IS THERE A CONSENSUS VIEW ON RECOMPRESSION PROCEDURES ?

A PANEL DISCUSSION WITH AUDIENCE PARTICIPATION

Members of the panel
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Moderator Chris Acott

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Moderator (Chris Acott)

Decompression illness (DCI) is a multi-system disease. With other multi-system diseases, such as septic shock, we optimise everything, we ventilate them, we maintain their cardiac output, we give them antibiotics, and intensive care nursing. But in spite of all our efforts there is a percentage of patients with septic shock who will die. I wonder whether it is the same with decompression sickness. Perhaps we are at a plateau now, with the best that we are going to get. Perhaps results in the future are not going to improve that much. Would anybody like to comment on that question?

James Francis

There is no eleventh commandment of "Thou shalt get better with recompression".

Des Gorman

I do not think we are at an endpoint of outcome, quite the opposite. There is a wide range of opportunities for improving treatment in DCI, but they may well be pharmaceutical rather than developments of pressure and oxygen. There are people who respond quickly to recompression, and it probably does not matter much what is used. Adding oxygen is a pragmatic, sensible starting point. But remember the reviews of the US Navy Tables, treatment Tables 1 and 1A, they had a very high success rate, 89% first time and 95% eventual success.[1,2]

I think people are overlooking the benefit of additional compression. There is no doubt that we see a small group of people in Auckland who get better with additional compression. If they do not get better at 18 m, they get better at 30 or 50 m. However, I think one can fiddle with pressure and oxygen for the next ten years and not see a dramatic improvement in the absence of earlier presentations. But I think there are significant inroads to be made from pharmaceuticals.

The fundamental problem is that DCI is a disease in which it is very difficult to perform controlled, prospective, randomised trials. We have, with the oxygen-helium trials in Auckland, a number of problems. First of all, how does one blind the attendants when using helium? The patient only has to say one word and the blinding has gone out the window! Yesterday Simon Mitchell presented what appeared to many of you to be a very complex scoring system.[3] However, without such a scoring system, one can end up showing no benefit for quite dramatically effective treatment when using a system as crude as complete, incomplete and no recovery. In our oxygen-helium trial there was no apparent benefit. We are restudying these cases and re-coding them to see if a difference emerges.

How does one obtain the patient group we want? The major weakness of our study was that, if we are to use a gas which is designed to shrink bubbles, we need patients who present early. Despite every effort, our mean time delay is between 2 and 3 days. What is the point of a trial looking at bubble shrinkage when people present after 48 to 72 hours. If we show a dramatic benefit for helium when we re-code the data, I think we are going to have to look very, very carefully at Type 1 errors. One would have to say "What on earth would be the plausible benefit at that period after onset"?

I am not sure how we correct that problem. We have done everything in our power, in terms of education programs, to get people to present early but the denial and culpability issues (which run through the head of the average diver with decompression illness) mean that they are almost unamenable to change.

So we have a disease which is progressive and which presents late. We have amazing heterogeneity in DCI; we have no clinical markers for follow up; we have no magic blood level to measure to show an objective score of outcome. We have, in the case of gas used for treatment, an almost impossible task in blinding them. And the end result is that, with a study like the oxygen-helium study, we have to say that, given our failure to recruit people early, it should be junked. And that is exactly what we are going to do. Round up the data, reclassify it and see if with a more sensitive scoring system, anything emerges. We are almost hoping that it does not, because if it does we will have to try and explain why it did.

The lignocaine study is a lot easier to do. We are doing a lignocaine study on divers, but late presentation is still a problem. We are more interested in the results of the cardiac surgical group, because in them we have pre-morbid data and post-morbid data and a measure of the insult. We have timing of insult and a reasonably homogeneous group in terms of the other phenomena.

The 1995 attempt at consensus went no further than the 1990 attempt at consensus, which was pretty much the same as the 1979 consensus, and my advice then was, as it is now, get the old document, white out the date and just change the date.[4-6]

Moderator (Chris Acott)

Does saturation therapy (which I understand is the only therapy where if anything goes wrong there is a very, very high chance of causing morbidity to the patient and the two attendants who are in the chamber), have any advantage over repeat hyperbaric oxygen up to 20 or 30 treatments, with or without SPECT scans.

