

- 1 Formal status
- 2 Medical manpower
- 3 Chamber upgrade
- 4 Facility manager
- 5 Chamber staff
- 6 Education

Formal status came fairly quickly within the Division of Anaesthesia. Medical manpower was organised. However, to date, little else has been achieved. Limited education has increased awareness considerably. Chamber upgrade has only involved minor chamber alterations. The assistant hospital engineer still runs the chamber. Several nursing staff and RMOs with rudimentary training provide the chamber staff on a very ad hoc basis. Currently there is a major campaign to considerably improve and upgrade the facility and service. Divers make up only a small number of the total customers treated in the chamber compared to patients with medical illnesses. However they do have considerable commercial value and their diving illnesses often require urgent attention. Any delay or need for further retrieval to Melbourne should the Hobart facility not be supported may well compromise a diver's chance of survival.

REFERENCES

- 1 Monaghan R. The risks of sports diving. *SPUMS J.* 1988; 18(2): 53-60.

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RECOMPRESSION CHAMBER REQUIREMENTS FOR TASMANIA

Peter McCartney

Tasmania has a population of under half a million people. The distance from Hobart to Launceston is a little bit more than 320 km.

With regard to our hyperbaric facility needs let us look at the two groups of people who provide our patients.

Firstly the divers. We have a lot of divers in Tasmania. Besides the 125 licensed Abalone divers, there are two groups of divers we know little about. There are 300 licensed Sea Urchin divers. We do not know what level of activity these people are operating at, but I certainly get quite a few for diver medicals.

The other group of divers that has crept up on us are the aquaculture divers. I have not been able to ascertain how many of these people there are. But they have been our most generous suppliers of patients over the last 18 months. We have had 5 aquaculture divers with problems that have required treatment in the chamber. Some people say that they do not really count as divers because all they do is swim round at 3 m in a few giant fish bowls. However this is not so. The last patient I had from this industry had done two 24 m dives to secure moorings in the week before he presented, during which time he had become progressively worse. Obviously they do not want their fish bowls to disappear down the river. Fixing moorings is an important part of aquaculture. This diver commented that it was very hard work. He ascribed his initial pain to the fact that he was holding a shackle in one hand and using that hand as a vice while he worked on the shackle with a spanner. I asked him about underwater tools. He was totally mystified. His reply was approximately, "What are underwater tools?". These people are taking a very simplistic attitude to diving yet they are going to 24 m and fixing up moorings.

The CSIRO also has divers. Tasmanian Sea Fisheries has divers. The Department of Main Roads uses contract divers. The Hydro Electric Commission employs divers who dive at high altitude areas, in very cold fresh water and in nil visibility. They work in a specialist area of diving. Disaster awaits people who are used to diving in warmish sea water with good visibility, when they hop into a helicopter, get up to the dive site and are faced with an absolute barrage of new parameters. They may never have been in a nil visibility situation. They have never been in fresh water. They have never done a high altitude dive. And they have never been in such cold water before. Death has been the result for at least one of these people.

And then there are the sports divers, not only the locals but people from the mainland going to Bicheno.

The others who need hyperbaric treatment are patients already in hospital. There are three important areas which will increase patient loads.

The first is burns. We have a very good relationship with our burns unit, but I have made it clear to them that the only patients we can possibly treat at the moment are patients who have problems of wound healing. They are not acute burns at all. It is the case that has been in for weeks which is not healing that is referred. I have to knock back cases of acute burns because we do not have the staff or facilities for proper care in the chamber. The burns unit are very willing to look at our situation and I have adopted a policy with their cases which was suggested to me by Dr Janet Vial. The problem was, how were we going to measure the efficacy of our treatment. The suggestion was to get the referring physician to state the time he would expect the burns to heal without hyperbaric treatment. I believe that the clinical judgement and acumen of those clinicians is some indica-

tion. Then we take them and treat them and see how they get on.

