

# The diving doctor's diary

## Treatment of psychological injury after a scuba-diving fatality

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### Key words

Diving deaths, scuba diving, psychology, instruction – diving, occupational health, trauma and stress, case reports

### Abstract

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After the death of a student during an ocean scuba-training dive, the student's diving instructor was suffering from acute stress disorder, a post-traumatic stress reaction. The treatment of the instructor's distress using a combination of two recognised trauma therapies – eye movement desensitization and reprocessing, and cognitive-behaviour therapy – is described. Improvement was noted after four treatment sessions. The instructor reported further improvement at a two-month follow up and the positive effects were maintained nineteen months later.

### Introduction

Death and injury are a risk for recreational scuba divers. For instance, in British Columbia, Canada, the estimated incidence is 2.05 per 100,000 dives for fatalities and 9.57 per 100,000 dives for decompression illness (DCI).<sup>1</sup> Physical injuries can have a psychological impact on divers and the death of a diver can result in psychological injury to the survivors. However, psychological injury related to diving is a subject that is not well documented. Much of the psychological research related to diving risks has focused on anxiety and panic behaviour.<sup>2,3</sup> A handful of studies have examined the effectiveness of relaxation methods and mental skills training for dive anxiety especially in novice scuba students.<sup>4,5</sup> There has been limited investigation of the impact of scuba diving on neuropsychological functioning and neuropsychological impairment following DCI injury.<sup>6,7</sup> The only published reports on the psychological treatment of dive injury are a series of case studies of DCI-injured technical divers from the north-eastern United States of America.<sup>8,9</sup> The present report describes the psychological treatment of an instructor for a post-traumatic stress reaction following the death of her student while on a training dive.

### Case report

#### BACKGROUND

A drysuit specialty course student died during an ocean-training dive in British Columbia, Canada. Within hours of the fatality, a police recovery team member recommended the student's diving instructor seek counselling and a fellow instructor made the referral. The student's instructor was female, thirty-seven years old, had been diving for five years and had been an instructor for four years. She had logged approximately 400 dives with 200 hours of bottom time.

She had no previous psychiatric, alcohol abuse or other drug abuse history and was not taking any prescribed medication. There was no history of non-diving-related traumatic events other than the death of her father five years earlier.

Approximately four months prior to the fatality, she was the instructor on an open water course ocean-training dive in which one of her students nearly drowned and was air evacuated to hospital. Her conduct relating to the near drowning had been reviewed by her certification agency and she had been cleared to return to work.

#### INCIDENT

The death occurred on the first ocean-training dive of the course. The student was a certified advanced diver and had logged 37 dives, but it was her first cold water dive. The instructor lost contact with her while at depth (approximately 12 metres' sea water) with visibility of two metres. After a brief underwater search the instructor surfaced in a light chop and could see no sign of bubbles. She did a second search then went to shore and called rescue services. The police recovery team found the student diver's body on the bottom very close to where she was last seen. Subsequent investigation by the provincial coroner's office found the cause of death to be drowning secondary to an arterial air embolism that occurred during a rapid ascent.

#### TREATMENT

Initial consultation with the instructor was five days following the student diver's death. She was finding it difficult to eat and "hard to focus on tasks". She was "getting upset easily" (i.e., angry) and found herself "getting emotional" (i.e., crying) unexpectedly. She was isolating herself from other staff, having pictures from the incident "pop into my mind" throughout the day and dreaming about the fatal dive. Her

symptoms were consistent with a diagnosis of acute stress disorder (DSM IV 308.3).<sup>10</sup>

The events of the near-drowning incident and the fatality were reviewed. She was given information on post-traumatic stress reactions and a pamphlet on stress reactions that can occur after a dive incident. Self-care guidelines were outlined, including a review of food intake, alcohol use and sleep hygiene. She identified two people in her life she would feel safe talking to about what happened. She was encouraged to contact and talk with them. A brief description was given of what psychological treatment would involve if she wanted further professional help. She decided she would wait and see how she did and initiate contact if she wanted further assistance.

Three weeks later the instructor called to request additional help. She was particularly concerned that she was still having difficulty concentrating at work and avoiding diving. Over the following 15 weeks she had four 1.5-hour sessions of psychological treatment. Treatment consisted of a combination of eye movement desensitization and reprocessing (EMDR) and skill-based, graded exposure cognitive-behaviour therapy (CBT) assignments between sessions.

