about decompression theory. This may be a practical solution when computers no longer allow unsafe repetitive dives but it is a "cook book" solution, liable to go wrong with the present generation of diving computers.

Some years ago one of the diving instruction organizations wrote to SPUMS asking for advice on what we thought was important in the final exam before qualifying people as divers. The Committee felt very strongly that the trainee should be able to pass a test on using the tables without making a mistake. As far as I know this advice has not been implemented.

Those are the things that will have to be addressed in the future of diving safety. The training agencies have the responsibility to make sure that every diver can control buoyancy properly, knows the hazards of depth (nitrogen narcosis, cold, increased use of air, increased risk of decompression illness) and sea state, can always calculate decompression requirements accurately, is determined never to run out of air underwater and knows how to reach the surface even if unconscious. This involves dropping the weight belt and inflating the buoyancy compensator. Knowing all these things does not detract from ones enjoyment of a dive.

It is lucky that human beings are tough and our bodies can stand a great deal of ill treatment. Otherwise there would many more diving accidents with serious consequences than there are at present. But we should not rely on this to reduce diving accidents.

What is needed is the attitude that diving safety is the diver's responsibility and this requires education in depth and a serious attitude to safety. Both Brett Gilliam's report[12] and Bob Halstead's survey[13] show that depth limitations are ignored safely by many experienced divers. The reason is probably that they are careful to dive safely and avoid making mistakes. Perhaps they are properly prepared for every eventuality or perhaps they know how to keep out of trouble and when to abort a dive. Perhaps they even know, as should every diver, what to do if they do get into trouble and how to contact assistance. Australia has a good recovery system for the Barrier Reef, but it is only as strong as the weakest link, which is usually a human.

Diving safety depends on having fit, well trained, thoughful, competent divers using well maintained equipment who are sensible enough not to do anything stupid or foolhardy.

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This paper presents the views of Dr John Knight which are not necessarily those of SPUMS.

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DIVER RESCUE AND RETRIEVAL IN NORTH QUEENSLAND

Geoff Gordon

The presence of generally fine weather and warm sea temperatures makes diving in the tropics very attractive and further conspires to increase both the number of dives per day, and the length of each dive. Most of this diving takes place in areas remote from tertiary medical facilities. As dive numbers increase so does the incidence of significant decompression illness (DCI). There is thus the need for a co-

ordinated and capable response in order that afflicted divers are treated expeditiously.

The problem

During 1991 in Townsville, 70 divers were treated for DCI, 33 (48%) being retrieved from their dive locations. These 33 included 24 who were retrieved and treated in the Duocom portable recompression chamber (RCC) during transit (Figure 1).

Traditionally this type of work was the domain of the armed forces, but as recreational diving has increased in popularity, the incidence of DCI has clearly exceeded the military's capacity to respond, and as such, the responsibility has been borne by State health authorities.

Our capability

In Townsville our response group consists of trained medical personnel from the Hyperbaric Medicine Unit, with aircraft and specialised equipment, originally provided by the National Safety Council of Australia (Victorian Division) (NSCA), which is currently owned by the Bureau of Emergency Services. These are a Beechcraft Super King Air turboprop fixed win aircraft, a Bell 412 helicopter (Figure 2) and a Duocom portable RCC.

The Duocom is a 240 kg pressure vessel, with an internal volume of 0.7^3 and a working depth of 50 msw. It is fitted with a built in breathing system (BIBS), a medical lock, an intercom system, a CO_2 scrubber and a Nato flange for transfer under pressure. With this chamber we take 4 x G size cylinders, two of oxygen and two of air, an additional 220 kg.

With a Duocom, ancillary equipment and personnel aboard, both available aircraft exceed their maximum all up weight (MAUW) on take off, and on landing have a rearward centre of gravity, requiring especially skilled pilots to transport this equipment safely. Because of these operational factors, we elect not to carry the Duocom by helicopter, but rather to collect the diver from the nearest appropriate air field in the King Air.

Cost

The King Air costs approximately $1,450 per hour to run (crew included) and the Duocom approximately $600 per trip and up to $1,300 for an international retrieval. Typical cost for a Duocom retrieval from Cairns to

