

THE AVGAR; A DECISION MAKING TOOL FOR THE ASSESSMENT AND DEPLOYMENT OF AVALANCHE SEARCH AND RESCUE MISSIONS

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ABSTRACT

We've experienced an uptick of complicated, avalanche SAR (AvSAR) missions in the US. Teams in Colorado have faced a rash of difficult rescues and recoveries, prompting rescue professionals to re-examine the decision making tools and deployment frameworks guiding our actions. Recent experiences have given us much to reflect on: from teams performing flawlessly in the field to narrowly dodging catastrophic near misses, to rescuers delaying response while members of the public attempt their own recoveries.

When deciding to deploy AvSAR personnel into the field, the pivotal question is: Do we GO? Do we HOLD and discuss? Do we decide to NOT GO at all?

We should rethink our approach and recalibrate our utilization of AvSAR decision making matrices. Frameworks which lead to dialogue rather than mathematical answers offer more clarity and consistency when considering organized response. These intentional discussions improve a team's ability to leverage their talent and resources when deploying at all hours of the day. Decision making based on conversation provides added value and insight within the ICS deployment process. Through substantive conversations, AvSAR teams have the best chance to address the difficult question: Do we GO? Do we HOLD? Do we decide it's a NO GO?

KEYWORDS: avalanche rescue, decision making, risk assessment, hazard management, exposure scale

1. INTRODUCTION

AvSAR Teams in the United States vary from paid, well resourced, and highly trained professionals to well intentioned, seldom deployed volunteers. Team members could include active duty military, federal and state employees, EMS and Law Enforcement personnel. In the civilian sector, one finds posses recruited by the sheriff, teams assembled by ski patrols and even for-profit, rescue businesses. Unquestionably, AvSAR response and recovery in the United States is executed by a myriad of responders and rescue organizations.

Every fielding AvSAR organization needs to have responders ready at a moment's notice. SAR leadership should deploy a starting line-up of the most capable, skilled, and experienced

members of a team when initiating a rescue response. For the purposes of this paper, we'll call those team members the "Varsity Team". We encourage all AvSAR teams to constantly cultivate a reserve of new, varsity level talent. When we discuss the refinements to decision making tools in this paper, we assume GO, HOLD, and NO GO decisions are being considered by an organization's varsity team.

2. DISCUSSION

2.1 The GAR Matrix

"A Failure to Plan is a Plan to Fail!"
-Ben Franklin

On any search and rescue mission, there are risks both identified and unknown; they range from minimal to grave threats to rescuers. To address risk in AvSAR missions, rescue teams have adopted risk awareness, hazard assessment, and decision making tools to guide their field deployments. A common tool used by many teams is the GAR Risk Assessment Model.

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The GAR (Green, Amber, Red) mission tool was developed in 1998. Dr. Tony Carvallos was conducting a study on sleep related mishaps when he created the GAR tool for the United States Coast Guard. (Davenport, 2023)

GAR is a simple evaluation tool designed to determine levels of perceived risk. It uses a calculated score to determine a Green/Amber/Red outcome, which can be articulated as GO, HOLD, NO GO. The outcome is generated from the sum of points in eight categories: Supervision, Planning, Contingency Resources, Communication, Team Selection, Team Fitness, Environment, and Task Complexity. The GAR assigns a points value between 1 and 10 in each category. The sum reflects overall risk. Although the GAR tool uses math to distill inputs into a decision point, the matrix was designed to elicit critical dialogue amongst a rescue team. Mark Davenport, manager of Risk Management and Team Coordination Training for the United States Coast Guard's Safety Assurance and Risk Reduction division posits, "GAR is a trick to make people have the conversations they need to be having."

2.2 *GARwashing the Math*

"17 and in the Green!"
-Mark Davenport

Rescuers are enthusiastic about being deployed on SAR missions. Whatever the agency, SAR teams are hungry to do their job! This excitement motivates teams to train hard, remain vigilant, and be ready to go at a moment's notice. It also leads to GARwashing, when rescue personnel manipulate the math in the GAR tool so that the sum adds up to automatic deployment. No matter the situation, "we always ended up in the green!" Davenport shares. "Rescuers figured out how to have conversations that made the math add up!" Davenport, the Coast Guard's lead for investigating major mishaps, conducting Human Factors Analysis, and co-creator of GAR continues, "Clearly, this was not the tool's intended use."

Bias can be one of the greatest pitfalls of any risk management tool. Increasingly, we review missions where the responders have a personal connection to the victim(s), a false sense of hope for their survival, or an inflated view of their

team's abilities to affect outcomes. These unacknowledged biases decrease the pragmatism teams bring to the assessment process and may allow them to accept unreasonable amounts of risk. Whatever individuals' perspectives may be, bias impacts AvGAR implementation. The AvGAR tool is intended to identify bias vs. incorporating subjective attitudes and opinions into the decision making and risk assessment process.

