

Planning a Dive Trip?

Some considerations for travelling divers and the dive operators offering services to divers



David Bryant Photo

Case Report

The victim was an apparently healthy 28-year-old woman, who was on vacation in a Pacific Island. She was a relatively inexperienced diver, having logged 20 dives since her certification five years earlier. She had done four dives in the previous year, the last one approximately two months before.

On this occasion, she booked to do two dives with a local dive operator. She hired all diving equipment from the operator and was provided with a wetsuit, which was described by her and others as too tight.

On the boat there were nine charter divers, including the victim, as well as two dive guides, the skipper and a non-diver.

The first dive was on a wreck in a depth of approximately 24 msw. The water was calm, visibility described as good, and there was very little current. During this dive, the victim had difficulty descending as she was too buoyant and was then given another two weights which she put in the pockets of her BCD. She then descended and completed the dive with the group.

After surfacing, she described having difficulty breathing from her equipment, although when she checked this post-dive, it seemed to be functioning properly so she did nothing further about this. The group spent about an hour's surface interval on a nearby island, during which the victim appeared happy and well, before going to the next dive site.

There was a very strong current at this site and the sea had become choppy. In what was described as a scant dive brief, the skipper advised the divers to descend quickly and stay together. The suggested dive plan was a maximum depth of 24 msw for a dive time of 60 minutes.

BY JOHN LIPPMANN

(with contributions from Stan Bugg)

Before the dive the victim seemed to have had difficulty differentiating between her depth gauge and contents gauge but this was explained to her by the skipper, and then again by another diver, when she still hadn't understood.

The victim initially appeared to be entering the water without her mask on but when this was pointed out to her by another diver (not the skipper or a guide), she put it on. She did not have an allocated buddy, nor did some of the other divers.

The divers descended into what was later described as a "ripping" current that even the experienced divers found difficult to cope with. Visibility was variously reported as 6-15 metres but the group became immediately separated due to the current.

Many of the divers, who were more experienced than the victim, soon returned to the boat as they had used their air quickly in the strong current. The victim's boyfriend and some divers on the boat became concerned when she failed to surface. She had last been seen swimming alone near the mooring line at a depth of 5 to 7 msw with one of the guides following behind her.

After a while, both the guides came aboard, leaving several divers in the water, including the victim. They changed cylinders and re-descended, presumably to search for the victim.

Possibly five minutes later, a guide surfaced holding the victim, who, by now had been underwater for around 50 minutes. She was limp, unconscious, her face was blue and froth was coming from her mouth. Her cylinder was empty and her depth gauge, which had been re-set by another diver before the dive, showed a maximum depth of 24 msw. She was brought back to the surface an estimated 17 minutes after she was last seen alive.

She was brought aboard the boat, confirmed to be unconscious and not breathing, and some of the divers promptly began CPR, while the guide and skipper watched on. Despite regurgitated water and froth coming from the mouth, CPR was continued and, after a while, the victim regained a more normal colour, although she did not re-commence breathing. When one of the guides was asked to help, it was apparent that he did not know what to do. (It later became apparent that the other guide was also unable to assist effectively.)

There was a further delay while the other divers in the water were being located and then picked up. There had been no recall system discussed or used, so the divers still in the water had no idea that there was an emergency. They had been left free-floating out of sight of the boat and were relieved to have been located. The dive guide appeared to have had no safety sausage to deploy, or audible alert. Fortunately one of the divers had an audible alert to attract attention.

When the remaining divers were picked up, one took over chest compressions while the other tried to assemble the oxygen equipment, which was described as filthy and totally disassembled. The cylinder was found to be nearly empty (i.e. the needle was already in the red section of the gauge). Despite this, the passengers valiantly continued CPR and attempted oxygen administration.