Richard Moon

The patients in our retrospective review suffered from the same problem that Des has just pointed out.[7] They arrived at our hospital very late, often one or two days after the event, so a treatment which is designed to optimise gas bubble volume reduction is not likely to offer any particular benefit. I believe that, in general, for patients who show up late, it is not worth the cost and the effort, and frankly the risk, of a saturation treatment. Although, if one has the capability to do it, it can be considered. If one is treating a patient with severe neurological disease, and who is responding dramatically to initial recompression at 18 metres breathing oxygen, it is certainly very tempting to keep the patient in the chamber to administer hyperbaric oxygen repetitively and frequently, more intensively than one can do with repetitive Table 6 treatments. I think that saturation treatment will remain predominantly a tool for the off-shore diving industry and possibly the military, where the capability exists and the time to recompression is very short.

I think if there is a consensus it should be a very simple one. I believe that first aid, pressure and oxygen should be administered to individuals with decompression illness. Also I think that pressure and oxygen should be administered repetitively until there is a clinical response or a "plateau", meaning no measureable clinical improvement. I have seen no convincing evidence that large numbers of treatments offers any benefit. In my opinion the SPECT brain scan data that have been presented as evidence for improvement are not up to scientific standards, in particular because the scans have not been read independently by blinded observers. I think that idea is out on the fringe and should be considered experimental.

Peter Chapman-Smith

How long after the injury it is worth embarking on recompression treatment for sports divers who delay, sometimes they roll up weeks later?

Richard Moon

There are a few "case collections" suggesting that, even several days after the event, one can see objective neurological improvement.[8-12] Whether weeks later one can do the same thing, I have my doubts but I have no direct experience. But, given that hyperbaric treatment is fairly safe, inexpensive and readily available, if somebody was to turn up in my chamber a week after onset, I would probably give it a shot. Two weeks, five weeks later, I do not know.

John Knight

In 1980 SPUMS had a meeting with the Singapore Navy where C L Yap, one of their diving doctors, reported on 58 diving fishermen who, when they developed DCI, remained on board the boat for up to a fortnight before reaching Singapore and treatment.[13] The mean time to treatment was 90 hours. All 11 type 1 cases recovered completely after a RN Table 62 (USN 6). Of the 47 Type 2 cases, who were treated with repeated hyperbaric oxygen, 18 (38.3%) had complete recovery and 20 (42.6%) had more than 50% recovery. Only 3, who had complete paraplegia and bowel and bladder deficits, failed to improve. So about 80%, got useful neurological improvement from their treatment with hyperbaric oxygen as late as three weeks.

Peter Chapman-Smith

What is the role of ambient pressure oxygen in between HBO treatments? We treat people once or twice a day. Is oxygen, at ambient pressure, ever used in between those once or twice a day treatments?

Richard Moon

I cannot answer that, except to say that if one does administer ambient oxygen between hyperbaric treatments, one is much more likely to experience pulmonary oxygen toxicity during subsequent treatments. We and others have seen that. Whether or not there is any difference in outcome, I do not know.

Unidentified speaker

In the 1960s and 70s Carl Edmonds in the Australian Navy was using normobaric oxygen between treatments. He found that this may have decreased the number of repeat treatments that the patient needed.

Unidentified speaker

Is there any place now for saturation treatment? For which patients would you still use the saturation treatment, or the very long air tables?

Richard Moon

I think saturation treatments should be reserved for the patient who presents early, and in a facility which has the necessary hardware and technical and medical support to provide saturation.

Unidentified speaker

Another problem is technical divers, and even military divers, going for deep heliox dives. That is, dives to 80 to 100. What kind of recompression table are you able to recommend for the deep blow up for these divers?

Richard Moon

I assume your question is related to civilian facilities. For deep blow up or technical dives, I think one has to often resort to the deep tables, such as the Lambertsen Table 7A or the US Navy Table 8, which cannot easily be administered in most civilian chambers. In these cases I

think the only thing that one can do is to treat using a table such as USN Table 6 with extensions until there is some kind of clinical response. I would be inclined, if I had a diver very soon after a blow up, to go deep rather than shallow, because the diver is likely to have a large volume of inert gas bubbles, which will be more likely to respond to pressure rather than simply oxygen. But the situation you are describing is uncommon, and it is one for which many civilian facilities lack the capability or the experience.