2.3 *The GAR 2.0*

"All models are wrong, but some are useful."
-George Box

In an attempt at refinement, the Coast Guard introduced GAR 2.0 in 2018. The GAR 2.0 incorporated the Coast Guard's PEACE and STARR risk assessment models into a recalibrated GAR template that added a new focus on mission gain.

This refined approach had teams use the PEACE model to determine the level of risk, the STARR model to determine exposure to and acceptance of risk, and the GAR 2.0 to elicit conversation around potential outcomes and their perceived value. This eliminated the mathematical computation found in the original GAR model. Although GAR 2.0 addressed the manipulation of scoring, the laborious multi-step implementation of added rubrics for assessment didn't lead to better conversations. Buried under multiple rungs of this jumbled assortment of matrices was an underlying and often unclear answer to the question, How'd we get to green?

2.4 *NPS Implementation*

"It's All About the Conversation."
-David Weber

In 2010, following tragedies experienced by the National Park Service in mountain SAR, the NPS mandated the use of GAR. Park Service climbing ranger and rescuer David Weber, a veteran of multiple decades of SAR service at Mt. Rainier, Denali, and Grand Teton National Park, recalls the initial reluctance of NPS staff to use the tool. The GAR tool "seemed clunky. It didn't seem to work for us." Weber continues, "Paperwork and policies don't work! You can have the greatest forms or apps, but if you don't have team buy in, they don't work. What really

matters in all of this is that a conversation is being had.”

Weber and his ranger colleagues at Denali National Park were having conversations about hazard awareness and risk assessment as part of their reflection and after action reviews involving missions unfurling on North America’s highest peak. They kept coming back to an essential question in their post-mission debriefs, “Did we make good decisions today or did we get away with it?”

Like the Coast Guard, the NPS rangers in Alaska believed it was the dialogue they were having before, during, and after a SAR mission that proved critical to their success and safety. “Whether it’s GAR or something else, it’s all about the conversation” [If a team member] “see(s) something is not right, they say something. If they have questions, they ask them.” (Weber, 2023) Like Davenport at the Coast Guard, Ranger Weber and his teammates recognized an important difference between a tool that addresses “field driven risk management” versus assessments and decisions developed in the “incident command realm.”

Assessments, evaluations, and decisions made by ICS leadership often clash with the reality of rescuers on the front lines of response. How should the reality of conditions and considerations on the ground inform the actions of a team while addressing and ensuring overall risk management and mission gain within the greater ICS system?

Weber and his colleagues were expected to use the GAR model, and they needed to make it work for them. They devised their own system for “how to use it and how to own it.” These contemplations on Denali led to the eradication of the math that accompanied the original GAR model. “Someone else’s 7 might be someone else’s 3” so they instead developed an alternative scoring system for their GAR assessments that would “lead to a whole team conversation” The adapted rubric gave them three choices: 1- Good to Go, 5- Need to Talk About it and 10- No Go. These tweaks to the original GAR lead to what Weber describes as “Real Risk Management” and the lesson he learned on Denali is “whatever risk assessment model you’re using, own it, make it work for you, make it less cumbersome and make it

something everyone’s familiar with so that it’s efficient.” (Weber, 2023)

3. REFLECTION & RECOMMENDATIONS

3.1 The AvGAR

“It was my understanding that there would be no math.”
-Chevy Chase

Reflecting upon the Coast Guard and National Park’s utilization of these tools and coupling their refinements and experimentation with our personal and professional experience implementing GAR in professional avalanche rescue work, we propose the use and continued development and refinement of the AvGAR tool.

Figure 1: The AvGAR (v.1/23)

FIXED CATEGORIES	
SUPERVISION	Leadership is actively engaged, knowledgeable, and experienced in avy rescue/response. Accessible for all teams. Chain of command is clear from bottom to top. ICS protocols are understood & field teams are empowered via de-centralized command
TEAM SELECTION	Team meets/exceeds the level of experience and training to move through avy terrain. Team is competent in snowpack, terrain, weather, and human considerations. Adequate numbers of personnel for mission tasks.
TEAM FITNESS	Team is mentally and physical fit. Team is rested, engaged, and has good morale. Team has a high level of situational and self awareness. Team is mindful of human factors and internal/external bias.
ENVIRONMENT	Avalanche and meteorological forecast reviewed. Terrain familiarity, snowpack knowledge, and weather challenges are understood. Recognized and anticipated natural hazards identified.
MALLEABLE CATEGORIES	
PLANNING	Adequate intel on victim(s). Review ingress and egress, turn around, tactical pause, and re-GAR points. Required equipment and PPE. Risk vs rewards, long approaches, remoteness, elevation gain, altitude considered. Safety for overwatch and spotting changing conditions established.
CONTINGENCY RESOURCES	Additional resources/assets exist, are easily actionable/deployable, and provide ample opportunity for adaptation, alternative action, and solutions. Rescue plan for rescuers in place.
COMMUNICATION	Two way communications, understood area of coverage, back up/satellite communications available. Non-verbal protocols established
TASK COMPLEXITY	Complexity increased by: heightened avy danger, persistent/problematic weak layers, unfamiliar terrain, time of day, inclement weather, deteriorating conditions, aviation/mechanized assets, limited resources, multi-agency collaboration, limited and/or unknown intel.

