

Providing Oxygen for Scuba Diving Injuries:

It Could Be You Who Needs to Know

The Event

Fielding DAN emergency calls has always been an interesting and rewarding experience for me. One day a couple of years ago when I was on call, my pager sounded. I called the Duke University Medical Center operator: "I have a DAN emergency call for you," she said.

She relayed the caller's information and then connected me to the caller, a woman who sounded very upset. She told me her story:

"I think we just had a diving accident," she began. "We're OK right now, but I'm afraid we might not be OK very soon.

"We just got out of the water; we're both still in our wetsuits. I am an Instructor, diving with a friend who is a divemaster. We had planned to make a deep decompression dive. We both were wearing doubles with ponies (two air tanks and a smaller additional tank), each with its own regulator," she said. "We went to depth and had no problems.

"Our ascent was fine until, at 50 feet (15 meters), my buddy noticed he was low on air from the first tank. He switched to what he thought was his second tank, not realizing that he had actually switched to his pony. Within a few minutes after the switch, he ran out of air. He began to panic and came



to me. We began to buddy breathe and went straight to the surface (still buddy breathing), omitting all of our planned decompression. What should we do?"

Oxygen First Aid

I asked the caller if she or her buddy were experiencing any possible signs or symptoms of decompression illness (DCI). Fortunately, they were both asymptomatic. Then I asked her if they had any oxygen on board. She hesitated and said, "Well, sort of. I'm embarrassed to say that I threw in the oxygen kit as an afterthought. I never thought we would actually need it — especially for myself.

"The problem is," she continued, "neither of us knows how to use it. We had planned to take the DAN oxygen course but just haven't had the time yet."

I asked her if she or someone else would be willing to be "talked through" setting up the DAN oxygen unit. She was still in her wetsuit, so she gave the phone to her buddy, who had changed out of his wetsuit into dry clothes. He said he would try to assemble the unit, using the directions I gave him over the telephone. I described how to set up the unit.

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"What does the case look like?" I began. "Describe it to me."

"It's a green plastic case with a DAN logo on it," he said.

As the minutes passed, I successfully explained how to set up the unit to deliver oxygen to them both. After they had received oxygen, they headed to a hyperbaric chamber, a little more than an hour away. By the time they got to the chamber, the man still showed no signs or symptoms of DCI, but the woman had developed some pain in her right wrist, shoulder and hip, with numbness and tingling in her right hand and foot.

The Chamber

In the recompression chamber, both divers were treated with a U.S. Navy Treatment Table 6 (lasting 4 hours, 45 minutes). Because the dive exposure was significant enough to produce symptoms in one of the divers, the man was treated prophylactically at the same time as his buddy, even though he had no symptoms at the time.

After treatment, the injured diver's symptoms resolved completely; the man remained free of symptoms.

The Discussion

In this case, both divers were fortunate they did not have more severe problems. Although they skipped their stop, they made a successful buddy breathing ascent, they had oxygen, and they had a phone that they used to call DAN.

Would they have experienced more severe symptoms without the oxygen? We don't know the answer, but you can be sure the divers were glad they didn't have to find out.

In the unlikely event of a scuba diving injury, providing a high percentage of oxygen is the single most important first aid measure. Because the bubbles causing symptoms are either nitrogen or air (which is 78 percent nitrogen), when the injured diver breathes a gas with no nitrogen, it will create a large pressure differential between the breathing gas, the blood and the bubbles. This can speed up the

elimination of nitrogen from the body, and it may reduce the formation of more bubbles, reduce the size of existing bubbles and possibly eliminate some of them.

Oxygen is the obvious choice for such a breathing gas: it helps treat any hypoxia, an inadequate oxygen supply to the body tissues, and it may reduce edema or swelling, which can accompany DCI. When divers are treated in a hyperbaric chamber, their treatment tables will be typically set at a depth of 60 feet (18 meters), and they will alternate between breathing 100 percent oxygen and breathing air during the duration of their treatment: the divers are, in effect, receiving the equivalent of 280 percent oxygen. This creates an even greater pressure differential that can remove bubbles even more quickly.

