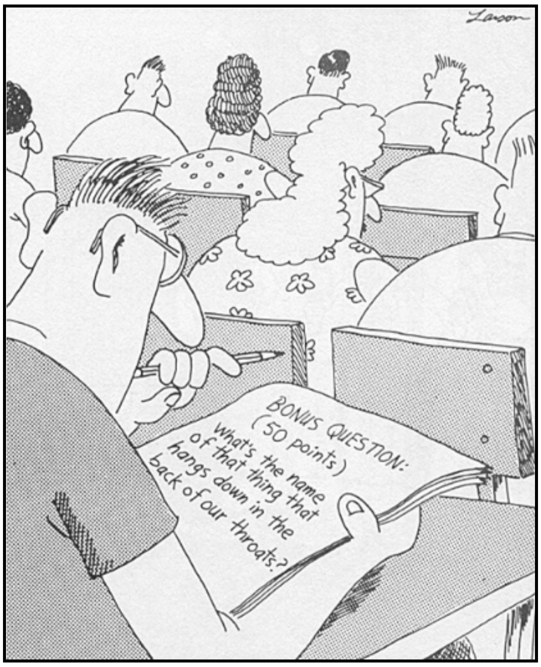
Section 4 — Manage Diving Illnesses and Medical Emergencies



Final page of the ADAS
Dive Supervisor Exam[1]

1 Copyright © The Far Side, Last Impressions, 2002, Larson. (Stolen, amened and used without permission!)

First Edition — December 2003; Revision (0)

REVISED BY: Active Learning Partners (Bronwen Campbell), Ian A. Milliner, and Paul Bulter **DATE & TIME:** 24-Feb-05 10:05
FILE REF: c:\documents and settings\ian milliner\my documents\data-1\milly\adas\text books\supervisor\a-dive supervisor - section 4.doc
ADAS REF: This Section corresponds to Module 6.4, Manage diving illnesses and medical emergencies.

i

CONTENTS

First Edition — December 2003; Revision (0)

REVISED BY: Active Learning Partners (Bronwen Campbell), Ian A. Milliner, and Paul Bulter **DATE & TIME:** 24-Feb-05 10:05
FILE REF: c:\documents and settings\ian milliner\my documents\data-1\milly\adas\text books\supervisor\a-dive supervisor - section 4.doc
ADAS REF: This Section corresponds to Module 6.4, Manage diving illnesses and medical emergencies.

1 CHAPTER 1 – INTRODUCTION

INTRODUCTION

ADAS COMPETENCY

Manage diving illnesses and medical emergencies.

Ensure recognition of all diving related illnesses, injuries and medical emergencies likely to occur in a dive operation within area of responsibility.

Ensure appropriate treatment of all diving related illnesses, injuries and medical emergencies likely to occur in a dive operation within area of responsibility.

Keep up to date with developments in first aid and medical equipment and procedures applicable to diving.

Ensure appropriate qualifications and/or training of personnel prior to use of any first aid or medical equipment or procedures.

GENERAL

Under AS/NZS2299.1, which has the force of law in most workplaces in Australia, there is a requirement for dive supervisors to be trained in the recognition and management of diving emergencies, in administering first aid and communicating with medical assistance[2].

As dive supervisor, you need to:

✔ ensure recognition of all diving related **illnesses, injuries and medical emergencies** likely to occur in a dive operation under your control,

✔ ensure appropriate **treatment** of all diving related illnesses, injuries and medical emergencies likely to occur in a dive operation under your control,

✔ keep abreast of **developments** in first aid and medical equipment and procedures applicable to diving, and

✔ ensure appropriate **qualifications** and/or **training** of personnel prior to use of any first aid or medical equipment or procedures.

A comprehensive coverage of the anatomical and physiological reasons for diving illnesses and medical emergencies is provided in the ADAS Part 1 manual and is repeated in section 13 of this manual for revision purposes.

This module briefly summarises some of the diving illnesses and medical emergencies you may encounter.