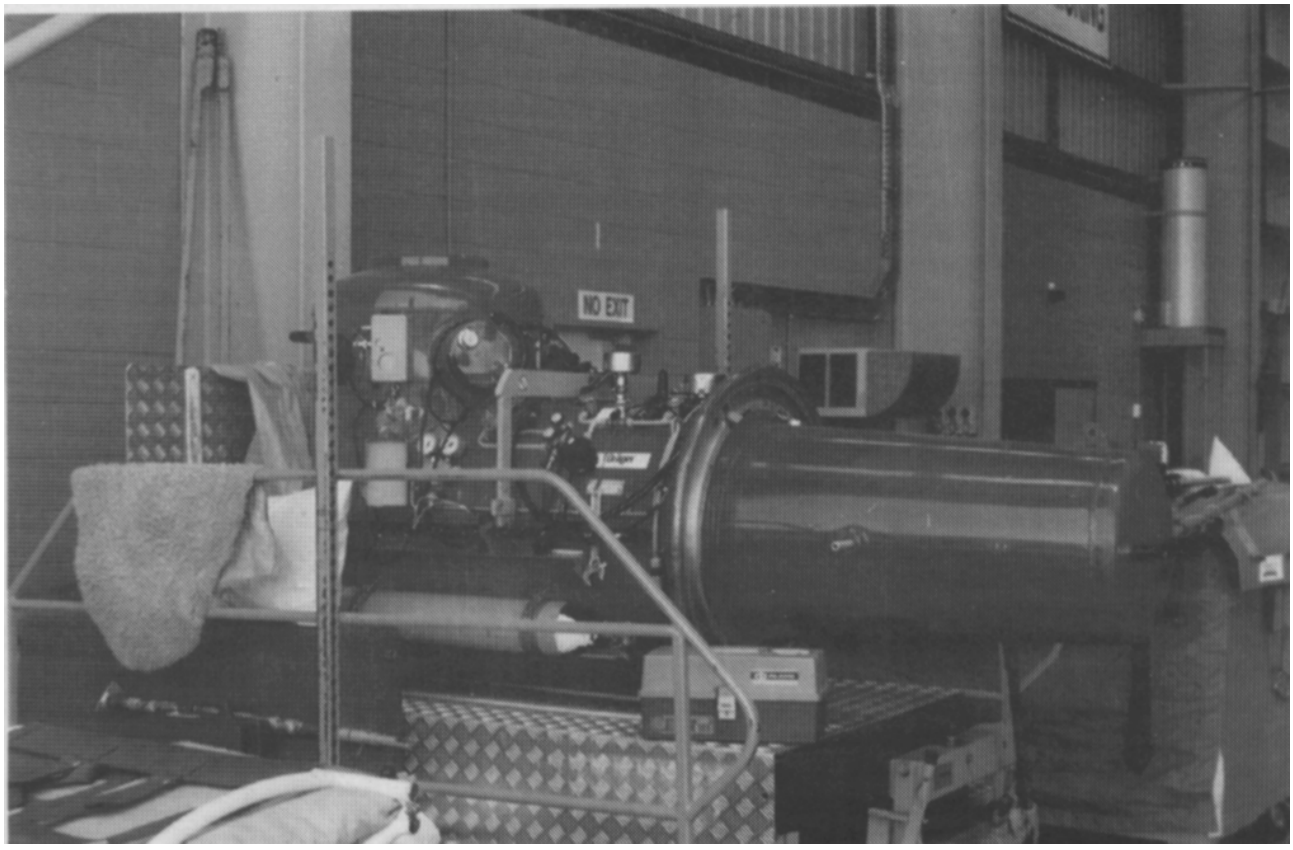

FIGURE 1. Dräger Duocom portable recompression chamber. The right hand end of the chamber fits into the main chamber (Figure 3) and the circular flange locks on so enabling transfer under pressure. When both chambers are at the same pressure the "toe" of the Duocom can be removed and the patient slid out.

FIGURE 2. Bell 412 helicopter with a Dräger Duocom, open with its "toe" lying beside it, in the background.

