Letters to the Editor

In Response to RECCO in Avalanche Rescue by Grasegger et al

To the Editor:

We read the article by Grasegger et al¹ regarding the radar-based RECCO Rescue System with great interest, in particular because we faced a very similar situation this past winter. A 39-year-old woman was completely buried by an avalanche while skiing off-piste in the Swiss Alps. She was neither equipped with an avalanche transceiver nor a RECCO reflector. The ski patrollers, alerted by her companion, detected a signal after a 5-minute search using the RECCO Rescue System that was later assumed to come from the victim's mobile phone. She was extricated from a depth of 80 cm after a 30-minute burial. She was uninjured, and a scarf covering both her nose and mouth probably prevented asphyxia from snow inhalation.

The advantages and limitations of the RECCO Rescue System are well described by Grasegger et al¹ in their article. However, we would like to add 2 further comments.

The first comment pertains to the analysis of the survival rate of completely buried avalanche victims located with the RECCO Rescue System. Grasegger et al¹ suggest that the vicinity of the accident sites to the patrolled ski areas may explain the high survival rate. Although vicinity certainly plays a role, we think that this apparently high survival rate should be interpreted cautiously. The reported cases represent a case series, without explicit selection criteria, and may be prone to a selection bias originating from 2 distinct sources. The first may be selection by the manufacturer of cases with a good outcome. The second, importantly, is the potential selection bias by those reporting cases to the manufacturer. A careful analysis of the case series seems to support this hypothesis. In the first category of victims found via the RECCO Rescue System within 1 hour of burial time, 9 of 11 (82%) were found not to have experienced cardiac arrest. This high survival rate is very unusual, as usually only one third of victims survive after a 30-minute burial time.² The second category of cases is represented by those found 1 or several days later using the RECCO Rescue System, all of whom died. Here again, the potential for a selection bias is high, as such dramatic cases are also certainly prone to being reported.

The utility of the RECCO Rescue System in both these situations is undeniable, either to save life in specific conditions or to help find the fully buried corpse of a victim. However, the magnitude of its impact on survival or retrieval rates can only be determined if the true numerator (ie, the total number of survivors or retrieved corpses located using the RECCO Rescue System) is not inflated while the true denominator (ie, the total number of fully buried avalanche victims wearing the device) is not underestimated.

Grasegger et al¹ must have reached the same conclusion because, in the abstract of their report, they state that the publication of their case is intended to encourage the collection of cases in which fully buried people are found using the RECCO Rescue System. However, this intention is not further discussed in the article, and no proposition made to support this intention. We suggest 2 potential approaches. First, the manufacturer could promote the reporting of all cases found wearing the RECCO Rescue System, dead or alive, by their impressive network of ski patrollers. Alternatively, the corresponding author, who is affiliated with a recognized mountain medicine research organization, could also collect all cases through a dedicated web site, his personal e-mail address, or a dedicated e-mail address. This independent approach would also prevent any conflict of interest.

Both solutions would be an incentive for rescue teams to report cases in which the RECCO Rescue System was critical in finding a fully buried person, such as the case we were involved with this past winter.

Mathieu Pasquier, MD

*Emergency Service, Lausanne University Hospital
Lausanne, Switzerland
Air-Glacières SA and GRIMM
Maison FXB du Sauvetage
Sion, Switzerland*

Alexandre Gnaegi, MD

*Air-Glacières SA and GRIMM, Maison FXB du
Sauvetage, Sion, Switzerland*

Olivier Hugli, MD, MPH

*Emergency Service, Lausanne University Hospital
Lausanne, Switzerland*

References

1. Grasegger K, Strapazzon G, Procter E, Brugger H, Soteras I. Avalanche survival after rescue with the RECCO Rescue System: a case report. *Wilderness Environ Med.* 2016;27:282–286.
2. Techel F, Zweifel B. Recreational avalanche accidents in Switzerland: trends and patterns with an emphasis on burial, rescue methods and avalanche danger. *Proceedings of the International Snow Science Workshop.* Oct 7–11, 2013; Grenoble – Chamonix Mont-Blanc, France. Available at: <http://arc.lib.montana.edu/snow-science/item/1844>. Accessed: May 16, 2016.

