Avalanche Safety

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Avalanche Accidents in Canada by Bruce Jamieson, Pascal Haegeli and Dave Gauthier.

Since I have no professional level avalanche training, you will have to take this article with a grain of salt :)

I was amazed at the effort and quality that went into this publication. Clearly, this is not your summer time pot boiler that will sell millions of copies and make the authors rich and famous. This book was written, with great patience, as a public service to hopefully save lives. The circumstance of each accident is given in great detail, from a not so brief history of the weather for the entire winter to a complete and objective account of each accident (avalanche forecast for the period, nearby weather station recordings, the events of the day, the rescue, the recovery, etc). Due to resource constraints, only fatal accidents are reported. However, every single fatal accident for the period is recorded. The authors avoid passing judgment, and conclusions are typically a summary of important facts that were most relevant to the negative outcome (i.e. no one had transceivers).

My one criticism is that the book is so detailed, that the overall numbers are not terribly relevant to specific groups. A fatal avalanche accident at an elementary school in northern Quebec is not particularly informative to a heli ski operation in Pemberton. However, all the information is there, it just needs to be re tabulated. I have therefore done that for the ACC demographic. Although the overall results are informative, the individual stories (filtered for relevance) are far more and I recommend reading at least some of the accounts.

I re classed the accidents pertaining to back-country skiers/boarders who are at least basically equipped to handle an avalanche rescue (beacon, probe and shovel) and gave the rescue a try. I excluded any accident involving groups without the proper equipment and snowmobilers, which unfortunately, were mostly synonymous. I included accidents where mechanized ascents were employed, including by snowmobile, but the accident occurred while the group had board(s) strapped to their feet. I was particularly interested in the human factor of the accidents, in particular, the skill of the group and the flexibility of options the group had to work with. I classed the skill of the group into four groups: basically equipped, at least one member with professional level avalanche training, at least one member was a certified guide and avalanche forecasters. I also classed the trips into scheduled and non-scheduled. I pretty much had to guess if the trip was scheduled because it was not stated directly, but I assumed that anything to do with a hut, a helicopter, plane tickets or a guide had to be scheduled in advance such that the trip timing was fixed and possibly the destination. I know in my decision making, the flexibility of trip is an (unfortunate) factor and in some cases has resulted in employing a make-do approach (i.e. high avalanche hazard for a trip, select the most conservative terrain choices available but still go).

Results:
-Total number of fatalities was 79 in 40 accidents over 10 winters (1996-2007).
-21 trips resulting in 37 fatalities used machines (helicopter, snow machine, chair lift) for at least part of the ascent. All groups were at least basically equipped for avalanche terrain. Some of the heli-ski operations were able to get defibrillators, doctors and additional professional rescue personnel to the scene in minutes.

-32 accidents involving 71 fatalities were on scheduled trips
-Most of us have heard that full burials should be recovered within 15 minutes. However, the majority of complete burials reported were not breathing after any burial longer than 5 minutes and required CPR of which only a small fraction began breathing again. Most victims buried more than 2m deep took at least

15 minutes to dig out, even with a very speedy beacon search, multiple rescuers and a helicopter flying more able bodies to the location to help within 5 minutes. Can you both find and dig out a victim in less than 5 minutes? How fast can you dig 2 m deep?

Accidents by training
4 fatalities were avalanche forecasters in 3 accidents (one was mechanized)
17 accidents with 38 fatalities were lead by at least one certified guide
3 accidents with 10 fatalities had someone with professional level avalanche training
17 accidents where everyone had basic avalanche training, but were not professionally trained resulted in 27 fatalities

These numbers do not identify statistically significant trends because we don't know the proportion of normal back-country activity for each group. However, we can identify risk factors.

1) We know that 90% of fatalities occurred on scheduled trips. Therefore, it important to frankly ask yourself how scheduling a trip before avalanche conditions are known influences your decision making. Are you willing to stay home if the avi conditions are too dangerous and eat your fees (hut, plane ticket and hotel, guide fees)? Is that level of acceptable risk any different than if there was nothing to lose by not going?

2) We know 47% of fatalities were machine assited. Does mechanization allow people to access higher risk terrain? Is the skin ascent an important part of the decision making? A skin-up allows the skiers to feel and test the snow and allows the group the ability to turn around at any point, a helicopter/cat lift to the top does not. However, a 50/50 split in fatalities is neutral to avalanche safety if mechanization is employed 50% of the time because a mechanized skier would have the same accident rate as a non-mechanized skier.

3) We know 66% of fatalities occurred on trips with professional level avalanche training (note that unprepared parties have been excluded from these numbers). Although these trips had some individuals with a high level of avalanche safety training, most of the group typically does not. Fatalities tend to be concentrated in less experienced members of the group and those who directly contradict guide advice. Is it fair to assume that having someone in the group with a high level of avalanche safety training will improve your own safety? I don't know the answer because I don't know what proportion of back-country trips have professional level training. However, if 2 out of 3 avalanche fatalities had someone with professional level avalanche training (for the subset of accidents studied) it doesn't seem reasonable to assume that having a skilled member along improves my own safety unless I am that skilled member. Since heli-skiing trips almost exclusively have guides, the numbers could be biased by the safety record of mechanization (point 2). If machine-assisted trips are removed, the numbers of fatalities on trips with professional or better training drops to 48% (20/42), only a small improvement. Accidents on trips with professional level avalanche training are far less frequent (7/21), but tend to be far worse (the three worst accidents by fatalities (9, 7, & 7) were all lead by someone with professional level training). This point is very complicated and the interaction of training, risk tolerance, and leader/follower interactions are not easily untangled.

I apologize to anyone who finds this morbid. However, I think it is important that we learn from others mistakes and do not make the same mistakes ourselves. I highly recommend learning both as much as you can about snow and yourself. Asking the hard questions about how additional training influences your risk tolerance, how scheduling a trip influences your decision making and how following a more experienced individual changes your risk perception.

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