Train For It

In an emergency, just having oxygen available is not enough: you have to know how to use it. Training is easy, fun and readily available. Many oxygen programs are available, including the Divers Alert Network "Oxygen First Aid for Scuba Diving Injuries" course. Other courses geared toward divers include those offered by NAUI / NASAR, by Lifeguard Systems Inc. and by individuals with instructor-designed specialties with affiliations with the scuba training agencies. General, non-diving courses in providing oxygen are available from the National Safety Council, the American Red Cross, SOS Technologies and American Health and Safety Institute.

One of the primary goals of DAN is to have oxygen and someone trained in its use at every dive site and on every dive boat. To address this need, DAN, with the help of its supporters, developed the "Oxygen First Aid for Scuba Diving Injuries" course. The course typically lasts four hours, with one hour of lecture and video or slides and three hours of hands-on, practical work with the equipment.

Divers learn how to assemble and disassemble the equipment and how to provide oxygen to one and two injured divers, both breathing and non-breathing, using various methods. Times for the course may

vary with the Instructor and the number of students. DAN Training regularly surveys the satisfaction level of the students: scores hold consistently at >9.4 on a 1-10 scale on overall satisfaction for the course and >4.6 on "confidence in providing oxygen to an injured scuba diver."

The DAN course is probably the most commonly available for divers. DAN has more than 1,200 Instructors worldwide: the program has been taught in more than 90 countries and on all seven continents, including Antarctica.

Become an Oxygen Instructor

If you're interested in training to become an oxygen instructor: it's almost as easy and as much fun as becoming an oxygen provider. A candidate for the DAN Oxygen Instructor Qualification Course (IQC), for example, must be:

- an active-status (approved to teach) scuba Instructor;
- a current DAN Oxygen Provider;
- and**
- currently certified in CPR.

The IQC lasts eight to 12 hours, and it covers the DAN Oxygen Provider course, critiqued teaching scenarios and administrative information. It also includes Instructor manuals, teaching videos and other support material. If the Instructor-Trainer (IT) has trained in the use of the DAN REMO₂ (Remote Emergency Medical Oxygen) system, the course may include this information as well. Call DAN Training for information on the REMO₂.

DAN offers the DAN Oxygen course and IQC equally to divers and Instructors of all the training agencies. For example, if you are a YMCA Instructor and a DAN Oxygen Instructor, you may train and certify divers in Oxygen First Aid from any agency. If you are a YMCA IT and a DAN IT, you may train and certify Instructors of any agency to become DAN Oxygen Instructors.

Becoming a DAN Oxygen Instructor-Trainer is not difficult, although the opportunity presents itself less often. DAN has more than 950 ITs who can teach the IQC, but only DAN Training staff can

teach Instructor-Trainer Workshops. DAN Oxygen ITWs are held annually at DEMA and by request of the training agencies or occasionally by request of a group of qualified individuals.

To participate in the DAN Oxygen ITW, a participant must be:

- An active-status Instructor-Trainer or Course Director (depending upon the agency).
- A current DAN member
- Currently CPR-certified.

The ITW lasts two full days, and includes a "role model" Provider course and IQC, critiqued teaching, critiquing scenarios, administrative information, Instructor and IT manuals, videos and support materials.

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ABOUT THE AUTHOR

Kimberley Walker has worked at Divers Alert Network in Durham, N.C., since 1993. She spent the first two years in the Medical Department, and, since 1995, Walker has worked in DAN Training. She has been scuba diving since 1979, a scuba Instructor since 1985, and is a DAN Oxygen Instructor-Examiner. She is also a Paramedic and EMS Instructor.

Tank Up!

Remember, just having oxygen is not enough — someone who has been trained in its use must also be present. Any diver at any time, no matter the level of certification, may need emergency oxygen first aid. It may even be you!

TAKE A COURSE

If you are interested in any of the programs mentioned, please call DAN or any of the certification agencies who have oxygen courses.

To contact DAN, call +1-800-446-2671 ext. 555, fax +1-919-490-6630, or email: oxygen@DiversAlertNetwork.org.