With EMDR, the beginning or earliest recollection of the traumatic experience is used as the starting point for the desensitization phase of the treatment.<sup>11</sup> The instructor believed she was responsible for the fatality because she had “not done enough” for her student. She held this same belief about herself for the near-drowning incident that had occurred four months prior to the fatal incident. Consequently, the disturbing memory that was used as the starting point for EMDR processing was when she first noticed there was something wrong on the instructional dive in which the near-drowning incident occurred.

Consistent with the procedural steps of EMDR therapy, she was directed to focus on the traumatic experience. She was asked a series of questions that identified what beliefs she held about herself, what emotions and body sensations she was experiencing, and how distressed she was on an 11-point subjective units of distress scale (SUDS) from 0 to 10 (0 = completely calm to 10 = as distressed as possible). She was instructed to notice what she had just reported she was experiencing as she recalled the traumatic event and simply notice what happens while listening to auditory bilateral stimulation through headphones. The stimulation played for approximately 30 seconds, at which point she was encouraged to rest for a moment and report what happened (i.e., thoughts, images, feelings, sensations that occurred during the 30-second set of stimulation). Sets of stimulation are repeated until the client has nothing new to report during the sets and is not experiencing any distress while thinking of the incident. How long this takes varies considerably and is not readily predictable.

By the second treatment session, twelve weeks post fatality, she had been cleared by her certification agency to return to work as an instructor. She was teaching pool sessions and acting as Dive Master on ocean-training dives. She confided she was very tense when in the water and had an episode of “near panic” when a student needed to be taken to shore because of hypothermia. She was afraid of losing contact with the diver. Recollection of the near-drowning incident was still distressing; consequently, EMDR processing of this event was continued. In addition, she was given the first of a series of CBT in-water exercises to practise between sessions. She was instructed to do a shallow dive with a buddy she trusted (i.e., not a student) in a sandy bay and practise diaphragmatic breathing at depth until calm (i.e., low SUDS). Second, she was directed to instruct her buddy not to move. Then she was to turn away from her buddy and repeat diaphragmatic breathing until calm.

At the third treatment session, fifteen weeks post fatality, the EMDR processing continued. She had completed the in-water exercise and was back instructing on ocean-training dives. She noticed that her breathing rate increased rapidly in ‘silt-out’ low visibility conditions. She was instructed to repeat the previous in-water exercise and extend it by purposely kicking up silt. With visibility of near zero, she was to breathe from the diaphragm until calm.

Nineteen weeks post fatality, EMDR processing continued at the fourth and final treatment session. Processing of the near-drowning incident was completed. While recalling the incident, she was calm and self-confident. She had not experienced any further episodes of “near panic”. Other than the assigned in-water exercises, since the fatality she had avoided doing any personal pleasure diving. She was instructed to undertake a favourite local dive with a trusted buddy. Key points of the dive were mentally rehearsed and combined with diaphragmatic breathing. Instruction was given on how to apply this exercise on the dive.

In follow-up interviews two months (28 weeks post fatality) and nineteen months (112 weeks post fatality) after the final treatment session, she was working as a dive instructor without any restrictions. She had not experienced any further episodes of increased air consumption, respiratory distress or near panic.

The Impact of Event Scale – Revised (IES-R) was used to provide a measure of the instructor’s functioning.<sup>12</sup> The IES-R is a short self-report measure of overall distress and three clusters of post-traumatic stress symptoms: avoidance, intrusive experiences and hyperarousal. With reference to the diver fatality, she was asked to rate on a five-point scale how distressing each of twenty-two items was for her (0 = none to 4 = extreme). She completed the instrument at the first interview, the final treatment session (19 weeks) and at follow up 28 and 112 weeks after the fatality (see Table 1). At first interview, her responses indicated elevated levels

**Table 1**  
**Patient's Impact of Event Scores (IES-R)**

Symptom type	Time since fatality			
	5 days	19 weeks	28 weeks	112 weeks
<b>Overall</b>	2.55	1.23	0.23	0.18
<b>Avoidance</b>	2.75	1	0.23	0
<b>Intrusion</b>	3.14	1.43	0.25	0.43
<b>Hyperarousal</b>	1.71	1.29	0	0.14

of disturbance on all scales. At the final treatment session her distress about the fatality was no longer clinically significant. This improvement was maintained for both follow-up interviews.

### Discussion

Post-traumatic stress is characterised as a response to an event that involves actual or threatened death or serious injury.<sup>10</sup> The event can involve a threat to one's own physical integrity, or witnessing or otherwise being involved in such an event. Typically, the focus of care for divers involved in a diving incident has been on their physical injuries. In one of the few published reports of psychological injury related to diving, Hunt described her interviews of three technical divers who had each suffered a case of DCI.<sup>8</sup> Her focus was on the diving-related inner conflicts the divers were experiencing in light of their DCI 'hits'.

