

Training and Operations

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Participants in the training panel were concerned before the workshop that the discussions might increase their liability, and several training agencies declined to attend. To allay these worries insofar as possible, discussions by the panel were not recorded. The topics discussed are listed below.

1. Running out of gas

Running out of gas is strongly associated with fatalities due to asphyxia and cerebral arterial gas embolism (CAGE). What might be done regarding equipment, training, diving operations or community development to make insufficient gas less likely?

2. Dive computers

Should entry-level divers be trained to use only dive tables, only dive computers, both tables and computers or either tables or computers?

3. Entanglement and entrapment

Entanglement or entrapment is common in fatalities involving asphyxia. What might be done regarding equipment, training, diving operations or community development to reduce the occurrence of entanglement or entrapment?

4. Overtraining

Running out of gas, emergency ascent, entanglement, equipment trouble, buoyancy trouble and rough water were risk factors associated with injuries leading to death. These occurred despite training. Might “overtraining” (excess skill repetition during training to make skills automatic/instinctive in emergencies) during initial training be applied to some skills to reduce the occurrence of the risk factors listed above?

5. Deepest training dive

Should a dive instructor perform one or two shallow training dives with advanced open-water (AOW) students before the deep dive to allow assessment of skills and comfort in the water?

6. Refresher training

Diving inactivity reduces skills performance. Is there a minimal level of diving activity that should be maintained before a skills-refresher review or check-out dive is desirable? Might instructor refresher training be useful?

7. Dive conditions and dive site difficulty

Should dive sites be assigned categories to indicate the level of training, experience, health and physical condition needed for a particular site? (This might be similar to ski run categories: green circle, blue square, black diamond.) Could this put more responsibility on the diver in selecting a particular site? Might regional dive conditions be specified as part of certification levels?

8. Diver competency

Dive accident investigators indicate that diver competency is a frequent problem in diving fatalities. Are codes of safety-related principles (such as the Responsible Diver Program and similar agency efforts) effective? Can effectiveness be tracked?

9. Diving operations manuals

Might diving operations manuals (prepared by individual agencies, DEMA or RSTC) be useful for providing guidance to dive operators (vessels, resorts, shops, dive professionals, etc.) that might reduce the occurrence of risk factors associated with fatalities? ISO 24803 might be a model (see comments below).

10. Dive operators

Should dive operators and dive professionals play a stronger role in reinforcing critical dive skills during pre-dive briefings?

11. Hazards and waiver/releases

How are candidate divers informed about specific hazards that can injure or kill them? What information should be in a release form that certified divers sign before participating in dives conducted by dive operators? Are health questions appropriate?

12. Mishap rate comparison

How do the mishap rates for “resort experience” programs compare with those for open water certification courses? Might age (young or old) be a contributing factor?

13. Training statistics

Might training agencies submit their annual training statistics to an unbiased third party for analysis and reporting in total and without attribution?

14. Quality control

What are the key factors in dive instructor and dive leader quality-control systems for maintaining instructor skills and performance?

15. Instructor retention

How long (assuming a moderate teaching load) does a dive instructor need to work before gaining the experience to handle a wide range of students? Do instructors receive adequate motivation to encourage them to continue teaching for long enough to ensure that most active instructors have achieved an optimal level of experience?

16. Diver health and fitness assessment

Is it feasible to assess certified divers for health and fitness before diving operations commence?

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Editorial Summary of the Training and Operations Consensus Discussion

Workshop participants were encouraged to base their comments on evidence rather than opinion, and a few unsupported opinions led to sharp exchanges. The points made were often useful, but the tone was not, so an editorial summary is provided below rather than the verbatim transcript.

- Apparent causes associated with diving fatalities have not changed over time in remembered history or available data. Causes include running out of gas, uncontrolled ascent, entanglement or entrapment, buoyancy trouble, buddy separation and lack of common sense. The training objectives divers are taught by the industry were agreed to be sensible, and data for training dives suggested greater safety than for dives after training, but divers who died often did not follow their lessons. Equipment was sometimes misused because accepted procedures were forgotten, weren't learned in the first place or the equipment had shortcomings. Reasons and solutions suggested for the problems are listed below.
- Longer training courses with more dives are needed. This was disputed, but evidence to settle the issue wasn't available.
- Skills refreshers were widely considered to be important. Methods for refreshing skills included check-out dives, buoyancy-control practice, alternate-air-source practice and briefings to emphasize avoiding buddy separation. Discussion of requalification for certified divers who had not dived in some time was unproductive.
- Entanglement could be prevented by carrying a cutting device. Entrapment could be prevented by avoiding overhead environments unless properly trained.
- Low-air and dive-computer alarms with triple redundancy (visual, vibration and audio) were suggested, but another opinion indicated that alarms rarely prevent problems.
- Instructors should be better role models for students and avoid setting bad examples. Certification cards were sometimes issued to inadequately prepared students. No supporting data were offered, and these opinions were disputed.
- As decompression table use is now rare, more training with dive computers was suggested.
- Instructors were encouraged to pre-assess their students for readiness prior to a deep dive in advanced courses.
- Individuals who dive infrequently after training may not retain their skills and may be at greater risk of dying, particularly in the first 20 dives after training. This opinion was offered without evidence. Dr. David Colvard reported surveys that indicated the number of dives made in the past 12 months was not a factor in panic (Colvard, 2003).
- Fatalities were sometimes associated with dive sites that were beyond the diver's training, experience and physical capability, particularly when an individual continued diving after a significant change in health. Discussion indicated that divers must make their own decisions about whether a given site was appropriate for them, but these decisions would be assisted if information on specific dive site challenges were available.

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- Suggestions for reducing poor judgment included emphasizing diving hazards and establishing a “safety culture” that used peer pressure to promote common sense and safe behaviors. Industry-wide information programs for the diving public were suggested, perhaps could be disseminated by the Recreational Scuba Training Committee (RSTC).
- Training agencies were encouraged to assemble statistics for investigation of diver and instructor erosion and to cooperate in developing diver population estimates. Periodic review of fatality data was suggested for investigating diver experience including the number of dives by individuals, the years diving and the interval since the most recent dive.
- The U.S. Underwater Diving Fatality Reports (McAniff, URI) are available for download on Rubicon (www.rubicon-foundation.org). The original data are stored at DAN America.
- Dive operators and trainers were encouraged to be familiar with ISO 24803, “Recreational diving services — requirements for recreational scuba diving service providers” (see www.iso.org). This document covers basic international standards for training and education, dive guiding and equipment rental.
- Diving fatality investigations need improvement to provide better data for understanding underlying causes. A course for first responders in diving fatality investigation might prepare more knowledgeable investigators. Central collection of fatality case data by each country was recommended with periodic data pooling and analysis.
- The U.S. Coast Guard (USCG) is developing an investigation checklist. Checklist distribution might be managed through USCG sectors who know the local diving and emergency response communities. Turnover of USCG personnel can make continuity difficult. Coordination with USCG Sector 545, Washington HQ, would be helpful as they receive data collected by regional sectors.

References

Colvard, DF and Colvard LY. A Study of Panic in Recreational Divers. *The Undersea Journal*, First quarter 2003, pp. 40-44.

“Diving fatality investigations need improvement to provide better data for understanding underlying causes.”