

A REVIEW OF THE EFFECTIVENESS OF THE RESORT STYLE MEDICAL DECLARATION IN QUEENSLAND

Chris Coxon

Note

Chris Coxon is a Senior Inspector with the Department of Employment, Training and Industrial Relations, Division of Workplace Health and Safety, of the Queensland Government. He is based in Cairns. He has worked extensively in the recreational diving industry as a PADI Instructor and had an intimate knowledge of industry practice across north Queensland.

The opinions offered in this paper are those of the author and do not represent the views or policy of the Department of Employment, Training and Industrial Relations.

Key Words

Medical standards, recreational diving.

Abstract

Resort diving, being an introductory scuba experience or introductory educational diving program conducted to a recreational scuba training organisation's standards, probably forms the single largest sector of the Queensland diving industry in terms of numbers of participants.

Resort dives take place in open water environments to a maximum depth of 12 m, usually for 20-40 minutes, in groups of a maximum of four participants to one instructor or six participants to one instructor and one certified assistant. The dives are, typically, immediately preceded by a short period of theory and in-water instruction. Participants fill in a medical declaration and there are age restrictions.

There has not been a notified fatal resort diving incident in Queensland since two were recorded in 1993. This contrasts with all other sectors of the recreational diving industry in the same period.

Following the 1993 incidents, legislation governing recreational diving in Queensland was reviewed and the Code of Practice for Recreational Diving and Recreational Snorkelling was gazetted in 1995 with increased focus on resort diving standards. In the intervening period, education and enforcement of these standards was expanded with the number of Workplace Health and Safety Inspectors working with the diving industry rising from two to five. The latest review of standards is the enactment of the Compressed Air Recreational Diving and Recreational

Snorkelling Industry Code of Practice and Regulation 1999. Currently Queensland is the only state in Australia with this type of legislation.

Throughout this period the key role of the medical fitness declaration for resort divers has been acknowledged by operators, training agencies, regulators and the diving medical fraternity. However the resort diving medical declaration has also been widely criticised as ineffective.

A study of declarations from four Cairns-based day trip dive operators reveals levels of identification of medical conditions similar to those found by medical practitioners with regard to the more extensive open water course style medical questionnaire. Coupled with the apparent low fatal incident rate, a case can be made for the overall effectiveness of this system in Queensland.

Resort Diving

Resort Diving in Queensland is dominated by two training agency programs, the Scuba Schools International (SSI) Introductory Diving Experience and the Professional Association of Diving Instructors (PADI) Discover Scuba Diving Program. The sobriquet "resort diving" seems to have stemmed from the initial popularity of this style of diving on island resorts. The programs typically aim to give a one off experience to introduce a person to compressed air diving.

Both agency programs are similar, with several companies offering both in an interchangeable manner. Table 1 shows certain aspects of the courses which are stipulated in either the Queensland Government's Workplace Health and Safety Regulation Amendment (No.2) 1999 or Compressed Air Recreational Diving and Recreational Snorkelling Industry Code of Practice (1999).^{1,2}

The resort dive program typically consists of four stages. The first is to sign up and evaluate potential participants. The role of the medical declaration in this process will be discussed in more detail.

Secondly, participants attend a theory session, usually lasting from between 20 to 40 minutes. In the PADI system this includes the compulsory use of a flip chart which is available in several languages. There is also an eight question true/false style questionnaire at the end of this presentation. The SSI system grants more flexibility to the instructor to determine the extent of instruction required. Although in some cases this session is conducted at some time prior to the dive taking place, it is more typical for this to occur as a vessel proceeds to the reef or upon its arrival.

Thirdly there is a water skills session. As with the theory session there is a discrepancy between the agencies,

TABLE 1

ISSUES ADDRESSED REGARDING RESORT DIVING IN THE QUEENSLAND WORKPLACE HEALTH AND SAFETY AMENDMENT REGULATION (NO.2) 1999 AND THE INDUSTRY CODE OF PRACTICE FOR COMPRESSED AIR RECREATIONAL DIVING AND RECREATIONAL SNORKELLING

Regulatory Elements (Mandatory)

Medical declaration
 Dive safety log
 In water supervision ratios

Code Elements (Advisory)

In water supervision methods
 Appropriate skills and knowledge of divers
 Instruction and advice to non-English speaking divers.
 Equipment for diving
 Diving depths

with PADI opting for set skills requirement and SSI leaving it more towards the instructor’s discretion, with a few mandatory elements. This may take place in a variety of settings offering confined water conditions, such as a resort pool, off a beach, on a platform, bar or rope arrangement hung from a vessel, or even from custom built “moon pools” which have become a standard feature on most reef pontoons. Typically this session lasts between two and 15 minutes.

