

Several years ago Dr Archer S Gordon studied the effectiveness of CPR performed in water and various other special situations in animals, human volunteers, and mannikins. He found that in-water CPR was quite ineffectual in moving blood to the brain when the test subjects were tilted to a 30° feetdown position; the mean carotid blood flow was reduced to 3% to 6% of control values when the patient was in this position (personal communication, May 1980, AS Gordon). Anyone who tries to perform in-water CPR in the horizontal, behind-the-victim position proposed by March will find it difficult to maintain a purely horizontal position while propelling oneself through the water. During informal observations of scuba diving students and instructors simulating rescues utilizing this technique in calm ocean water, I observed that a 20° to 30° feet-down position was about the best that could be maintained for distances greater than a few feet.

Several other questions about in-water CPR have not been adequately answered. There is no published data about the efficacy of the proposed method in the open water situation where a rescuer must contend with waves, surge, current, sometimes frigid temperatures, inclement weather, and other conditions not encountered in the reported swimming pool trials. If trained test rescuers are unable to meet the basic CPR standards in a swimming pool, it is hard to conceive that such could be achieved in less hospitable water. Similarly when CPR is performed in the horizontal, behind-the-victim position, all the work of chest compression must be done by the arms. In all but very well-muscled individuals, this is exhausting, especially if simultaneously propelling oneself through open water. Rescuer exhaustion, waves breaking over the rescuer's head, and other conditions likely to be encountered in real open water situations pose significant rescuer hazards.

Another aspect of in-water CPR that needs further investigation is the problem of assessing pulselessness in an aquatic accident victim who may be cold, wet, bradycardic, and possibly wearing a wet suit with a tight-fitting hood that obstructs neck access. How effective is in-water palpation of carotid pulsations in this victim, particularly if the rescuer has cold hands or is struggling against a surge? What is the risk of inducing ventricular fibrillation in a chilled bradycardic heart (which may be providing adequate cerebral circulation) that receives chest compressions because a pulse was erroneously not felt? Similarly how does wearing a wet suit, which increases chest wall stiffness, affect the pumping action of intrathoracic pressure fluctuations?

Perhaps the major value of the in-water CPR method proposed by March is identification of the scuba regulator as a means of providing in-water positive pressure ventilation. Studies by Eastman et al (4) also have suggested the usefulness of scuba regulator positive pressure rescue breathing. However, neither of these studies reports the use of this method in actual in-water casualty situations. Thus, although this method of pulmonary resuscitation appears promising, it is of unproved efficacy.

Despite the current enthusiasm displayed for in-water CPR by some, I cannot recommend the method proposed

by March and Matthews. The efficacy is far from established, and the method poses significant rescuer hazards in certain situations. The most likely result of performing in-water CPR as currently recommended would be to prolong the time it takes to get the victim to a place where more effective resuscitation can be accomplished. Therefore, I recommend the following approach for aquatic rescues: 1) move the victim out of the water and onto firm, horizontal surface as quickly as possible, deferring CPR until this is accomplished; and 2) perform in-water, mouth-to-mouth rescue breathing in cases in which the rescuer is a strong swimmer or has adequate flotation devices, and when the victim's head can be safely tilted back and turned to the side for rescue breathing. Specially calibrated scuba regulators may be useful for administering in-water positive pressure ventilation if future studies verify their efficacy.

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We are grateful for permission to reprint this letter from ANNALS OF EMERGENCY MEDICINE. Dr Kizer is the President of the North Pacific Chapter of the Undersea Medicine Society.

SCUBA WORKSHOP REPORT CONFERENCE OF NATIONAL CO-OPERATION IN AQUATICS

1982 COLUMBUS, OHIO

Dennis Graver, Chairman

The general theme for the scuba workshops at the conference was, "The physical screening of divers and discussion of theoretical levels of participation for those generally screened out because of medical conditions or physical disabilities". Experts in the areas of diving medicine, diver training, and physical disabilities assembled in Columbus, Ohio for four days of discussions related to the general theme. CNCA was fortunate to have the medical

community represented by noted physicians, to have representatives of two diver training agencies - PADI and YMCA - and to have the disabled community represented by two disabled diver organisations and a number of disabled individuals who dive.