In Reply to Drs Pasquier, Gnaegi, and Hugli

CrossMark

To the Editor:

We thank Drs Pasquier, Gnaegi, and Hugli¹ for the interesting case report and the valuable comments. Regarding the comment about analysis of the survival rate, we would like to emphasize that the case series listed in the Table were, as clearly stated in the subtitle, “selected cases.”² Thus, by definition these data were not expected to be complete. Being well aware of this selection, we did not calculate (or report) any survival rate in the article and did not pretend that the case series could be generalizable.

Thirty-five minutes is the threshold of time after which a patent airway is needed for long-term survival.^{3,4} In our case series, 7 of the 14 cases with known duration of burial were located by RECCO Rescue System within 35 minutes; 6 of them (86%) presented with vital signs at extrication. In contrast, of the remaining 7 victims who were found after >35 minutes of burial only 2 (29%) had vital signs, which reflects the poor survival after this time period. Interestingly, all victims with a short duration of burial (≤ 35 minutes) were off-piste skiers, whereas 5 of the 7 victims with a long duration of burial (>35 minutes) were other recreationists who were obviously found away from ski areas. This indicates, in our opinion, that the vicinity of the accident sites to the secured ski areas was one of the reasons for the prompt extrication and high survival of the off-piste skiers.

We agree that the survival rate of the presented case series may be overestimated compared with previously published systematic retrospective analyses,⁵ but survival analysis was neither the aim of the study nor stated in the article. However, we do not assume that the manufacturer intentionally preselected cases with good outcome as suspected by the authors, but we agree with them that there will be a good number of not-reported cases. This bias applies to all observational studies on mountain accidents in which cases with good outcome may be underreported.⁶

We support the suggestion of Drs Pasquier, Gnaegi, and Hugli¹ that a systematic data collection of cases rescued with the RECCO Rescue System, or even a comprehensive international avalanche registry, will be needed to estimate its effect on survival. Moreover, it will also help to identify those groups of recreationists who have the best benefit from the additional use of the RECCO Rescue System by organized rescue teams.

Hermann Brugger, MD
Institute of Mountain Emergency Medicine, EURAC
Research, Bolzano, Italy
International Commission for Mountain Emergency
Medicine ICAR MEDCOM

Katharina Grasegger, MD
Institute of Mountain Emergency Medicine, EURAC
Research, Bolzano, Italy
Faculty of Medicine, LMU Munich, Munich, Germany

Inigo Soteras, MD, PhD
Cerdanya Hospital, Puigcerdà, Spain
Faculty of Medicine, Girona University, Girona, Spain
International Commission for Mountain Emergency
Medicine ICAR MEDCOM

Giacomo Strapazzon, MD, PhD
Institute of Mountain Emergency Medicine, EURAC
Research, Bolzano, Italy
International Commission for Mountain Emergency
Medicine ICAR MEDCOM

References

1. Pasquier M, Gnaegi A, Hugli O. Response to RECCO in avalanche rescue by Grassegger et al. *Wilderness Environ Med* 2016;27:533–534.
2. Grasegger K, Strapazzon G, Procter E, Brugger H, Soteras I. Avalanche survival after rescue with the RECCO Rescue System: a case report. *Wilderness Environ Med.* 2016;27:282–286.
3. Brugger H, Durrer B, Adler-Kastner L, Falk M, Tschirky F. Field management of avalanche victims. *Resuscitation.* 2001;51:7–15.
4. Procter E, Strapazzon G, Dal Cappello T, et al. Burial duration, depth and air pocket explain avalanche survival patterns in Austria and Switzerland. *Resuscitation.* 2016;105:173–176.
5. Brugger H, Paal P, Boyd J. Prehospital resuscitation of the buried avalanche victim. *High Alt Med Biol.* 2011;12:199–205.
6. Haegeli P, Falk M, Procter E, et al. The effectiveness of avalanche airbags. *Resuscitation.* 2014;85:1197–1203.