Jim Marwood

It seems that there is not much we can do other than to induce divers to come earlier. I remember an instructor, a long time ago, who quite early in the course would draw a tombstone on the blackboard and say "That is for any of you who is impatient enough to come up quickly, and especially if you hold your breath!". The PADI course, which so many divers do, stresses the positive and the pleasures of the sport, all very enthusiastically. But an instructor is not, as I understand it, encouraged to emphasise the dangers. I wonder if it would be a good idea to have, somewhere fairly early in the course, a doom and gloom session to bring to notice the importance of reporting any symptoms as early as possible.

Des Gorman

I think that doom and gloom is, unfortunately, why people present late. We all have a concept of culpability which runs through most things we do. We do not understand risk but we do understand blame. A classic example of an Antipodean risk assessment is the young bloke who goes to a party, meets a girl he does not know, decides not to have sex with her for fear of getting AIDS, and then drives home pissed.

Our concepts of risks are related to the outcome. A social acceptability outcome, rather than real level of risk. If we tried to set up a dive shop marketing a risk-related approach to diving, we would not make money. The reason why people go along to the diving schools to learn to dive is because they market safe diving, and that is the only commercially viable form of diving education. Safe diving is what the community wants and what the community demands. Unfortunately, the minute one says to somebody "this is safe diving", one is saying that any adverse outcome is the product of unsafe diving. The end result is that culpability is established at the core of decompression illness. I suspect the doom and gloom link just reinforces that.

The only way, I believe, is to try to shift education to a risk-related basis. But I do not think it will work. Divers are looking for safety. I do not think they would understand a risk-related approach, even if one tried to teach it. The average person is not receptive to that level of sophistication in teaching. My fear about doom and gloom is that it continues to reinforce the false culpability axis which I believe is a major player, but not the only player, in delayed treatment. One of the reasons why people show up with an amazing series of explanations, "I twisted my knee on this", "I hurt my shoulder on that", "I often have a sore back", "It's not uncommon for me not to be able to pee for three days", is rationalising away what they see as being some admission of fault or breaking of some sacred writs.

So I have some misgivings about doom and gloom, and I do not believe that any dive training organisation would be able to shift away from the concept of safe diving. Because it is what the market demands.

James Francis

I would put a slightly different slant on that. Doom and gloom, I agree, is not the way to approach the problem. But I think it is worthwhile taking a pragmatic approach and telling people that, as we all know, diving problems happen. And if it does happen, it is a good idea to tell somebody fairly quickly. I think one can get around this problem of blame by saying "as you all know people get bent regardless of whether they are inside the tables or out". In the Royal Navy divers are taught from a very start that they should report any abnormal symptoms. That is, I think, one of the reasons why military divers do so well from treatment, because, generally speaking, they report early. They are not blamed if they report an illness. One of the reasons is the way the military diving is controlled; if anyone is to blame it will be the dive supervisors, because they have a pretty rigid control over the dive profile which is actually dived. So if the divers do develop DCI they do report it early, and generally they respond well to treatment. If that sort of ethic or culture could be inculcated in the sports diver community, I think we would be on a better wicket than the way things are currently done.

Simon Mitchell

We, in the Royal New Zealand Navy (RNZN), have a policy of taking people deeper after inadequate response, first at 18 m of seawater and then at 30 m. We have seen a lot of cases where inadequate response at 18 m is reversed at 30, or even deeper at 50 m. We have not published that data. The data from the last 3 or 4 years is really the property of another researcher at our unit, and is not something I have looked at writing up. However, the lignocaine trial where we have a similar recompression algorithm, will be written up and published.

We have had three Royal Australian Navy Medical Officers, over the last 5 years, who have arrived with the mindset that one should not go deeper than 18 m under any circumstances or that it is very unusual to do so. All of them left as a proponent of going deeper where there is inadequate response initially at 18 m, because we see it so often. However I have no figures to present to you.

Mike Bennett

There is some data suggesting that people get short

term improvement, but that still does not answer the question of whether there is any difference in ultimate outcome. Extended and/or repeated oxygen treatment at 18 m may produce the same final result in the end, it is just not presented in the same way, as resolution of symptoms on a deeper compression.

Simon Mitchell

I am sure that is true. The problem is one of risk benefit, a similar situation which applies to saturation tables. Richard has recommended that the use of saturation tables should be limited on the basis that they are difficult to do and they present hazards all of their own. Our contention is that the deeper treatments at 30 m and 50 m involve relatively small increases in risk to attendants and in logistical difficulties. On top of that, if it is something one can do early that produces an apparent benefit, then one probably should do it. But I have not got the long term outcome data that would demonstrate a benefit overall.