CPR was continued en-route to shore, which reportedly took 30 minutes. On arrival, the group was met by a taxi van which had been called to take the victim to hospital as no ambulance was available. Because the van was unsuitable for transporting the victim to hospital while continuing CPR, the victim's companions managed to obtain

a station wagon and continued CPR during the 10-minute trip to the very basic local hospital (clinic). The clinic was unprepared for their arrival, and the doctor arrived some five minutes later. Within about 20 minutes, the victim was pronounced dead after limited efforts were made by the medical staff to resuscitate her.

This report was constructed from information provided by five people on the trip and checked by them. The dive operator declined to provide input.

Lessons we can all learn

This tragic case highlights some problems that can potentially be encountered when diving, especially in places more remote from close professional scrutiny, and from good quality emergency services and medical facilities.

Planning a dive trip: What to look for in an operator

If you are planning a dive trip, it is a good idea to check well in advance that the dive operator you plan to dive with is focused on diving safety and has taken appropriate steps to enhance the safety of its customers. There can be a large divergence between the preparedness of various dive operators, especially in some of the more remote dive locations.

Even though a dive operator or its staff may have purchased suitable safety equipment and had some appropriate accident management training, this does not necessarily guarantee that the equipment is fully functional when needed, or that the training skills are current. However, it is a good start!

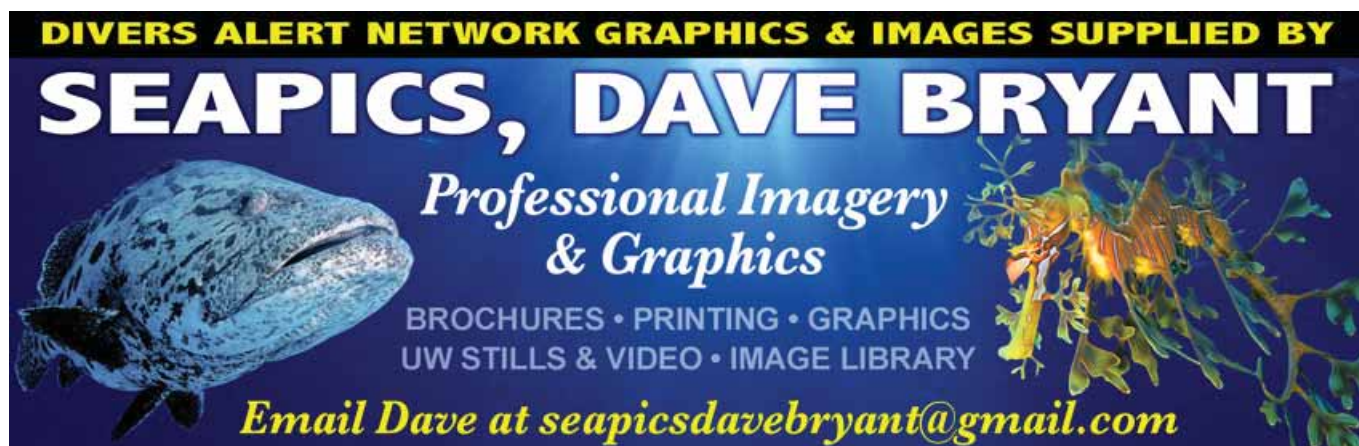
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Medical facilities in remote locations

Divers should also be aware that the medical facilities in developing countries are often relatively basic and this generally becomes increasingly the case the more remote the location. For this reason, it is important to dive more cautiously and conservatively as there can be considerable delays before evacuation to a suitable facility, often distant and possibly in another country, can be achieved. It is also important to call a DAN Hotline as soon as possible if any symptoms develop after a dive.

Prompt, appropriate and sufficient delivery of oxygen first aid can sometimes reduce or even clear some symptoms of decompression illness (DCI) but this should be done under appropriate diving medical guidance.

A shared responsibility

Safe diving is a shared responsibility between the diver and, to some extent, the dive operator with whom he or she dives.