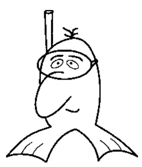
2 AS/NZS 2299.1:1999, cl 2.1.2 (d) and (e), p. 10

2 CHAPTER 2 – DIVING ILLNESSES AND MEDICAL EMERGENCIES

INTRODUCTION

GENERAL

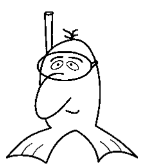
As mentioned in the physics and physiology chapter; the behaviour of gases in changing pressures is one of the main risks to the safety of a diver. The risks fall broadly into the following categories:



- ✔ Barotrauma
- ✔ Gas poisoning
- ✔ Decompression illness

These conditions, their symptoms and their treatment have been covered thoroughly in the ADAS Part 1 text (see also section 13). The use of oxygen is an important treatment for diving illnesses and medical emergencies. Parts of this chapter (2) and the following chapter (3 and 4) on oxygen and recompression are extracts from the ADAS Part 1 text.

Other diving illnesses and medical emergencies include:



- ✔ Salt water aspiration syndrome
- ✔ Near drowning
- ✔ Dangerous marine animals
- ✔ General (non-diving specific) injuries or illnesses

The treatment for these are covered in most standard first aid courses and should be well known and understood by all dive supervisors.

BAROTRAUMA

Gas within the gas cavities in the body expands or contracts as the diver ascends or descends. This causes direct stress or damage to the internal organs or body tissues if there

First Edition — December 2003; Revision (0)

REVISED BY: Active Learning Partners (Bronwen Campbell), Ian A. Milliner, and Paul Bulter **DATE & TIME:** 24-Feb-05 10:05
FILE REF: c:\documents and settings\ian milliner\my documents\data-1\milly\adas\text books\supervisor\a-dive supervisor - section 4.doc
ADAS REF: This Section corresponds to Module 6.4, Manage diving illnesses and medical emergencies.

is no means or not enough time for the gas to escape or enter. The resulting injury is called barotrauma. Typical injuries include:

- ✔ Aural barotrauma (ears)
- ✔ Sinus squeeze
- ✔ Dental barotrauma
- ✔ Pulmonary barotrauma of ascent – resulting in one or all of the following conditions
  - ☞ Interstitial emphysema
  - ☞ Pneumothorax
  - ☞ Arterial gas embolism

More information on these conditions is available from most diving texts (see also section 13).

The treatment for pulmonary barotrauma of ascent is recompression. Urgent medical advice should be sought in all cases of suspected pulmonary barotrauma of ascent.

Mask squeeze, helmet squeeze and nips are also a type of barotrauma. Squeeze is caused by compression of gas inside a mask, suit or helmet. The drop in pressure inside a helmet, mask or suit causes pain and sometimes injury. The effects are generally temporary, but can be painful and debilitating.

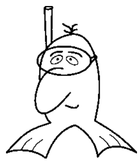
Proper training and well-maintained modern equipment should prevent squeeze.

GAS POISONING

The human body is designed to operate with a breathing mixture of approximately 79% nitrogen and 21% oxygen. Although the body can tolerate breathing gases at different ratios for short periods, there are adverse side effects as exposure to these gases increases either because of time breathing a non-air mixture or increased absorption at high pressures. The toxicity limits are only guidelines as each person's susceptibility is different and even varies for the individual depending on their physical condition at the time.

Note that it is the partial pressure (not the percentage) that is important physiologically.

Gas poisoning includes conditions such as[3]:



- ✔ Nitrogen narcosis (when partial pressure of nitrogen exceeds 3.2 bar – generally at depths exceeding 30msw for air diving)
- ✔ Oxygen toxicity (Pulmonary oxygen poisoning after long exposure to PpO_2 in excess of 0.6 bar. CNS oxygen poisoning if PpO_2 exceeds 1.6 bar)
- ✔ Anoxia (complete lack of oxygen)
- ✔ Hypoxia (shortage of oxygen – when PpO_2 is less than 160mb [0.16 bar])
- ✔ Hypercapnia (carbon dioxide poisoning)
- ✔ Carbon monoxide (from a faulty compressor)
- ✔ Hydrogen sulphide (from oil-based mud)

---

3 IMCA Dive supervisor's manual pp75-79 (IMCA list includes hydrogen narcosis which is not pertinent to onshore dive supervisors)

- ✔ Hydrocarbons (from oil based mud)
- ✔ Cleaning fluids (from poor cleaning procedures)

DECOMPRESSION ILLNESS

GENERAL

The term, decompression illness, describes all forms of decompression related problems.