Richard Moon

Can I again speak to the helium issue? The idea of using heliox as part of a recompression has been around now for 10 or 15 years, and slowly but surely, based on anecdotal reports and personal experience, it is becoming the de facto standard of care, unfortunately, I believe, without the necessary data. It may well be correct that helium-oxygen is more efficacious than oxygen or nitrox, but I think the danger of accepting this notion without the proper data is that a tremendous expense to chambers around the world would be incurred as a result of having to install the necessary capability.

Let me give you a example of the danger of basing ideas on personal anecdotal experience. I have seen a number of severe neurological bends referred to our medical centre after having received a treatment somewhere else, which either did nothing or actually appeared to make the patient worse. Those patients uniformly responded to recompression at our medical centre. I do not really understand why, it must have something to do with the natural history of the disease, but treatment a day later often is more efficacious than the initial treatment.

If we had used helium-oxygen for those second treatments, we would be enthusiastically touting helium-oxygen. So, we must keep an open mind on heliox, but not accept it until we the necessary observations have been made.

Des Gorman

In response to Michael's comments about repeated oxygen treatments, I agree with Simon's stance. I believe that it is inappropriate to wait until tomorrow to try and resolve neurological disease if one has access to treatments that can turn it off today. I think one should pursue recovery vigorously as soon as one possibly can. The idea that one gives them something this afternoon on the basis that we can treat them tomorrow is inappropriate for a young person with a neurological lesion. I think we should be aggressive and try and control the disease as quickly as you can.

An issue that I forgot to mention with the helium study, and one of the things I think we need to address in our lignocaine study and elsewhere, is what is the incidence of long term depression and psychometric anomalies in people admitted to hospital for a broken leg, an abdominal crisis, or after road traffic accident. In other words, are we measuring the effects of hospitalisation per se rather than the results of DCI?. It worries me enormously when I see 40% of our patient load suffering from depression at one month, which is the sort of figures that one sees if one takes the trouble to talk to them. We need to know how many people admitted to hospital for any reason will have similar levels of depression which affect their psychometric performance a month later. I think we need to introduce another control group of people who are age, sex, alcohol and drug matched, who have not been diving at all, but have been admitted for some non-traumatic, preferably non-head injured, reason and discover what is the prevalence of psychometric anomalies and mood anomalies in people admitted to hospital. Looking at studies of CO poisoning, in particular, and decompression illness as well, I believe we are now measuring what may well be the result of a lifetime of stress, and nothing to do with the effects of bubbles. We need to know what the effect is on young people who have a traumatic admission to hospital. Simon and I intend adding such a control group.

Mike Davis

We now have heliox in our chamber. It was not very expensive to put in. The gases are much more expensive than using oxygen, there is not much doubt about that, but the amount of gas one uses with a built in breathing system (BIBS), with a demand supply, for a single patient in one treatment is not particularly great. The table that the RNZN is using, which we have adopted, is shorter than extending a Table 6 and so one saves on costs of staffing. The RNZN table does not require an enormous initial capital cost. It cost us about $NZ 5,000, and we may save a little bit on the treatment compared with an extended table. Cost is perhaps not a concern in that approach, as opposed to saturation therapies, which clearly are not cost effective in terms of the enormous outlay.

I will aslo comment on the "second treatment effect", when commonly one appears to get a significant improvement with the second oxygen treatment. For quite a few years in our old unit in Christchurch, we tended to give divers a Table 6, as their second treatment. In recent times we have adopted the Behnke 18:60:30 table as our routine follow up and I have got my doubts about that. It has been nagging me that perhaps we should go back to doing a Table 6 as the second treatment in any patient who requires more than one treatment and keeping the shorter oxygen treatments for later. I would like to hear the panel's

comments.

James Francis

I agree with your sentiments. The problem is the lack of any properly controlled trials. That is the only way these issues will be resolved and, until the trials are done, it is one opinion against another. It does not matter how many animal experiments one can quote on one side of the argument or the other. There are tremendous difficulties in extrapolating the findings from animal experiments to the human disease. Not just in measuring endpoints, but indeed in the nature of the disease. I am particularly critical of people who extrapolate experiments on small rodents to the human species. There are a few rats amongst us humans, but not enough to make any such trials appropriate.

