Monte Carlo simulations within avalanche rescue

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Refining concepts for avalanche rescue involves calculating suitable settings for rescue strategies such as an adequate probing depth for probe line searches or an optimal time for performing resuscitation for a recovered avalanche victim in case of additional burials. In the latter case, treatment decisions have to be made in the context of triage. However, given the low number of incidents it is rarely possible to derive quantitative criteria based on historical statistics in the context of evidence-based medicine. For these rare, but complex rescue scenarios, most of the associated concepts, theories, and processes involve a number of unknown "random" parameters which have to be estimated in order to calculate anything quantitatively. An obvious approach for incorporating a number of random variables and their distributions into a calculation is to perform a Monte Carlo (MC) simulation. We here present Monte Carlo simulations for calculating the most suitable probing depth for probe line searches depending on search area and an optimal resuscitation time in case of multiple avalanche burials. The MC approach reveals, e.g., new optimized values for the duration of resuscitation that differ from previous, mainly case-based assumptions.