Increased pressure affects the amount of dissolved gases in the bloodstream and body tissues. The longer the time spent in the high-pressure environment, the more dissolved gases there are in the tissues and bloodstream (up to equilibrium).

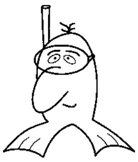
When the pressure is reduced by ascending, the amount of dissolved gas that can stay in the bloodstream or the tissues is reduced. The extra gas needs to escape. Given enough time, the gas will slowly diffuse out of the bloodstream and tissues without causing any problems. However, if the decrease in pressure is too rapid, the gas forms bubbles in the bloodstream or tissues, which can cause decompression illness and even death.

Decompression illness may be apparent soon after surfacing, or may take up to 36 hours after a dive to appear.

DESCRIPTION

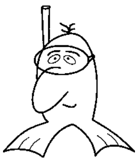
Decompression illness may be categorised in a number of ways. It has been commonly categorised as Type I (mild) or Type II (serious), which includes Arterial Gas Embolisation (AGE), the most dangerous manifestation of Type II DCI[4].

Many countries and individual institutions still use Type I and II as classifications of DCI. Because of its common usage, we have defined Type I, II and AGE here. It is important to note however, that in Australia and New Zealand we treat all suspected cases of DCI, so, to some extent, the classification becomes irrelevant and a new descriptive system has been developed (see next section).



TYPE I

Caused by bubble formation in muscles, joints or fat. Symptoms are pain, itching, rash or minor twinges ("niggles").



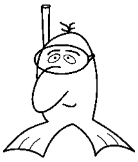
TYPE II

Generally caused by bubble formation in central nervous system (CNS). There is often very little pain (in up to 70% of cases[5]). Symptoms include numbness or pins and needles. Type II also includes pulmonary symptoms (the "chokes") and hypovolemic shock because of their life threatening nature.

---

4 **Joseph Kaplan and Marshall E Eidenberg, eMedicine Journal,** November 8 2001, **Volume 2, Number 11** http://www.emedicine.com/EMERG/topic53.htm accessed Aug 2002

5 **Stephen A Pulley, eMedicine Journal,** June 18 2002, **Volume 3, Number 6** http://www.emedicine.com/emerg/topic121.htm accessed August 2002

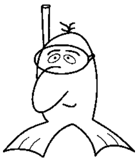


AGE

Arterial gas embolisation is generally caused by pulmonary over-pressurisation[6] allowing large gas bubbles to enter circulation. Symptoms depend on where the gas emboli lodge. Cerebral AGE is characterised by suddenness of symptoms – they usually occur within 10-20 minutes of surfacing.

■ NEW DESCRIPTIVE SYSTEM FOR DCI

It has been argued that a better classification can be made using terminology that describes the dynamic nature of DCI. AS/NZS 2299.1 suggests that the description "decompression illness" should be qualified by the part of the body affected, the severity and its timing, e.g. "severe progressive spinal cord decompression illness arising within a few minutes of surfacing".



A new, more objective and descriptive system has been developed, which is very simple and not necessarily rigid. It starts with the time of onset (only two options), then moves to evolution (only three options), then describes the body system affected (many options here, but the common ones are listed below). Some of the terminology that is used is rapid or delayed onset, progressive, stable or resolving. For example, rapid onset, progressive Central Nervous System (CNS) DCI would be the worst type.