Medical Conditions Workshops

Two workshops were devoted to the discussion of various medical conditions which can adversely affect divers. An attempt was made to categorize various conditions as either absolute or relative contraindications to diving. Only two conditions were discussed before the emphasis shifted to a broader topic area. One of the conditions addressed was epilepsy, which was identified as an absolute contraindication, even if an individual is symptom free for years and requires no anti-convulsant medication. Physicians present were aware of at least two instances where persons with long histories of absence of seizures above water experienced seizures at depth and subsequently embolized. The other condition discussed was diabetes. It was decided that participation in diving may be allowed if the diabetes could be controlled by diet and/or oral hypoglycaemics, but could not be condoned if an individual was insulin dependent.

It was discussed and agreed that the various medical conditions were so varied and individualistic that the establishment of a fixed, objective policy regarding them is not possible. The workshop participants concluded that persons with medical conditions which might be detrimental should be examined by a physician knowledgeable about diving, and that the acceptability or unacceptability of the person's participation in diving should be determined by the physician. To achieve this, several needed actions were identified:-

1. A list of all licensed physicians familiar with diving and diving medicine is needed. Dr Alfred Bove indicated that the Undersea Medical Society (UMS) was computerizing its directory and may be able to provide such a list very soon. Dennis Graver will contact UMS and request an annual listing of appropriate members. Other sources of physician's names include the Diving Accident Network, and the organizations which conduct diving medical courses for physicians.

2. Dr Chris Dueker proposed that a physical examination by a licensed physician be strongly recommended for all prospective divers. This proposal received strong support. Some objection was expressed, however, due to the cost ineffectiveness of a required physical examination and the lack of assurance of diving familiarity by the examining physician.

3. New forms to assess the medical condition of potential divers are needed. Considerable discussion led to agreement that the following items are needed:-

- A. A new medical history form that will identify undesirable medical conditions through a series of questions is to be developed.

Dr Werner Lissauer stated that 85% of all medical problems could be identified through a medical history. Several questions regarding each condition will be asked on the new form to help identify a condition by asking about it in various ways. The desirable response to each question will be varied from question to question to encourage careful reading of the questionnaire. A person will not be able to mark all "yes" or "no" and skim over the questionnaire lightly. Conditions indicating possible problems will be identified by a key prepared for the questionnaire. This method will enable a diving instructor to objectively determine when a diving student should be required to obtain medical approval for participation in diving. Dr Arthur Dick agreed to develop a draft of the medical history form and key. This form, along with the others to be described, will be finalized and offered to all diving training agencies under the auspices of CNCA.

- B. An informed consent statement on medical considerations is needed, and will be drafted by Dr George Harpur. The statement will identify various medical conditions and concerns regarding the effects of diving upon an individual with the conditions. The recommendation for a physical examination will be included in the statement, which will be worded in such a way that prospective divers will be informed, but not intimidated. A statement will be included to the effect that the medical history form (reverse side) has been completed accurately, and that the informed consent statement has been read, understood, and appreciated. Spaces for date, signature, and parental consent for minors will be included on the form.

- C. A set of brief guidelines for physicians conducting examinations for divers is needed. Dr Harpur also agreed to draft these. The guidelines will parallel the conditions listed on the medical history and informed consent forms, and will not exceed four quarto pages. A physician's statement will also be included to indicate approval or disapproval for participation in diving activities. It was decided that a "Conditional" approval not be included, but that any limitations recommended by a physician, eg. prescription lenses, be part of the approval portion of the physician's statement. Glen Egstrom will draft this statement.

Drafts of these new forms and statements will be reviewed by all workshop participants and submitted to the Undersea Medical Society for approval. Hopefully, with the endorsement of UMS and CNCA, the medical assessment of divers can be standardized through the development of these materials.

