heli to Camp 1
 - 44 yo male fall during descent from summit at 23K feet

Case 6: 1000 foot fall