TIME OF ONSET

✔ Rapid

✔ Delayed

EVOLUTION

✔ Resolving

✔ Stable

✔ Progressive

BODY SYSTEM AFFECTED

✔ Musculo skeletal

✔ Skin

✔ Heart

✔ Lungs

✔ Central nervous system (CNS)

✔ Gastro intestinal

✔ Inner ear

✔ Blood

---

[6] Note that bubbles may also bypass the lungs if the diver has a patent foramen ovale (hole in the heart). There is a good description of this in an article by Dr. Sawatzky in the May 1999 edition of Diver, the Canadian Magazine of scuba diving. www.divermag.com (http://divermag.com/archives/may99/divedoctor_may99.html accessed November 2002)

PREDISPOSING FACTORS

Different people have varying susceptibility to the formation of bubbles. This variation is due to a variety of factors, most of which are under our control.

An understanding of these factors may reduce the potential risk of decompression illness in marginal cases.

The following factors may increase a diver's likelihood of suffering from decompression illness, even if tables or computers are followed correctly[7]. The information that follows is a possible reason for the increased risk.

- ✔ **Exercise before a dive.** Increases gas nucleation, elevated heart rate leads to increased gas uptake.
- ✔ **Exercise during dive.** Increases heart rate, therefore increases rate of gas uptake.
- ✔ **Exercise after a dive.** Increased turbulence can agitate blood and lead to greater bubble formation.
- ✔ **Dehydration.** Reduction in blood volume means poor blood flow. This reduces the rate at which nitrogen can be removed from the tissues. In addition, thicker blood is more likely to form clots.

- ✔ **Alcohol.** Alcohol is a vasodilator, which increases gas transport to peripheral tissues. It also leads to dehydration.
- ✔ **Drugs.** Some recreational drugs, e.g. marijuana, cause vasodilation similar to alcohol.
- ✔ **Being cold.** Vasoconstriction traps nitrogen in tissues, limiting out-gassing.
- ✔ **High CO_2 levels.** Causes vasodilation, which leads to increased gas transport to the surface tissues.
- ✔ **Fatigue, lack of fitness.** An unfit diver will breathe more heavily, therefore absorbing more nitrogen than a fit diver does.
- ✔ **Illness.** Chronic disease reduces a person's fitness, increases heart and respiratory rates. These lead to increased nitrogen uptake.

- ✔ **Stress, anxiety.** Anxiety will lead to an increased breathing and heart rate, which will increase gas uptake.
- ✔ **Repetitive diving, including multi day repetitive diving.** A diver ends a dive with a safe level of nitrogen, but an elevated level nevertheless. By diving again before completely out-gassing, dangerous nitrogen levels are reached much sooner. When repetitive dives are done over a number of days, the residual nitrogen levels can become dangerously high.
- ✔ **Multiple ascents.** Multiple ascents increase the risk of bubble formation, and also the risk of bubbles being compressed and passing into the left side of the circulatory system.
- ✔ **Flying too soon after diving.** Reduced ambient pressure may allow new bubbles to form, and existing bubbles to expand.

---

[7] There are some interesting case studies in Dive New Zealand, Issue 58 June/July 2000 *Practical considerations in dive 'accident' scenarios* by Lynn Taylor and Simon Mitchell http://www.divenewzealand.com

- ✔ **Travelling to altitude too soon after diving.** Reduced ambient pressure may allow new bubbles to form, and existing bubbles to expand.
- ✔ **Age.** Degenerative changes in circulatory, respiratory and muscular systems can lead to problems with gas elimination.
- ✔ **Previous bends.** Damaged tissue may have impaired perfusion or reduced vascularity.
- ✔ **Previous injury**. Damaged tissue may have impaired perfusion or reduced vascularity.
- ✔ **Presence of patent foramen ovale**. This is a heart condition that usually goes unnoticed. A patent foramen ovale is a defect in the septum separating the right atrium from the left atrium. Blood is usually filtered of bubbles as it passes through the capillary beds in the lungs, and it reaches the left side of the heart largely bubble free. A patent foramen ovale allows blood from the right (unfiltered) side to cross to the left (normally filtered) side. If blood with bubbles reaches the left side of the heart, the victim has a higher risk of suffering severe DCI symptoms. Studies indicate that divers with PFO have a far higher incidence of DCI even when they follow tables/computers correctly. It is believed that about 10-15% of adults have this condition without being aware of it. Unfortunately, tests for PFO are invasive, expensive and occasionally inconclusive.