4. A final desirable action is the development of a standard medical conditions presentation to be included in instructor training courses. This presentation is to familiarize new instructors with the effects of various medical conditions as they pertain to diving. This concept is strongly supported by all workshop participants. Glen Egstrom suggested that Dr Jeff Davis may be able to coordinate a group effort among physicians to produce a script for the presentation. Dr Bove recommended that the Undersea Medical Society be contacted regarding co-

ordination and possible funding for the final product. Dennis Graver will contact them on this matter.

The medical workshops were very productive. If the materials identified can be developed on a widespread basis, diving organisations will experience less confusion and concern with the medical conditions of prospective divers. It will be very helpful to have better informed instructors and would-be divers.

Disabled Diver Workshops

In addition to physicians and instructional representatives, the following were in attendance at these workshops: 6-8 disabled divers, representatives of the American National Red Cross Adapted Aquatics group, instructors experienced in teaching disabled people to dive, an occupational therapist, and the leaders of two disabled diver associations.

Several slide presentations demonstrated that many individuals with various disabilities, some quite severe, are capable of performing the skills required for safe diving. Performances such as surf entries and exits performed independently by paraplegics were depicted, as well as independent performance in open water by persons with quadraparesis.

It is important that those with disabilities causing insensitivity in parts of the body be made aware of potential problems such as tissue breakdown caused by hard surfaces, possible injuries to exposed extremities, hypothermia from heat loss in extremities, increased risk of decompression sickness, and the inability to detect the symptoms of diving maladies. Possible respiratory problems for those with high-level injuries were also identified.

A conservative approach to diving for disableds who can safely participate in diving is recommended. Favourable environmental conditions, shallow dives, and the application of the cold and arduous rule for the dive tables were suggested.

Those who would teach diving to the disabled are encouraged to obtain information and training in advance. Proper attitudes and understanding are important. Suggestions include visits to rehabilitation centres, discussions with disabled divers, simulation of disabilities by the instructor, and studying information on disabilities. Information sources include articles on disabled divers, adapted aquatic books, and the disabled diver associations. Rusty Murray and Jim Gatacre, disabled association leaders, have agreed to compile information about training.

The majority of the discussions centred around the certification of disabled divers. It was agreed that anyone who could meet the standard requirements established by an agency could be certified. It could not be agreed, however, as to what form certification, if any, should be issued to a disabled individual who can safely dive under certain circumstances but who could not meet certain current objective performance standards for certification.

It was agreed that perhaps a set of comparable functional performance standards for disableds could be created. A committee, consisting of Dr Harry Heinitsch, Rusty Murray, Jim Gatacre, Bill Miller, and Fred Crouner was formed to develop recommended standards for disabled divers.

Instructional techniques were shared, and it was determined that similar techniques had been discovered independently in different regions of the country. The need to compile these procedures and make them available from one source was identified. Jim Gatacre and Rusty Murray offered to initiate such a project. Examples of information shared in the workshop include:

1. Buoyancy control (balance and stability) was the general problem most frequently experienced in training.
2. Fear of falling, fear of injury from improper handling, and injury from insensitivity were concerns of disabled students.
3. If a disabled person can keep up with a class, the person should be mainstreamed into training. Severe injuries require separate training, however.
4. Instructors should not assist disableds unless asked and then should act on instructions from the disabled person.
5. Equipment considerations include use of purge masks for paraplegics, use of low pressure inflator mechanisms at the outset of training, and the division of weights on two weight belts for open water training.
6. Activities outside of regular class hours are suggested for disableds. The suggested activities include swimming, snorkelling, and skill practice.
7. More time is required for the training of disableds. Time must be allowed for injuries and illnesses. Often the course is not set, but is an on-going programme.
8. Disabled individuals who are experienced divers are helpful in training other disableds to dive.