Finally there is the dive itself. Here the agencies revert to a similar standard and the regulatory involvement is highest. Dives are restricted to a maximum depth of 12 m although most dives take place in about six m. The sites selected are normally used on a daily basis and despite sometimes less than perfect conditions, are usually well known to the instructors. Many sites have been modified, for example with guiding ropes or bars, to ease the control of the group. Many operators used certified assistants, such as divemasters (PADI) or dive controllers (SSI) to raise ratio numbers and provide extra supervision. In recent years the advent of a viable video retail industry and increased use of “diver training for work” programs have helped increase the numbers of qualified, or semi-qualified, persons escorting a group of resort divers. Some companies advocate a simple “all dives are hand-held

policy” and most restrict the distance travelled by the divers to about 30 m from the starting point. The time spent underwater is usually between 20 and 40 minutes.

The scope of resort diving in North Queensland

There is a dearth of good and recent data on how many people dive in Queensland, how many dives they do and what categories they fall into. The Great Barrier Reef Marine Park Authority (GBRMPA) studied the number of dives (Table 2) in its various areas for 1994.³

The same study concluded that a total of 1,290,500 dives were done in total, making resort diving approximately 10% of the total. It also concluded that 60% of all Queensland diving took place between Lizard Island and Innisfail.

In 1994 the average cost of a resort dive was \$65, thereby generating an overall earning of \$5,395,000. The average cost in 1999 has risen to approximately \$80.⁴

These figures were constructed on the number of dives, not the number of divers. One diver undertaking an open water course will undertake a minimum of 4 dives. A certified diver on a 4 day dive trip will usually do about 12 dives. However, typically, the resort diver does a single dive only. Applying these figures to the Cairns region suggests that, in the same period, there were 5,500 open water certifications (22,000 dives) and 60,000 certified divers (720,000 dives). Thus it would appear that resort divers constitute the single largest group of divers (83,000) although their exposure to the risks of diving are limited by their, typically, single dive experience.

Locally gathered figures for 1999 concluded that there were 125,581 resort dives in the Cairns Region in 1999. This represents an approximate 50% growth in 5 years. Anecdotal evidence suggests that this rate of growth for resort diving far surpasses other sectors of the recreational diving industry.

TABLE 2

RESORT COURSES IN QUEENSLAND, FROM A STUDY INTO THE NUMBER OF DIVES CONDUCTED ON THE GREAT BARRIER REEF IN 1994.

Cairns	83,000
Townsville	4,500
Whitsundays	34,000
Capricorn Bunker	5,500
SE Queensland (non-GBRMPA permits)	2,500
Total	129,500

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The resort diving market is quite sectoral, both geographically and amongst operators. However its low entry hurdles and mass marketing possibilities make it the mainstay of an increasing number of diving operations ranging from back-packer vessels to the largest reef pontoon operators.⁵

The incidents

As discussed above, there is limited data available for comparative comment on rates of diving incidents.

Instead discussion often focuses on the anecdotal nature of particular incidents which can only be of little value in an overall assessment of the efficacy of the various control measures used to minimise the risks associated with this type of diving.⁶

All workplaces in Queensland are required to notify the Division of Workplace Health and Safety of certain categories of workplace incident. These include fatalities and hospitalisations.

Compliance with these notification requirements may not be complete, but are best with the most significant incidents i.e. fatalities.

Anecdotal evidence suggests that there are many lower level incidents, such as ear and sinus barotrauma that go unrecorded.⁷ Nonetheless Table 3 shows that resort diving fatality statistics are amongst the lowest levels in the recreational diving industry and that there has not been a fatal incident in Queensland since 1994.

In each of the three resort diving fatalities the person became separated from their instructor.

None of the incidents recorded a known medical precondition as a significant contributory factor although one showed a severe myocardial infarction on post mortem.

There is widely held belief amongst recreational diving operators that two main factors contribute to this low incident rate, these being close in-water supervision and the pre-dive screening provided by the resort dive medical declaration.

