

ORM Might Have

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It's again time to touch upon operational risk management (ORM). As a reminder, ORM is a formal way of using common sense and leadership skills to plan and execute any operation. Although ORM cannot and does not prevent all mishaps, its use every time we plan an evolution ensures that we consider the risks and consequences. ORM doesn't stop you from doing an operation; it just makes you stop, think, and plan before you do it.

In this article, we're going to see how operational risk management might have prevented a diving mishap.

The scenario:

The victim, a 36-year-old diving officer, arrived at the explosive ordnance disposal mobile unit early in the morning after flying for five hours from his permanent duty station. He was sent for temporary additional duty from his non-diving command so he could perform his dive requalification. He checked into his quarters, slept for four hours, then reported to the mobile unit's dive locker. Upon arrival, he found the dive team already assembled, equipment issued, and pre-dive checklists completed. The diving supervisor asked him if he was uneasy about diving to 120 feet after eight months of not diving. He said, "No, I'm ready to dive."

By the time they arrived at the dive site, it was early afternoon. The boat was moored to an existing float marking a shipwreck. The diver and his dive buddy entered the water, descended to the wreck, and, after a four-minute bottom time, began their ascent. Four minutes later, both divers surfaced, reported OK, and swam to the boat.

The victim had some trouble getting into the boat. Once in, the supervisor asked, "Are you all right?" He replied he was but then slipped to one knee. The

supervisor, sensing something was wrong, had him sit on the side of the boat. He insisted he was fine. Suddenly, his chin sank to his chest. His blank stare and apparent weakness confirmed to the supervisor and his dive buddy that something was wrong. The supervisor's initial diagnosis was arterial gas embolism (AGE).

The supervisor laid him on deck, administered oxygen, and unsuccessfully tried to contact the mobile unit via radio in an attempt to have the duty recompression-chamber personnel standing by. The dive team got the boat underway and headed for shore, arriving within a few minutes. Still having no radio comms with the chamber, the diving supervisor sent a member of the dive team ahead to inform the chamber crew and to find transportation.

Eighteen minutes after surfacing from the dive, the diver was finally in the chamber and on his way down to initial-treatment depth. Treatment went well at first, but, after 30 minutes, the inside tender reported the diver had tingling and decreased sensation in his lower limbs. The diver then stated he had not reported that he had felt some tingling upon ascent during the dive.

After several hours, the tingling and decreased sensation worsened, and he got weaker. His pulse and respiration rates were dropping, and medical authorities sensed the onset of cardiac arrest. After

e Saved a Diver

Navy photo by PH1 David M. Tilton

more than 49 hours of recompression treatment, the crew brought the chamber to the surface. The diver had no blood pressure and was in sinus tachycardia (fast heart beat).

After the ambulance arrived, his pulse and blood pressure stabilized. Upon reaching the hospital, his temperature was 106.9, his pulse was 158, and his blood pressure was 98/25. He immediately was admitted to the intensive care unit where further treatment was started. He did not improve, and, 10 days after the dive, he died of multiple arterial gas emboli with re-perfusion injury and hyperthermia.

How ORM could have helped:

If they had applied the five steps of ORM during the planning for this dive, the mishap might not have occurred. ORM's first step is to identify hazards. This is actually a two-part task. First, make a list of your operation's major steps, then list the hazards and associated causes for each step of the operation. Here are some of the hazards and causes.

- Infrequent diving can result in abnormal physiological stresses and lack of familiarity with diving procedures.
- Inadequate or no sleep can result in improper decisions.
- The absence of an environmental package in the recompression chamber can cause unacceptable temperatures for patient care.
- The lack of a thermometer in the medical kit prevents inside tenders from taking core temperatures of patients.

After identifying hazards, prioritize them based upon the severity and chance of occurring—this is the second step in the ORM process. The easiest

thing to do is ask, "What possible hazards are likely to occur first?" Continue the list of hazards down to the least probable.

In our scenario, the probability of the victim having a problem was increased due to his lack of sleep and inactivity. The lack of an environmental package in the chamber caused temperatures to exceed the recommended values for the *U.S. Navy Diving Manual* treatment tables 4 and 7. This made it essential to have a method of checking the victim's temperature, yet there was no thermometer in the medical kit.

Step three in ORM is to make risk decisions. With your prioritized list, determine if the benefits outweigh the risks. If they do, keep moving down your list of hazards. If the risk is unacceptable (such as death or permanent disability), notify your chain of command and determine whether the task is necessary. If in doubt, use controls to tip the scale toward safety. Granted, any dive can result in a loss of life or severe injury, however, we can decrease the risk, depending upon the task, the environment, and the experience of the personnel.

For this mishap, the use of ORM's third step could have made a big difference. For example:

- *Should the officer dive after flying in the same day? Should he go to 120 feet after not diving for eight months?* The answers should have been "no." This was just a re-qual dive—there was no pressure to conduct the dive. It was an unnecessary risk. The diver should have been given more time to get adequate rest. Some work-up dives in shallower depths would not have been a bad idea, either.
- *Should the chamber be used without an environmental package? Should it be used without a thermometer to monitor core temps?*

Again, a big “no” to both questions. Using the chamber without an environmental package (the mobile unit had requested the environmental package, but the request was denied) was a necessary risk, but to do so without the means to monitor core temps or treat hyperthermia was an unnecessary risk. Since the hazard of high chamber temperatures had been identified, it was imperative that the rectal thermom-

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eter be in the medical kit.

The next step of ORM is to implement controls. Once the causes of your hazards have been identified, it will be much easier to select controls. These include engineering controls (tagout), administrative controls (checklists, instructions, training), and personal protective equipment (wetsuits). Analyzing our mishap, we found some of the controls that could have been used:

- Require work-up dives before a deep dive. Observe the diver during work-up dives to assess whether he or she is ready to make deeper dives. Review procedures and give detailed dive briefs. Make divers prove they are physically and mentally ready.

- Start training later in the day to allow the diver more sleep. Knock off the first day’s training early enough to ensure plenty of time to rest.
- Review a diver’s medical record and dive log to verify qualifications, especially if the diver hasn’t been in the water recently.
- Inspect the contents of medical kits to ensure all components are present.

- Have enough ice and chilled IV fluid on hand.

The last step is supervision. Supervisors must be aware of all that is happening on the dive station. Make sure the controls you and your divers have

implemented are, in fact, working as planned. Finally, keep alert for changes or new problems that might arise. When something changes, stop and reassess the operation before proceeding. Don’t let new hazards creep into the picture. Stay alert and try to predict the next problem.

Again, the use of operational risk management might not have prevented this fatality. Sometimes things go wrong no matter how much you plan and prepare. However, by using ORM in our daily planning, the number of mishaps will go down because we have incorporated safety into our planning from the start. ☺

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