The diver needs to refrain from diving if concerned that the conditions are beyond their capabilities, or if they are not feeling well enough, or comfortable enough, to dive. Diving medical health and fitness is an essential part of safe diving and divers should regularly monitor their health and fitness. The diving environment can be stressful, both physically and mentally, and is relatively unforgiving. For example, a person who becomes unconscious on land may often be managed successfully, depending on the circumstances, whereas a diver who becomes unconscious in the water is at a high risk of drowning. Divers also need to follow appropriate advice from the operator and conduct their dives in a manner that is likely to ensure their safety.

However, divers often need to rely on the dive operator to provide important information about the dive sites and conditions. In addition, divers are often reliant on the functionality and safety of certain



equipment provided by the operator, the purity of the breathing gas supplied, and safe and suitable transport to and from the sites.

Safe diving is a shared responsibility between the diver and, to some extent, the dive operator with whom he or she dives.

The operator is also expected to provide its services in a professional manner that should not endanger the diver. This includes having systems to reduce the chances of divers being unknowingly put into dangerous situations that could well have been foreseen by the operator with their local knowledge. This could include areas with treacherous down-currents and circumstances where the divers could be left at sea after the dive, among other things.

The dive operator also has an obligation to provide ready access to suitable oxygen first aid equipment and an appropriate oxygen supply, as well as someone at the dive site who is trained and competent in its use.

Considerations for divers and dive operators

Below are some points to consider for both divers and dive operators alike:

- **Is the dive operator affiliated with a reputable dive training organisation?**

Such affiliations can provide some level of overview of the services provided. However, this cannot guarantee the safety of an operator as it is difficult for agencies to monitor operations, especially in distant places.

- **Is the quality of the breathing gas supplied acceptable?**

This issue is often overlooked. There have been some serious accidents, some fatal, as a result of contaminated breathing gas.

In developed countries, there are often stringent standards and testing requirements. However, this is not the case in some developing countries where such requirements do not exist. This can be an expensive exercise but not impossible for the operators to do. It is an important safety measure and should be done.

- **What is the condition of the diving cylinders and valves?**

Are these cylinders 'in test'? How often are they hydrostatically tested? The recommended test period varies between countries, from about one to five years. Visual inspections for corrosion and cracking are required more frequently. On rare occasions, cylinders have exploded and have killed or maimed nearby persons.

Are the cylinder valves in good condition? Do they operate smoothly and are they free of leaks?

- **What is the condition of the hire regulators, BCDs, wetsuits, masks, snorkels, boots and fins?**

Are they well-maintained and functioning properly? Are they appropriately cleaned and sterilised between uses?

Infections can occasionally be transferred between users of such equipment and it should therefore be cleaned and sterilised using appropriate procedures after each use.

- **Do they have appropriate oxygen equipment and is the staff adequately trained to provide oxygen first aid.**

Appropriate oxygen equipment should be capable of supplying near-100% oxygen to a breathing diver by both a demand valve and a *high concentration* constant flow mask (e.g. non-rebreather mask). It should also be capable of supplying at least 50% oxygen to a non-breathing diver.

Can the oxygen delivery system provide oxygen to more than one diver at a time?

- **Is this oxygen available at the dive site?**

It is important that oxygen equipment and a trained oxygen provider are available where the diving is taking place. This often means on the dive boat. In a serious case of decompression illness (e.g. an arterial gas embolism), it is

important that the victim begins breathing high concentration oxygen as soon as possible.

- **Do they have a sufficient oxygen supply?**

This needs to provide near-100% oxygen to a diver or divers for the likely period required before an evacuation team arrives. In some places, this means a supply that will last more than 24 hours of constant oxygen administration.

- **Do they have appropriately trained and competent staff to provide oxygen and other first aid if required?**

There should be staff available who is trained and currently competent in oxygen provision, basic first aid and CPR. It is not enough to simply have had basic training. The staff must practice to maintain familiarity and competency in these skills. This is more essential in remote locations without prompt access to good medical care. DAN offers appropriate training, often at a higher level than many others.

- **Do they have an appropriate protocol in the event of an accident?**

This should include a prompt call to a **DAN hotline** for advice, provision of basic life support and first aid, and knowledge of the local medical centres and suitable chambers.