I think that one of the most exciting things we have heard this week so far was from Simon yesterday.[3] If one is going to try to do controlled trials, one has got to have a sound means of assessing outcome. I wish Simon all success with the model he has come up with. If it does prove to be a reliable, and above all, reproducible measure of assessing individuals, then for the first time we have a got a fighting chance of doing some properly controlled trials. Until they are done we could have this meeting again in another five years and we would reach a similar consensus, which is basically, to say "I do not know".

Des Gorman

Let us design that study though. We could do a study to look at retreatments for patients. How many centres would one need, over what period of time, to achieve a power for a comparative group on follow up treatments? We would have to have virtually every hyperbaric unit around the world, which treats divers, using the same protocol, to acquire, over a 5 years period, enough subjects of homogeneity to make some sensible power study. That is the problem. Just think about the problems and complexities of getting comparative data for follow up treatments. My concerns are the length of time, the number of units and the number of subjects. One needs to study follow up treatments, looking at different options and at homogeneity of the population. It would be a hideous project. James, you can do that one.

I think there are some far more fundamental issues about acute presentation.

James Francis

I do not think one necessarily has to test every single table. One could certainly make a start by looking at, say, with initial treatments, deep versus shallow. One might, after that, do a second study looking at oxygen tables versus heliox tables. As far as retreatment is concerned, one can group them into short tables for retreatment versus longer ones. If one can start to find answers to the broader questions, then one may be in a position to start refining it to specific tables. One needs to decide which is the most important question and look at that one first. Probably the most important question is do you go deep, or do you go reasonably shallow for your first treatment? I have no idea of the answer.

Des Gorman

I agree that one has to choose the right question. But we have a considerable advantage, because we have two relatively large groups of patients, in Australia and New Zealand, who do not become completely well. Having a lot of treatment failures actually makes research easier. With a group in which about 30% have significantly less than complete relief, bringing a practical improvement in that rate, down to 15% say, will allow one to use a much smaller group of people.

David Griffiths

My experience in Queensland is that the majority of people who present to diving instructors after diving are tourists. A few of them are just sent away and told that they have nothing to worry about. The majority are taken seriously and are treated with surface oxygen. Some of these people are a day or so out from port. There is a debate about whether they should stay on surface oxygen and come in on the boat within 12 hours, or whether they should be evacuated by helicopter. Can the panel give advice about who should be helicoptered in? The worrying group is those who, when they have had surface oxygen, feel so much better that they do not come to the chamber at all. Following that group will be difficult. Are they exposing themselves to risk of dysbaric osteonecrosis, or other problems?

David Youngblood

I cannot answer about dysbaric osteonecrosis. There is very little information available on surface oxygen, except in the realm of altitude decompression sickness. The US Air Force, and probably other air forces as well, use surface oxygen as a definitive treatment for altitude DCI when there is complete relief and there were no neurological symptoms. I think it is an open question for the treatment of decompression sickness in divers. Is there any circumstance in which surface oxygen could be the definitive treatment? I think it bears looking at, particularly with minor pain or perhaps even sensory symptoms. However, I think we have all seen cases in which there was an apparent response to surface oxygen and then deterioration once the oxygen was discontinued. So, I think if one wants to incorporate a surface oxygen paradigm into the treatment of bends, it has to make allowance for the problem, what does one do with the patient who gets worse once the oxygen is stopped?

Simon Mitchell

My belief is that one should see them all. We have often had someone ring in with apparently trivial symptoms

and, when they arrive at our unit and we examine them, or get a decent history, we find that the situation is a lot worse than it was first portrayed to us. And we think "Thank goodness we encouraged this person to come", because it is actually quite significant DCI. We see this time after time. I think it is part of the denial response. When people ring up, they are in a situation where it is going to inconvenience others to be evacuated, so they tend to play it down.

James Francis

The only data I am aware of on dysbaric osteonecrosis relates to naval divers. It is the Harrison and Elliott paper of some years ago now, where they looked at 88 cases of dysbaric osteonecrosis.[14] They found that not all of these cases had been bent in the past and, where they had had limb pain, it did not necessarily correlate with the site of their dysbaric osteonecrosis. I think similar findings came out of the Newcastle-on-Tyne registry. As yet we are not aware of an epidemic of dysbaric osteonecrosis in the recreational diving community, so I think that is probably a bit of a red herring at the moment.

Ian Miller

I have an anecdote, a comment and a question.