Some other factors that may increase susceptibility:

- ✔ **Obesity.** There is conflicting evidence regarding this risk factor. It is now believed that the risk has more to do with overall fitness than obesity alone. This factor may be more significant with longer exposures, as nitrogen is poorly supplied with blood vessels, which would delay out-gassing.
- ✔ **Female.** Once again, conflicting evidence exists. Females were previously thought to be at increased risk, but there is little recent evidence to support the theory. Much of the earlier evidence was based around aviation studies rather than diving. Hormonal changes during different phases of the menstrual cycle may contribute to increased risk.
- ✔ **Complement protein activity.** The presence of complement proteins in the blood are believed to be associated with increased risk. Complement proteins are involved in the inflammatory responses that act as a stimulus to the immune response. A blood test is needed to ascertain levels of complement proteins.

■ PREVENTION OF DCI

Prevention is difficult, as some very susceptible people have suffered DCI following extremely conservative and apparently safe dives. Divers Alert Network (DAN) USA data from 1987-91 indicates that 60-70% of divers treated for DCI had been diving within the limits of their tables. The level of risk can change from day to day. What was a safe dive one day can induce symptoms at another time.

The cautious diver will take careful note of the factors increasing risk, above. One diving doctor said the only ways to eliminate the risk of DCI was either not to dive, or never to ascend!

Some ways to reduce risk of DCI are listed below. Where one risk factor cannot be avoided, such as a deep dive, other steps must be taken to reduce overall risk.

- ✔ **Choose conservative tables.** Older tables were developed to avoid DCI symptoms, not bubbles. Modern tables have been developed to minimise bubbles. Two examples are

First Edition — December 2003; Revision (0)

REVISED BY: Active Learning Partners (Bronwen Campbell), Ian A. Milliner, and Paul Bulter **DATE & TIME:** 24-Feb-05 10:05
FILE REF: c:\documents and settings\ian milliner\my documents\data-1\milly\adas\text books\supervisor\a-dive supervisor - section 4.doc
ADAS REF: This Section corresponds to Module 6.4, Manage diving illnesses and medical emergencies.

the Buehlmann and the DCIEM tables[8]. As a result, they have shorter no-stop times than US Navy and similar tables.

✔ **Apply safety or fudge factors.** Fudge factors are adjustments to how you actually dive, involving building in safety. This can be done in several ways:

- ☞ calculate next deeper depth,
- ☞ use next longer time, and
- ☞ use total dive time rather than bottom time when calculating repetitive dives.

✔ **Ensure divers ascend slowly.** There is much evidence that the rate of ascent is critical to avoiding DCI. According to current information, you should be ascending slower than 10 metres per minute[9], or one metre every 6 seconds. Slower ascents allow nitrogen to off-gas more safely, as large pressure gradients are avoided. A point of reference such as a shot line or anchor line will help you judge your rate of ascent. Many computers have ascent warnings.

✔ **Add safety stops**. A 1990 workshop conducted by the American Academy of Underwater Sciences recommended that a safety stop should be done between 3-9m for 3-5 minutes at the end of all dives. The major training agencies recommend the stop be made at around 5m. In addition to aiding in out-gassing, such a practice also slows the ascent rate.

✔ **Avoid multiple ascents.** Multiple ascents increase the likelihood of bubble formation. Bubbles formed on earlier ascents can then be compressed and might enter the arterial circulation on re-descent. Repetitive bounce dives have the same effect, and should be avoided.

✔ **Avoid deep dives.** Dives deeper than 24-30m are statistically more risky than shallower dives.

✔ **Avoid excessively long dives.** According to a US Navy study, the risk of DCI increases greatly when the bottom time exceeds 45 minutes.

✔ **Plan repetitive dives conservatively**, especially multi-day repetitive dives. The increased risk of repetitive dives is established. If your work schedule calls for repetitive dives, plan them well within limits set by tables, and with added fudge factors. Multi-day repetitive dives are especially risky, as the residual nitrogen load is not allowed to attain equilibrium. Experts recommend a dive free day after 3-4 days.