The second group is diabetic ulcers. In my ignorance, I knocked back the first one that was referred to me. Subsequently I have treated quite a number of diabetic ulcers and now have very strong support from both the consultants who look after our diabetics and who are treating diabetic ulcers. In one recent case we quite definitely saved a foot. This patient had had an amputation of one foot previously and had a diabetic ulcer.

I do not have to elaborate on carbon monoxide poisoning. There is no doubt that hyperbaric oxygen treatment is very useful.

Furthermore we are hoping to establish a coronary bypass unit in this hospital in the next six months or so. As neurological changes, probably due to gas embolism, often accompany bypass surgery it is necessary to have a good hyperbaric facility with good transport to and from the facility if one is going to provide the optimal service post-bypass.

Present facilities

When our unit first started up Dr Penny McCartney and I ran it with two nurses. It is quite extraordinary that everything was on a volunteer basis. Our facility is still being run like that. If we could get proper staffing structures officially appointed we would be in a position to offer a much better service. We have a small chamber, acquired when it was no longer useful for a diving company, which has room for one patient lying down and the attendant. A very good indication of what sort of priority hyperbaric medicine has here is that the hyperbaric unit is housed in a garage. We have a splendid theatre complex. When the Quantum team came down to feature our work a very apt remark was made by one their team said, "If you want your leg off go up to the theatres, if you are keen to keep it go down to the garage". To get a stretcher patient into the chamber one has to open the garage doors to get enough room for the stretcher.

Hyperbaric physicians are often fairly sensitive about people criticising their units. Well I am not, I can not afford to be. The funniest comment that I have had from a well meaning colleague, is that it is the lovingly restored FJ Holden of hyperbaric units in Australia. That about sums it up.

I have what I call the "knock back" file. It contains referrals that I can not cope with or which I deem to be inappropriate for hyperbaric medicine. I always make that big distinction. It is very tempting for planners to say if one has knocked back 20 patients in the last 3 months therefore one would have had 20 patients. That is not a true reflection

of the situation at all. For the simple reason that if one knocks back 3 cases to one consultant, within a couple of weeks, with the words "I agree this patient needs hyperbaric oxygen therapy, but I am sorry we can not treat as our chamber is too small (or we are too busy)" the consultant is quite justifiably going to stop referring for a while. In other words the number of knock backs is only an indication of the minimum possible patient load. Medical records at the Royal Hobart Hospital keep a data base of admissions according to diagnosis. Mike Martyn ran through that for 1983 using the Undersea and Hyperbaric Medical Society's Category One definite indications for hyperbaric oxygen treatment and found about 98 patients. Then allowing for how many of these we would probably treat and how many treatments they would need we came up with an average of about 5 or 6 treatments a week just on that group. Our figures are purely looking at medical patients. There was a study regarding the of incidence of various diseases according to population and the need for hyperbaric units according to population which came up with figures that were in fact a little bit higher ours. We have had a lot of patients who we would have liked to have treated but were unable to treat with hyperbaric medicine.

As an indication of how little spurts of patient load come in, the last serious case from the intensive care unit (ICU) we were asked to treat was only about a fortnight ago. On that same day there were two other ICU cases that we were asked to treat that were quite out of the question for us to treat because we cannot handle that degree of critical care in our chamber. I believe that when my colleagues view our chamber they will be quite sympathetic towards this attitude and agree that the correct thing is to say no. We believe one has got to have the maxim "first do no harm" firmly fixed in ones mind before we agree to treat. So we are knocking back a lot of cases.

Future needs

I believe we need a hyperbaric facility. I prefer to call it that rather than a chamber, because I believe we require a multiplace chamber, with transfer under pressure (TUP) facilities, which allows the patient to be wheeled in and which has facilities which allow intensive care. I believe we also need a monoplace chamber. There is great polarisation of views about monoplace chambers. In the United States there is a very prestigious unit which is entirely composed of a row of monoplace chambers. The physicians working in this unit say that they are completely satisfied with their equipment and that a row of monoplace chambers is quite adequate. Having seen these units functioning one realises that the people who work in them become very expert at handling difficult situations with the patient remote from the physician and where "hands on" treatment is not possible.