In Melbourne we have certainly had several patients who had a high cortical function loss, lethargy, not performing well, who have presented 3 to 4 weeks after onset and responded to hyperbaric treatment. We have also had several cases who have had significant higher brain dysfunction, the improvement in which has plateaued out and they have been left with quite severe disease after 8 to 10 treatments using 18 m tables. We elected to try a Comex 30 with heliox on one diver and an 18 m using heliox on another, and in both saw quite dramatic response. That was 10 days to two weeks after the initial presentation.

I think that says something interesting about the variability of the disease, which is my comment with regard to any trials. I think we need to be very careful when we are designing trials, that we recognise that it is a very variable disease and, if we aim to test just a single therapy across the board, or a single approach, we run the risk of losing significant results in a lot of noise. The therapeutic approach may be the right one for a particular subgroup of decompression cases, but may offer no benefit or may indeed be a negative factor for another group. Inevitably we need to be looking for a treatment strategy which is matched to the severity of the disease.

What are the Panel's thoughts on whether we maybe introducing a negative factor into patients by giving them too much oxygen? Whether there may be an element of oxygen toxicity or of oxygen exacerbation of inflammatory or liver peroxidation processes going on, and whether that may be something we need to consider.

Des Gorman

Just briefly Ian, I think the anecdotes you describe are the reason why any clinical trial of decompression illness needs a placebo and a non-diving control group.

The other point, made about oxygen on the surface. If we are going to trial oxygen-helium, that is where we should be trialling it, as a first aid gas. I would recommend a trial of oxygen and heliox as first aid treatment.

About oxygen toxicity. There is no substantive data at present. The reality is Table 5 or 6 produce recovery in 95% of patients, especially if treated early in the Naval context.[14] The question one should ask is, whether that is the appropriate dose of oxygen for someone turning up 2 to 3 days later. That is the heterogeneity I am talking about. I am not arguing that we should not do trials, I am just saying that we need to be reasonably modest in our ambitions, because the potential heterogeneity is so great.

I think the simple answer to oxygen is, that the majority of people who are treated with it early get dramatically better. I have got no idea why. It is a poisonous dose of oxygen we use, there is no question of that. But the clinical response is that they get carried in and walk out. We have to have faith in what we see and not worry too much about problems. When we are looking at outcomes, we have to be very careful not to be confounded by placebo and hysteria and the effect of depression induced by hospitalisation.

David Youngblood

I thought this might be an appropriate time to drop a challenge to this group, and hopefully to a potential multi-national group. Last year you heard about the lobster divers on the Mosquito Coast of Honduras, who are relatively advanced.[15] I have just got back from Nicaragua and there is a very unusual situation there. God's great experiment, I call it. There are 54 boats with a minimum of 30 divers on each, that is roughly 1,500 divers. They are, genetically, almost all the same. They all dive the same profiles. For the first time in diving history we have a denominator. They get absolutely no treatment, so we do not have anything to be confused about and it would be the first aid intervention. We could put teams on various boats at the same time. The season runs from December through to the end of March, although it is a bit rugged to do it. They all dive to 27 m (90 ft) to 36 m (120 ft), they dive all day, they use 16 to 20 tanks a day and they have huge omitted decompression debts. We have just finished installing a chamber in Nicaragua. We need to get there and measure what is happening first and then carefully plan some interventions and see what happens.

Des Gorman

I would like to ask Peter Robinson whether as a health funder, is he worried about the possible shift to more expensive treatments for decompression sickness?

Peter Robinson

I think the short answer is that anything that is going to increase ACC spending is going to be of some concern, if not to me personally, then certainly to the new Minister for ACC. Diving accidents last year consumed about one million dollars. It is the second highest cost group per claim that we have, behind skiing, if you look at recreational issues. In the overall scheme of things, a million out of 1.6 billion budget of outgoing is pretty minimal.

I think that we certainly would want some sort of cost containment, because we do not have a direct levy to pinch money off the people who damage themselves and then consume our resources. New Zealanders will have noticed in the press recently that we have been talking of insurance excesses, so that people become responsible for the first $400. That will be $400 for treatment which comes from the patient. There is also the question of whether we should be levying sports clubs. That is such a bureaucratic and administrative nightmare that I do not think it will happen in the next decade.

Certainly we want efficacy of intervention, and I think one of the first things that will impact upon the people treating divers will be that the contracts will start asking how you assess that one has done a good job. To say "I thought we did well, because it seemed to work last year" is not, I think, a viable funding option for the future.

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