In the case presented, the dive instructor was referred for psychological assistance by a colleague after a student died while in her care. However, patient history-taking revealed that four months prior to the fatality another one of the instructor's students had nearly drowned while in her care. Both the fatality and the near drowning meet the DSM-IV diagnostic criteria for an event that is likely to provoke a traumatic stress response (i.e., acute stress disorder and post-traumatic stress disorder); however, the instructor did not seek psychological services after the first incident. It is noteworthy that for both the near drowning and the fatality incidents, neither her employer nor her certification agency offered her psychological assessment or assistance.

A diver can also be involved in a dive incident, escape physical injury, but be psychologically harmed by the experience. In the case described, the instructor sustained psychological injury even though she was not physically harmed in either incident. In a follow-up study of the psychological impact on those involved in dive incidents in the Florida Keys, post-traumatic stress symptoms in both divers and the dive instructors were noted. Provision of psychological services to both the divers involved in an incident and the dive professionals who respond to the incident was advocated.<sup>13</sup>

Both the EMDR approach used in-session and the CBT approach used for the in-ocean assignments

are empirically-based recommended treatments for post-traumatic stress.<sup>14,15</sup> The instructor's response to the treatment was comparable to that reported in outcome studies of EMDR. For instance, in a 15-month follow up of 66 adults who were treated with three 1.5-hour sessions of EMDR, there was a 68% reduction in the mean number of post-traumatic stress symptoms for all participants.<sup>16</sup>

While improvement typically begins rapidly with EMDR, the amount of processing required for an incident to no longer be distressing for the patient can vary considerably. In this case, rather than there being a single trauma, there were two (i.e., the near drowning and the fatality) that were thematically connected for the instructor. In both incidents she felt responsible for what had happened to the students. In the course of tracing her associated thoughts, feelings, body sensations, and images about the near drowning using EMDR, various connections were made spontaneously with the fatality. By the fourth treatment the near-drowning incident was no longer distressing and she was experiencing only a few mild post-traumatic symptoms related to the fatality. The instructor was satisfied with her improvement so she sought no further treatment.

When the instructor reported she experienced dive anxiety and near panic when she returned to ocean diving, CBT exercises that included diaphragmatic breathing were introduced to complement the EMDR treatment. One of the advantages of this approach is that the patient is able to practise in the natural setting where the dive anxiety is experienced (e.g., at depth in the ocean) and the treating psychologist's presence is not required.

Breathing more slowly is frequently advocated as a means of controlling dive anxiety and preventing panic. Breathing and relaxation training have been used successfully to reduce the intensity and frequency of anxiety episodes in patients suffering panic disorder and is a common intervention for anxious divers. For divers it is a way of coping with self-perceived breathing and exertion discomfort.<sup>2</sup> Mental skills practice that included relaxation training has been shown to slow the respiration rate and increase the self-confidence of novice divers performing scuba skills but there is some evidence that, when applied to diving, the positive effects of relaxation training and mental rehearsal are task specific.<sup>4,5</sup>

In my work with divers I have found that dive anxiety following a dive incident is frequently context specific. The anxiety occurs in conditions that share characteristics with the original traumatic incident. The instructor was experiencing anxiety in situations that, by way of the shared characteristics, were reminders of both the near drowning and the fatality. There was a rapid onset of anxiety that included increased air consumption and respiratory distress. The in-ocean breathing exercises used in this case represent the clinical extension of practices that have been used with sub-clinical cases of dive anxiety. The exercises used in

this case followed a graded exposure hierarchy that began with breaking visual contact then purposely creating low visibility 'silt out' conditions. Concurrent with the EMDR in-session treatment, recreating these conditions as part of CBT assignments that included practising diaphragmatic breathing successfully reduced her anxiety and improved her self-confidence.

### Acknowledgement

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The Baromedical Research Foundation has been awarded a substantial research grant from Sechrist Industries, Inc., to study hyperbaric oxygen's radiation sensitisation effects in the treatment of squamous cell carcinomas of the head and neck. It involves both Phase I (dose escalation) and Phase III (randomised and double-blinded) components at four participating centres in the USA, including The Mayo Clinic. Foundation Director Dick Clarke notes "The best treatment for this form of cancer is not presently known. There is clearly room for long-term survival improvement, with tumor hypoxia a limiting factor in its control and eradication. This important award provides the opportunity to fully investigate the potential of hyperbaric oxygen to impact survival".

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