The AvGAR (v.1/23) utilizes the eight key areas for consideration that the original GAR model established. The AvGAR further divides these eight categories into two, critical focus areas: Fixed Categories for the Operational Cycle and Malleable Categories within the Mission Profile.

3.2 How to AvGAR Fixed Categories

“Someone’s sitting in the shade today because someone planted a tree a long time ago.”
-Warren Buffett

A team that is dedicated to perform rescue in their jurisdiction can assess four of the eight

aspects of the AvGAR at the beginning of their shift/mission cycle:

Supervision: Who's in charge today? Does that leader have the experience and knowledge to lead a complicated AvSAR mission? Has the leader and the team addressed, assigned, and established proper command, control, and oversight roles & functions?

Team Selection: Do those on the responder roster today have the experience, knowledge, tools, and skills to carry out an AvSAR mission? Are we capable of fielding a starting line-up with the Varsity Team? Are we including 'marginal' personnel just to achieve a minimum team number?

Team Fitness: Are those on today's roster adequately rested, well fed/hydrated and healthy? Are team members physically, mentally and emotionally ready to tackle whatever task is assigned to them today? Is the team in response-ready condition for an AvSAR mission?

Environment: Meteorological and avalanche forecasts have been reviewed and discussed by all. Team members have familiarity with the mission environment and are ready to respond to an AvSAR incident with considerations of current conditions, anticipated hazards, weather, terrain and snowpack in mind.

It's important to note that rescuers may not be on-shift or assembled in advance at the start of an operational cycle. In that case, if the team gathers together at a trailhead or advanced rendezvous point, the rescuers will need to assess Fixed Categories along with the four, Malleable Categories before committing personnel to the mission.

3.3 How to AvGAR Malleable Categories

"Plan B is Not Plan A Harder!"
-Jonathan Wilson

The malleable aspects of the AvGAR don't become apparent until an incident has occurred. As details, conditions, and considerations of a mission emerge, the malleable aspect categories of the AvGAR will need to be uncovered and understood so the risk can be evaluated:

Planning: What is the nature of the incident and the appropriate response? What is the scope and timeline for response? Is there sufficient information on the condition of the subject(s) based on a call for help or are they overdue individual(s)? How does the team plan on accessing the terrain? How will the team manage the snowpack? What will the team do to mitigate weather and environmental challenges?

Planning is the most critical and complex category in the AvGAR. Effective Planning requires thorough consideration of ALL mission details until the entire team achieves clarity on order of operations, field and command actions, considerations of individual response behaviors and contemplation of all decision making points relating to every anticipated aspect of mission execution! It is of utmost importance to discuss when the team will initiate the Tactical Pause: a reassessment of risks, considerations, and conditions. When/Why/How Often will the team pause and Re-AvGAR?

Contingency Resources: What assets and resources are incorporated into the team's initial response? Does the field team have additional equipment/transport/human resources on back-up? Are these contingencies easily deployable and do they provide ample opportunity for in-field adaptation, alternative action and creative solutions? If resources prove faulty, inadequate, or unavailable, who rescues the rescuers?

Communications: What is the Comms Plan and what are the communication strategies to be employed? Determine what comm devices will work in the incident area. What is the timing/frequency of communications? What is the backup comms plan? Since communications are always challenging and often problematic, what take-aways from the past are we accounting for now? Reflect upon potential field to base/command comms problems as well as rescuer to rescuer, in-field breakdown. Review options for non-verbal communication.

Task Complexity: A high level overview of all the aspects of the mission. Ex: Employing helicopters, working at night, or in inclement weather increases complexity. Challenging snowpack conditions and considerable or higher avalanche danger increases complexity, as do higher ATES Technical Model ratings. Robust mileage, significant elevation gain, high altitude,

and difficult travel increases complexity. The more rescue personnel that are placed in the field, the greater the complexity of the operation.

3.4 AvGAR Colors and Commands

“No One Uses a Tool They Don’t Believe in!”
-David Weber

(Green/ GO) No Conversation Needed: Team has clarity regarding considerations/conditions presented in the AVGAR. Team members are clear on mission direction/action and currently question free.

(Yellow/ HOLD) Pause for Discussion: Team members pause until all considerations/conditions, questions/comments/concerns/conundrums/clari fiers are voiced and addressed.