✔ **If possible, avoid decompression stop dives**. If a diver has mandatory stops, and problems force him to miss those stops, he is at far greater risk of DCI.

✔ **Avoid risky profiles**. Different profiles offer different degrees of risk of DCI. Profiles that have a short time at maximum depth at the start of the dive, then gradually getting shallower for the remainder of the dive, are safer than a "square" profile where the diver stays at maximum depth for an extended bottom time, then ascends directly to the surface.

✔ **Reduce personal risk factors**. Many of the risk factors described earlier can be reduced with attention to planning, personal fitness and health.

---

8 AS/NZS 2299.1:1999 uses primarily DCIEM tables, which were chosen for inclusion in the Standards as they are generally more conservative than other commonly used tables (AS/NZS 2299.1:1999 p 56)

9 AS/NZS 2299.1:1999 suggests 18 +/- 3m/min, cl F2.2, p 57, but slower ascents are considered safer.

3 CHAPTER 3 – RECOMPRESSION

INTRODUCTION

Recompression is an important treatment for decompression illness. It is also used in cases of pulmonary barotrauma of ascent. Recompression should be carried out in a chamber. (In-water recompression, although occasionally carried out in practice, is not advised and should definitely not be used for anyone with any symptoms of DCI).

The actual supervision of a compression chamber is covered in detail in the chapter covering supervising on site chamber operation.

Recompression will;

✔ reduce the size of the bubble, thus restoring circulation, and

✔ cause re-absorption of the nitrogen.

The initial treatment for all cases of decompression illness arising from air diving operations should be in accordance with an appropriate therapeutic recompression treatment table. AS/NZS 2299.1 provides Table G1, which is reproduced from RN Table 62, USN Table 6. It commences at 18m equivalent chamber depth with the patient breathing 100% oxygen.

HYPERBARIC OXYGEN THERAPY (HBO)

Hyperbaric oxygen therapy simply means administering a high concentration of oxygen during therapeutic recompression.

High concentration of oxygen will;

✔ provide greater concentration of oxygen to hypoxic tissues, and

✔ accelerate nitrogen elimination by increasing the pressure gradient between the nitrogen in the bubble and the lower nitrogen levels in the surrounding tissues.

Such high-pressure oxygen often produces a rapid reduction in the severity of symptoms, but risks CNS oxygen poisoning. For therapeutic recompression using RN 62/Table G1, the patient will be breathing 100% oxygen with a PpO_2 of 2.8 ATA. The patient is monitored for symptoms of oxygen poisoning, and is placed on air if symptoms occur.

If the above treatment causes reduction in severity of symptoms, decompression illness is assumed, and full treatment is carried out. If no relief of symptoms occurs after 20 minutes at pressure, the diagnosis of DCI may be questioned, but treatment is often continued in case bubbles are present.

Several sessions may be required for full resolution of symptoms. Repeated treatments are usually 12-24 hours apart.

Despite multiple recompression treatments, some divers are left with residual impairment for extended periods after treatment is finished.

Some are left permanently disabled.

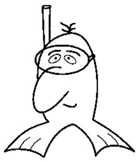
REVISED BY: Active Learning Partners (Bronwen Campbell), Ian A. Milliner, and Paul Bulter **DATE & TIME:** 24-Feb-05 10:05
FILE REF: c:\documents and settings\ian milliner\my documents\data-1\milly\adas\text books\supervisor\a-dive supervisor - section 4.doc
ADAS REF: This Section corresponds to Module 6.4, Manage diving illnesses and medical emergencies.

4 CHAPTER 4 – OXYGEN

INTRODUCTION

Part of the requirements of the dive supervisor, the divers, and attendants are that they are trained in administering oxygen.

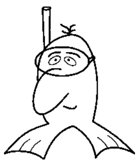
Diving accidents or ailments for which oxygen may be of benefit include:



- ✔ Decompression illness
- ✔ Pulmonary barotraumas
- ✔ Carbon monoxide poisoning
- ✔ Carbon dioxide poisoning
- ✔ Near drowning
- ✔ Salt water aspiration syndrome

BENEFITS OF OXYGEN

The benefits of oxygen are:



- ✔ increases supply of oxygen to hypoxic tissues,
- ✔ in the case of decompression illness, oxygen will provide a pressure gradient, which will aid in the diffusion of nitrogen from the bubbles, and
- ✔ further to the above, this will reduce the bubble volume.