Be aware that most medical personnel have little or no knowledge of diving medicine, and may therefore find it very difficult to diagnose and provide correct management for some potentially serious diving injuries. By calling a DAN hotline, expert diving medical advice is accessible 24 hours a day for a diving emergency.

- **Is there an effective and reliable means of communication between the boat and the land base and/or emergency services and/or DAN?**

This is important anywhere, but especially important when distant from land.

- **Do they provide adequate, clean drinking water on the dive boat?**

Adequate hydration is important to reduce the potential risk of DCI, as well as conditions such as heat exhaustion, a common potential problem in warm climates. Divers should be actively encouraged to hydrate sufficiently. Clear or nearly-clear urine can provide a rough indication of adequate hydration.

- **Does the boat have sun protection?**

This is important in warmer climates and even more important if the dive sites are distant from the base.

- **Does the dive boat have suitable, easily accessible and safe entry and exit points for divers?**

Divers can easily be injured entering the water if the entry point(s) are not suitable. Exertion on exiting the water should be minimised to avoid precipitating DCI or cardiac stress after the dive.

- **Are decompression arrangements suitable for the type of diving?**

Such arrangements should allow comfortable decompression for a group of divers and should be appropriate to the level of difficulty of the dives, the number of divers, and the decompression obligations that might be expected.

If compulsory decompression is expected, a more complex system will be required which may need to incorporate decompression stations at multiple depths.

- **What is the level of underwater supervision provided/required?**

Travelling divers have a widely varying range of expectations when it comes to being led underwater. Some prefer to be left alone, while others prefer to have the dive closely monitored by the dive guide. It is helpful to know if the dive operator's procedures will match the needs and expectations of your group.

- *Is a dive plan imposed and enforced by the diver leader(s)?*
- *Is the supervision close or remote?*
- *Is there any underwater supervision?*
- *Does the customer have sole responsibility for their planning and implementation?*

If the latter, it is essential to obtain prior knowledge of local conditions and to ensure that divers have adequate experience for this.

Enjoy your diving but be responsible and prepared

The above suggestions are just some of the factors to be considered in an effort to enhance the safety of diving in remote locations. However, most apply equally to routine diving circumstances.

Diving is a wonderful and rewarding activity and is relatively safe as long as the diver is sufficiently healthy, well-prepared, and due care is taken

by those involved. However, accidents do happen, sometimes with tragic results. Some are unavoidable while others are preventable.

When accidents do happen it is essential to have suitable management strategies in place, especially when remote from high-level medical care. Although sometimes a poor outcome is inevitable, on many occasions injury can be minimised, and death avoided, by swift and appropriate action.



Does your Oxygen Equipment Need Servicing? Do you need some oxygen equipment?

Most oxygen first aid equipment needs to be inspected and serviced at least every two years to ensure that it is properly functional.

DAN AP doesn't service oxygen equipment in-house, but we do pass it on to an appropriately licensed service agent who is experienced in servicing this medical oxygen equipment.

Now is also a good time to buy new oxygen equipment as the prices have been temporarily reduced. See pages 26-27 in the catalogue and contact sales@danasiapacific.org.

DAN AP will also be selling some of its used oxygen training equipment. Expressions of interest can be sent to training@danasiapacific.org.

Why not take your own oxygen mask on your dive trip?

In our experience, even though the majority of dive operators now have oxygen equipment of some type, this may not include suitable high concentration oxygen masks.

Sometimes, even if these masks are available, they have been pre-used and are no longer hygienic as they are designed for a single use only.

A non-rebreather mask is a cheap and effective high concentration oxygen mask that. When used with an oxygen flowrate of 15 lpm, it can deliver an inspired oxygen concentration of around 70-95%.

As the mask only cost about A\$7 each (plus post) and can easily be packed



with clothes or dive gear, DAN AP believes divers should consider taking their own mask on their dive trip, just in case it is needed.

See our catalogue to order (p27).