(Red/ NO GO) All Stop: No action by team at this time due to uncontrollable and/or unmitigatable conditions/considerations.

3.5 Facilitating the AvGAR

“The idea that the future is unpredictable is undermined every day by the ease with which the past is explained.”
-Daniel Kahneman

Just like the GAR Tool, an AvGAR leader will facilitate a systematic review of all categories and invite each team member to articulate a score determination for each category. If a team has already addressed Fixed AvGAR Categories, the AvGAR leader may opt only to review the Malleable AvGAR Categories.

When facilitating the AvGAR, it is imperative that all voices are heard from and that the team “goes slow to go fast” when working through each category of the AvGAR. If the HOLD determination is articulated by any member of the team, the AvGAR leader will facilitate an efficient follow-up conversation. AvGAR leaders should be well trained and practiced in facilitating these conversations. The AvGAR leader function is often, but not always facilitated by the Incident Commander (IC).

Example:

IC: “Hasty Team Leader, score for Supervision?”

Hasty Team Leader: “I am Green, Let’s Go”

3.6 Handling the HOLD (Yellow) Score

“Instead of altering our beliefs to fit new information, we do the opposite, altering our interpretation of that information to fit our beliefs.”
-Annie Duke

Example:

IC: “Medic One, score for Team Selection?”

Medic One: “HOLD”

Incident Command: “Address the Hold”

Medic One: “I am a HOLD because ALS capable responders are currently enroute”

Following the articulation of a HOLD score, team discussion and dialogue ensues, facilitated by AvGAR Leader. The goal of the AvGAR leader should be to clarify what would get a HOLD (Yellow) score into a GO (Green) determination. Facilitated dialogue should be free of ego, emotion, and judgment of the person articulating the HOLD score. Teams MUST understand and agree that not every HOLD (Yellow) score will result in remediation of that determination into a GO (Green) score! When the team’s dialogue yields a HOLD score, this can also result in a NO GO (Red) determination.

3.7 Handling the NO GO (Red) Score

“We Don’t Fight Our Way into the GAR!”
-Michael Ackerman

Example:

IC: “Safety Officer, score for Environment?”

Safety Officer: “NO GO, Extreme Avalanche Danger prevents personnel from deploying”

Incident Command: “All STOP, all mission personnel stand down at this time!”

AvGAR leaders/Incident Commanders need to be ever mindful of resultant action/discussion following a NO GO (Red). A common quip when

considering movement into complex backcountry terrain when avalanche danger is high is “We don’t fight our way into the bar. We fight our way out when things have gone awry!”

AvGAR Leaders should remain vigilant for bias, peer pressure, and further plying of team members when a NO GO (Red) is articulated. Conversation following a NO GO (Red) assessment should refocus on what future criteria, considerations, and conditions must exist to move a mission towards the green of GO. Team members and leaders must be vigilant and honest about their biases. As with the HOLD command, it’s critical the team remains mindful of the ego, emotions, and paradigms that may be leading them to GARwash the assessment process. Internal pressure to take on more risk based on relationships with the victims can lead to members ignoring hazards they would normally not engage.

Transposing possibility for probability in the environment with unknown or incomplete information has led teams to engage with higher risk than they normally would. Despite our desire to help, our innate sense of duty to victims and our intrinsic want to give every mission our all, we must follow the cardinal medical rescue rule of: do no further harm. Mother nature bats last and she’s often fond of hitting a walk-off grand slam in the bottom of the ninth inning when the opposing team believes they’ve got the victory all sewn up! Never manipulate, discount, or ignore a NO GO determination from your team.

4. CONCLUSION

Avalanche rescue and recovery missions are challenging and complex. Incorporating field tested tools that cultivate stronger risk assessment, better hazard awareness, and smarter decision-making metrics strengthen any AvSAR team’s response and increase rescuer safety. We believe the AvGAR builds upon past models and helps us think more critically about mission complexities within established ICS protocols. The timing and deployment of any rescue or recovery mission in avalanche terrain must be filtered through the lens of the avalanche triangle and an acute awareness of past, present, and future considerations and conditions in the field.

Moving forward, wisdom and refinements garnered from our reflections upon recent case studies, current rescue research, and future in-sector publications will assist us in making the AvGAR tool stronger. Furthermore, we look to gain more experience implementing and utilizing the AvGAR via our training, deployments, and involvement with the International Commission for Alpine Rescue’s Avalanche Commission, the American Avalanche Association’s ProAvSAR course and with US based SAR teams, federal agencies, and the military. We appreciate all the alpine rescue, snow professionals, and SAR personnel whose expertise, experience, and recommendations have led and will continue to lead to the advancement, adaptation, and adoption of this decision making tool. Together, we endeavor to increase the efficiency, efficacy and impact of the AvGAR for avalanche rescue and recovery missions.

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