The resort dive medical declaration

The current resort dive medical declaration has had a chequered history. In Queensland this document stemmed from an original developed by Dr Bob Thomas for remote location use (the original resort concept).⁸ However, once in use, diver employer groups such as the Queensland Dive Tourism and Travel Association (QDTAA) and later Dive Queensland picked it up as a medical screen. It can be found in both PADI and SSI agency standards and has appeared firstly as a both an advisory and most recently a regulatory element in Workplace Health and Safety Legislation.¹

The layout has changed somewhat over the years, both in terms of individual questions and the format.

TABLE 3

**RECREATIONAL DIVING AND SNORKELLING FATALITIES APRIL 1993- 31 DECEMBER 1999,
QUEENSLAND. SOURCE: DIVISION OF WORKPLACE HEALTH AND SAFETY INSPECTION AND
ADVISORY SERVICES DATABASE**

	Resort	Training	Certified	Workers	Total Divers	Snorkellers
93	1	1	2	1	5	3
94	2	0	1	0	3	1
95	0	1	2	0	3	1
96	0	0	1	0	1	9
97	0	0	1	0	1	13
98	0	1	4	1	6	2
99	0	1	1	0	2	5
Sub total	3	4	12	2		
Total					21	34

Originally it was in a questionnaire style but is now a declaration.

The form consists of three sections. Firstly are the "have you ever had" statements, then "Are you currently suffering from" and finally selected individual questions. The language is relatively non-medical in its terminology and the declaration is available in 12 languages from the Division of Workplace Health and Safety.

The purpose of the declaration is not to exclude a person from diving per se. Instead it is to exclude a person from a resort diving program until a medical practitioner has a chance to query them on the issue. Simply a "Yes" to any question on the declaration renders the participant unable to dive without a medical practitioner's approval.

Critics of this process may point to its prescriptive and arbitrary nature. Undoubtedly it is both of these and many persons who may, after proper consultation with a diving medical practitioner, be allowed to dive are restricted from undertaking a resort dive. However, as a tool to be used by essentially medically untrained persons, diving instructors, who seek clear, if not always medically valid delineation, the advantages of such a process should be clear.

Many operators have developed a relationship with a diving medical practitioner to allow queries or borderline cases to be reviewed, usually via a radio or telephone consultation. Despite the cautious responses from most medical practitioners involved,⁹ it remains a valuable part of the process.

The value of this is most commonly seen as a strategy to minimise the likelihood of a person lying. Assuming that a person completing the declaration wishes to undertake the resort dive, there may be a compulsion for the person to conceal a medical issue raised by the declaration. This type of problem must bedevil any sort of screening process for any condition not readily picked up by an examination. Where a medical practitioner is portrayed as the final arbitrator, there is less compulsion to lie on the original form presented to the dive instructor.

The ethical standards of the individual operator and instructor are the final hurdle for this process. Particularly where pay rates are linked to the numbers of dives undertaken, there may be an incentive to ignore, avoid, alter or dissuade the correct filling in of the declaration. In this area the prescriptive nature of the Workplace Health and Safety Regulation and penalties attached must serve as a reminder to all operators of the importance to follow the spirit as well as the letter of the declaration.

Since 1989, the Division of Workplace Health and Safety has mounted successful prosecutions of operators over resort diving incidents and has increased its enforcement, education and monitoring role across

Queensland by expanding the original force of two diving Inspectors to five.

Both training agencies also maintain quality assurance and education strategies to maintain compliance with their particular standards.

The Study

To maintain a level of confidence in the resort dive medical declaration as a screening tool for prospective participants, it would be reasonable to compare the identification rate and type of condition that it identified with the other similar screening process in the recreational diving industry. This is the AS4005.1 medical questionnaire given to prospective open water course students by a diving medical practitioner.

Four Cairns-based dive operators were approached who agreed to partake in the study. All operated day trips to reef sites off Cairns and resort diving formed the major part of their diving business. Each operator paid their dive instructors with an incentive commission based on the numbers of divers taken and for repeat dives.

Each operator was asked to provide a complete selection of completed medical declarations. All of the operators had policies to keep all completed declarations. However it was related that staff occasionally threw declarations disclosing a medical condition away on board. Others had to be discarded in the study where there was insufficient or confusing information on the form.

An indication of a medical condition does not necessarily imply that the person did not dive. However this was usually the case. The review process by the instructor, often including a radio or telephone consultation with a medical practitioner, would be the final arbitrator. This was not a mechanism to cast dive instructors in the role of medical examiner, but more usually the case to clarify an issue or misunderstanding. For example it is common that a person will indicate a medication with a brand name without any clear knowledge of what it is for. Similarly some issues do not translate well. The Mandarin for ear surgery is frequently taken to include ear piercing by prospective participants.