Our basic premise is to have a chamber with a door where we could roll our patient in on a trolley and where we

would be able to fit at least four trolleys. One of the reasons we have to knock back people because of the difficulty of having to lift them in and out of that small chamber.

A four bed multiplace chamber would be quite adequate for us. I mean four people lying down. I am fairly paranoid about patients being able to recline or lie flat in a chamber. I think posture in the chamber is extremely important and a lot of damage can be done if people are not properly postured during their treatment and the attendant can end up having trouble, as happened in one situation in America.

In addition to a multiplace chamber with TUP facilities and a monoplace chamber, we need a transportable chamber with TUP facilities. The entire state of Tasmania in respect of diving is now aware that transfer under pressure facilities are needed. If by some good fortune we acquired a Duocom or Paracel chamber tomorrow, it would be quite useless to us because we cannot lock it on to our chamber. So if we did receive a patient in a portable chamber we would be in the incredible situation of having to return that patient to one atmosphere pressure, that is run the risk of seriously damaging that patient, before being able to place the patient in our chamber.

Australian Standard 2299, up until perhaps a year ago, could be regarded as guidelines and recommendations. The duty of care on the part of the employer is hardening up quite considerably. The Police Department has been very quick to recognize this and have taken very energetic steps to alert our government to this. Other departments also are aware of it. Tasmanian Sea Fisheries, who employ divers, are aware of this and I am quite sure are keen to see a hyperbaric facility becoming available.

A facility which has both monoplace and multiplace facilities has a potential for very large cost saving. The important aspect of having a monoplace chamber is that as the unit gets up and running it is a facility that can easily be added to. One is not looking at doubling the cost to buy another unit because a sizable proportion of the cost of the first unit is the oxygen control unit which can serve more than one chamber. Two chambers, multiplace and monoplace, running in parallel would be a great saving of people having to go into the chamber on a daily basis and the cost effectiveness of that is quite considerable.

If we install a hyperbaric facility with intensive care capabilities, I believe that in the end it will be very cost effective. I can point to some studies from America which have looked at cost effectiveness. There are some absolutely untouched areas such as the compartment syndrome where we should be looking at treating acute cases far more seriously. This is again a backing up argument for our claim for further finance.

We have situations here where patients occupy hos-

pital beds for ages, when they could be out of hospital much quicker after hyperbaric therapy. Even our primitive "guess the time to healing" index shows this quite clearly. Nearly all of our clinicians who deal with these patients have become aware of the benefits of hyperbaric therapy over the last few years.

I emphasise again we will need to have proper staffing. If we have proper hyperbaric facilities we will then just have to have a more generous staffing arrangement so that we can supply a better service.

The above has been adapted, by the SPUMS Journal Editorial Staff, from the transcript of a lecture presented at a meeting on Hyperbaric and Diving Medicine, sponsored by SPUMS and the Royal Hobart Hospital, 4th - 6th November, 1988, at the Royal Hobart Hospital, Tasmania.

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CRITICAL CARE IN THE HYPERBARIC CHAMBER

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Introduction

Some of the indications for hyperbaric management include slightly over 50% of cases that require intensive care nursing, either before or after hyperbaric oxygen (HBO) treatment. It seems illogical to have a patient in intensive care or critical care very well monitored, well ventilated, well looked after and then, for a period of two hours, take the patient off all those monitors, off the ventilator and pushed through a fairly small orifice into a small chamber for hyperbaric oxygen. What then do we need? The management of critically ill patients in a recompression chamber

Table 1

CRITICALLY ILL PATIENTS SUITABLE FOR HYPERBARIC OXYGEN.

Gas Embolism
Severe Infections
Trauma
Poisonings