METHODS OF OXYGEN DELIVERY

Oxygen can be supplied in many different ways. The three most common ways are:

- ✔ Demand valve
- ✔ Non-rebreather mask
- ✔ Pocket mask with supplemental oxygen

■ DEMAND VALVE

By using a demand valve for a breathing patient, an oxygen concentration of 100% is possible if the mask is fitted properly.

NON-REBREATHER MASK

By using a non-rebreather mask for a breathing patient, a flow rate of 15 litres/min will give an oxygen concentration of 95% if the mask is fitted properly. If the reservoir bag deflates, the flow can be increased accordingly.

The non-rebreather mask is better for patients who cannot tolerate the demand valve mask, or patients experiencing respiratory difficulty, e.g. asthmatics, small children.

POCKET MASK WITH SUPPLEMENTAL OXYGEN

If a patient is not breathing, and requires EAR, the expired air of the rescuer can be supplemented by using a pocket mask fitted with an oxygen line. With a flow rate of 15 litres/minute, the oxygen concentration will be approximately 55%, which compares favourably with the 16% of normal expired air.

SOURCES OF OXYGEN

If oxygen is not readily available, it can be obtained from the following sources:

- ✔ Service stations
- ✔ Aquarium shop
- ✔ Mechanical workshop
- ✔ Some schools
- ✔ Vet, doctor, dentist
- ✔ Airport
- ✔ Swimming pool
- ✔ Lifesaving club

ADAPTORS

It is NOT safe to fit a standard SCUBA regulator to an oxygen bottle, as they may burn. In spite of this, diving regulator adaptors can be purchased through dive stores, which enable a diving regulator to be fitted to a standard oxygen bottle.

Remember: Avoid using adaptors.

MEDICAL VS INDUSTRIAL OXYGEN

The oxygen used to fill the cylinders is the same. The difference is that medical oxygen cylinders are vacuum emptied before refilling, whereas the industrial cylinders are not.

PRECAUTIONS WHEN USING OXYGEN

When using oxygen, care needs to be taken to avoid explosions and fires.

- ✔ No smoking

- ✔ No flames or heat sources
- ✔ No oils or other inflammable contaminants
- ✔ Ensure your hands are clean before handling oxygen equipment
- ✔ Open slowly
- ✔ No engines
- ✔ Avoid positive pressure oxygen delivery devices when giving treatment to patients suspected of pulmonary barotrauma

■ THE DAN OXYGEN KIT

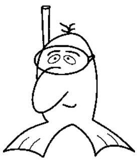
This kit is convenient, compact and versatile. It can be used to treat several patients at once.

The kit can be connected to oxygen cylinders of any size.

5

CHAPTER 5 – SUMMARY

DIVING ILLNESSES AND INJURIES



- ✔ Diving illnesses and injuries fall broadly into the categories of barotrauma, gas poisoning, decompression illness, salt water aspiration syndrome, near drowning, dangerous marine animals and general (non-diving specific) injuries or illnesses.
- ✔ Barotrauma is caused by expanding or contracting gas within gas cavities in the body.
- ✔ Gas poisoning is caused by absorption of gases to a poisonous or toxic level based on the composition of breathing gases and length of exposure.
- ✔ Decompression illness is caused by a rapid reduction in pressure, forming gas bubbles in the bloodstream or body tissues.
- ✔ The description "decompression illness" should be qualified by the part of the body affected, the severity and its timing.
- ✔ Recompression is an important treatment for decompression illness and in cases of pulmonary barotrauma of ascent.
- ✔ Hyperbaric Oxygen Therapy (HBO) is administration of a high concentration of oxygen during therapeutic recompression.
- ✔ Administration of oxygen aids treatment of decompression illness, pulmonary barotraumas, carbon monoxide or carbon dioxide poisoning, near drowning and salt-water aspiration syndrome.