The results of the study are shown, by operator and condition, in Table 4.

The operators differed in one major respect. Two of the operators offered a generalised reef trip with diving, snorkelling, glass bottom boat tours etc (Numbers 1 and 2). They distributed dive medical declarations to all customers on boarding. This was done primarily as a marketing tool so that all clients on board could be potential resort dive customers. It served a safety function in that enabled the

crew to be aware of the medical conditions of other types of customers, including certified divers and snorkellers, as well. The declarations were then reviewed with those deemed as fit to dive and of the correct age moving automatically to the theory lesson part of the day. Once this was completed all customers, unless they actively "opted out", were grouped into dive groups and allotted a time. In this dive all divers were required to perform the necessary skills in confined water. It was at this moment that the customer was required

to acknowledge, with a signal, that they wished to proceed with the dive itself, and consequently pay for the experience.

The reality is that it is usual, for any group of four allocated to a particular dive, that at least one and occasionally all four limit their dive experience to the confined water experience and do not proceed away from the vessel. However as a marketing tool it is typical for

TABLE 4

CONDITIONS INDICATED ON THE DIVE MEDICAL DECLARATIONS OF FOUR CAIRNS DAY DIVE TRIP OPERATORS

	Operators					Totals %
	1	2	3	4	All	
Total declarations	2,051	536	660	141	3,388	
Incomplete/unclear	19	21	9	6	55	
Total available for study	2,032	515	651	135	3,333	
Total indicating medical conditions	179	40	39	8	266	100%
% indicating medical conditions	9%	8%	6%	6%	8%	
Medical conditions						
PULMONARY						
Asthma or Wheezing	98	22	19	4	143	53.8%
Chronic Bronchitis or persistent chest complaint	4	0	0	0	4	1.5%
Collapsed lung (Pneumothorax)	2	0	0	0	2	0.9%
TB or other long term lung disease	0	0	0	0	0	0.0%
Breathlessness	1	0	0	0	1	0.4%
CARDIOVASCULAR						
Chest Surgery	2	0	1	0	3	1.2%
Heart disease of any kind	4	2	0	0	6	2.3%
High blood pressure	18	3	2	0	23	8.6%
LIABLE TO ALTER CONSCIOUS STATE						
Diabetes mellitus	6	1	0	0	7	2.6%
Epilepsy	2	1	0	0	3	1.2%
Fainting, seizures, blackouts	0	1	0	1	2	0.9%
EARS AND SINUS						
Chronic sinus conditions	1	1	0	0	2	0.9%
Ear surgery	3	0	0	0	3	1.2%
Recurrent ear problems when flying	6	0	1	0	7	2.6%
Chronic ear discharge or infection	6	1	2	0	9	3.4%
Perforated eardrum	4	1	0	0	5	1.9%
OTHERS						
Brain, spinal cord or nervous disorder	1	0	1	0	2	0.9%
Other illness or operation within the last month	4	1	0	1	6	2.3%
Currently taking medicine or drug (excluding oral contraceptive)	13	5	5	1	24	9.0%
Alcohol within last 8 hours	3	1	0	0	4	1.5%
Pregnant	1	0	1	0	2	0.9%
Combined disorders	0	0	7	1	8	3.0%

vessels operating this type of system to take approximately 60% of their customers on a resort dive.

The other two operators (Numbers 3 and 4) used an "opt in" type of system. The resort dive program was promoted on the vessel using a variety of media with interested persons requested to approach the dive staff. This promotion usually would include face to face promotion with one or more diver instructors moving through the vessel. Once a person had approached the dive workers, they were then requested to complete the dive medical declaration. There would often be a pre-screening process, particularly when the style of declaration was a specially printed version, such as that produced by PADI as a part of the Discover Scuba Diving Program. This would involve the instructor talking to a person before requesting them to complete a medical declaration. Medical conditions may be discovered in this process and hence no declaration completed.

The day would then proceed with the theory session, division into groups, in water skills and then the dive. The dropout rate for this process tends to be much lower but typically the overall participation rate on a vessel is lower, typically around the 20% rate.