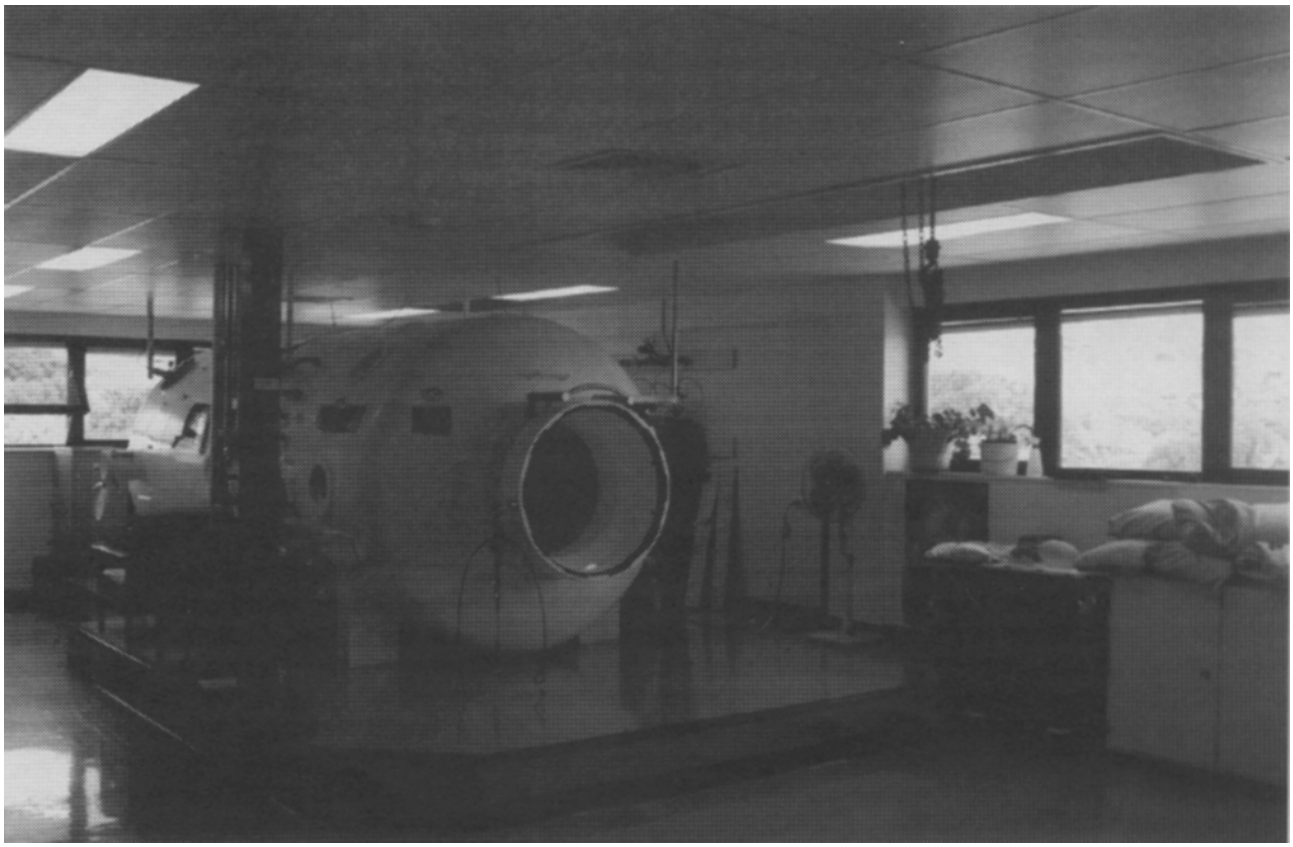

FIGURE 3. The double lock chamber at Townsville General Hospital. The Dräger Duocom locks onto the flange on the entry port. It is manoeuvred into place using the travelling hoist set in the ceiling.

Townsville, taking approximately 3 hours, is $3,000 plus staff salaries.

In overseas retrievals the cost is always borne by the diver or by his or her insurance company.

Communications

For all accidents occurring in Queensland, we are usually first contacted by the DES network, and as most of these divers are Australian, the Health Authority meets the costs. For divers who are not eligible for Medicare, and for those retrieved from overseas, the financial aspects are dealt with by one of the medical retrieval agencies, and they subcontract the work to our unit in Townsville.

We have collected divers from Cape York to as far south as the Gold Coast, and offshore from PNG, Fiji, Nauru, Port Vila and the Solomons. With increasing diver awareness we expect this work to increase.

Treatment

In all patients our initial first aid is

1 85% or greater oxygen via appropriate mask and circuit;

2 the patient is positioned horizontally if air embolism is a possibility;

3 aggressive rehydration intravenously.

If we are using the Duocom, we initially compress to 18 msw with the intention of treating using a RN Table 62 profile of pressure and time. We have the option of going to 50 msw in deteriorating cases.

On arrival in Townsville, the diver is transferred, under pressure, to the main chamber in the Hyperbaric Medicine Unit of the Townsville General Hospital (Figure 3), where the treatment profile is completed. Follow-up recompressions are conducted as is required following repeated patient assessment.

Conclusions

Any retrieval service must satisfy the objective that it is "to improve patient care". Stated more simply, the care given during transport must equal or better the management at the point of referral.

There can be no doubt that our service fulfils these objectives, and as it is yet to be determined whether early retrieval and treatment ultimately reduces morbidity, any caring society is obliged to support activities its community indulges in. This earlier treatment may reduce the incidence of some of the irreversible conditions related to scuba diving. As inexpensive insurance becomes readily available to all divers, the onus of cost will fall on the consumer, and clearly, the divers will want to be recompressed as early as possible, putting additional pressure on hyperbaric units to run efficient retrieval services.

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The photographs were taken in October 1991 by Dr John Knight during a visit to Townsville. Then retrieval organisation was then the North Queensland Emergency Response Group.

REPORTS OF OTHER DIVING AND HYPERBARIC MEETINGS

HYPERBARIC TECHNICIANS AND NURSES ASSOCIATION (HTNA) FIRST ASM

Hyperbaric nurses and technicians in Australia founded the Hyperbaric Technicians and Nurses Association at their first Annual Scientific Meeting in Adelaide on August 28th and 29th 1992.

The Association aims to promote and encourage the exchange of information between members; to standardise protocols and practices within the technical and nursing communities affiliated with the HTNA; to educate and inform the recreational diving community of developments that affect safe diving practice and standards; and to establish training requirements for hospital based chamber technicians.

The HTNA encourages members to join SPUMS and is closely affiliated with the Australian and New Zealand Hyperbaric Medicine Group, which is a Standing Committee of SPUMS.