Both systems, and also questionnaires completed for diving medical practitioners, all suffer from a further pre-screening process that may take place formally, for example with booking agents advising persons regarding medical conditions when a trip is booked. This also takes place informally, particularly in the more developed information networks of backpacker-type participants, where information and advice (often incorrect!) is passed from person to person regarding this process.

This has two outcomes. Firstly it means that persons with listed conditions do not attempt to participate in a resort dive. Secondly it better prepares a person to lie or ignore questions about a particular condition.

Discussion

In his examination of the relative importance of different parts of the open water diving medical in identifying fitness to dive and the detection of asthma, Dr John Parker showed that, in his sample group, 9.8% were failed as fit to dive^{10,11}. In his break up of the four stages of the medical examination process, the questionnaire, the interview with the diver, the physical examination and investigations, he indicated that 48% of the failed group were anticipated through the questionnaire. This represents 5.2% of the whole examined population. If this is combined with the second stage of his examination, the total failed during these two processes represent 6.8% of the examined population.

The detection rates for the resort dive medical declaration provide detection percentages consistent or marginally higher than those in Dr Parker's study. This may lend some credibility to the capacity of the screening process of the resort dive medical declaration. However, the 3.9% of the failures identified by Dr Parker through examination and investigation are unable to be detected by the resort dive medical declaration.

This discrepancy should only matter if there is a difference in the outcome regarding diving incidents stemming from acknowledged medical conditions that materially contributed to an incident. For this to be accurately determined there would have to be experimental

TABLE 5

ADVANTAGES AND DISADVANTAGES OF THE RESORT DIVE MEDICAL DECLARATION SYSTEM AND THE OPEN WATER STYLE MEDICAL EXAMINATION BY A DIVING MEDICAL PRACTITIONER

Advantages

Resort Dive Medical Declaration

Quick
Simple
Cheap
Less reliant on medically trained persons and equipment
Current

Open Water Style Medical Examination

More comprehensive
Diving medical practitioner
Examination and investigations
Qualitative outcomes eg conditional certificates

Disadvantages

Limited scope
Administered by persons of limited medical training
Subject to external operational/ fiscal pressures
Arbitrary

Lengthy
Usually one-off check
Expensive
Reliant on medically trained persons and equipment
Subject to external operational/fiscal pressures

measurement against a control group, which is ethically unlikely to take place, or a comparable difference between the two main medical screening systems and particular incidents. As the overall numbers of documented incidents are so low and the rates of participation inaccurately known, quantitative comparisons are of limited value.

Instead it is probably of more use to acknowledge the relative effectiveness of both systems and consider their relative merits and disadvantages (see Table 5)

Conclusions

The resort dive medical declaration provides a widely used system of screening potential participants for a popular but limited diving experience. Despite limited anecdotal evidence based on particular incidents, it is possible to demonstrate with some confidence that the screening process identifies similar numbers of medical conditions of concern as the similar questionnaire part of the open water style medical examination.^{10,11} Within a regulatory framework provided under the Workplace Health and Safety Act 1995 in Queensland to enforce compliance levels on operators, this system appears to manage the risks posed by pre-existing and acknowledged medical conditions to this group of divers.

Acknowledgments

I wish to thank the four Cairns operators who volunteered their medical declarations for my scrutiny. Also the Department of Employment Training and Industrial Relations for their support in allowing me to prepare and present this paper.

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Mr Chris Coxon, MA, is a Senior Inspector in Workplace Health and Safety, Department of Employment Training and Industrial Relations of the Government of Queensland. His address is PO Box 2465, Cairns, Queensland 4870, Australia. Phone +61-(0)7-4048-1436. E-mail <christopher.coxon@detir.qld.gov.au>.

GLEANINGS FROM MEDICAL JOURNALS

Cigarette smoking and transcutaneous oxygen tensions: a case report

Strauss MB, Winant DM, Strauss AG and Hart GB. *Undersea Hyper Med* 2000; 27 (1): 43-46

We report the effects of acute smoking cessation on transcutaneous oxygen (PtcO₂) measurements in room air and with hyperbaric oxygen (HBO₂) of an extremity at risk for amputation. The reports on cigarette smoking and PtcO₂ do not discuss acute smoking cessation. PtcO₂ measured

46 h after smoking cessation increased 10% while breathing room air and 34% with HBO₂, as compared to measurements made before smoking cessation.

Baromedical Department, Long Beach Memorial Medical Center, P.O. Box 1428, Long Beach, California 90801-1428

Key Words

Hyperbaric research, medical conditions and problems, oxygen, reprinted.