More information is needed concerning disabled divers. Documentation of diving activity will help provide a means of compiling data and statistics. Physical and physiological studies would be beneficial and add to existing knowledge. The safety record of disabled divers needs to be established. A single, central source to coordinate information and studies is needed. Rusty Murray and Jim Gatacre have expressed interest in forming a national agency to meet this need. They can be contacted at 128 Castle Road, Nahant, Massachusetts, 01908 and 1104 El Prado, San Clemente, California, 92672, respectively.

It was decided to continue the discussion of disabled divers at the next CNCA conference, and also to have a demonstration of diving skills by disableds.

Meeting with Camp Aquatics Group

The Camp Aquatics Group expressed interest in what the scuba training agencies could do to enhance aquatic programs at camps. Bob Smith of the YMCA and Dennis Graver of PADI outlined diver training programmes which could be useful for aquatic camps. Suggestions included skin diving classes, introductory scuba courses, refresher courses for certified divers, and the use of camps as instructor training course sites. It was also suggested that the agencies train the aquatic directors to teach skin diving. PADI offered its field representatives to assist with co-ordination and training. It was decided that the possibilities should be brought to the attention of the entire camping community through their periodicals. Armand Ball will co-ordinate the preparation of an article outlining the aquatic support which can be provided by diver training organizations.

Diver Re-Evaluation Workshop

An unscheduled workshop was conducted to address the topic of re-evaluation and updating of divers. This was a matter of general concern among the scuba workshop attendees. It was agreed that periodic updating would be valuable to refresh skills and knowledge, to familiarize divers with new information and equipment, to review dive table procedures, and to sharpen diving ability after periods of inactivity. Completion of such a program on an annual basis was recommended for all certified divers. It was felt that the course could be completed in about four hours. Groups of divers, such as dive clubs, can provide the best means to attract divers to such a course. It was agreed that such a program could not, nor should not be mandatory, but should be highly encouraged. It was unanimously agreed that a diver refresher programme is highly desirable for all divers. The YMCA refresher course was brought to the attention of the workshop participants, and the PADI "Scuba Review" course was introduced. These courses meet the needs identified within the workshop. It is hoped that all agencies will soon offer refresher courses and that the diving community will encourage periodic updating by all divers.

THE TECHNIQUES FOR DIVING ALONE

THOUGHTS ON A TABOO TOPIC

Lou Fead

SOLO DIVING

Have you made more than 50 open water dives?

Are you capable of surviving routine dives without any assistance, physical or mental, from a diving buddy?

"Yes" answers to the above mean you're probably experienced and capable enough to discuss another kind of sport diving - SOLO DIVING.

Solo Diving lets you satisfy the sudden urge for a dive immediately. It lets you linger underwater wherever and for however long you want - or jet away at full speed - or do whatever strikes your fancy. It even lets you change your mind at any time and not dive if that be your pleasure.

That's the main benefit of Solo Diving ... diving with a freedom of choice not hassled by any other humans.

Without a buddy, the burden for enjoyment is on the soloist. There's no one else to point out attractions, share the dive delights, or swear to the size of the one that got away. All that comes with the camaraderie that most buddy divers say attracts them to the buddy system.

You can be ready to dive solo if you'll accept the responsibility for your own enjoyment your own actions, and your own safety in the water. Accepting those responsibilities may be difficult in this day of suing someone else for not protecting you from yourself, but if you want to leave the beaten path and solo successfully, all you have to do is plan adequately to meet the personal responsibilities of solo diving to enjoy that special sport.

The Land Plan for Your Solo Dive

Planning differs from that for a buddy dive mainly in that it doesn't involve anyone else, obviously. In fact, the best solo dive planning is done to *eliminate the need for anyone else*.

There is one situation, however, in which even the finest of solo planning cannot achieve its purpose of eliminating the need for outside assistance. That's when a diver becomes incapacitated in the water. Survival then, without assistance, is just a matter of luck, the major disadvantage of being alone.

Since planning is the crux of a good solo dive, let's discuss the long-term variety where we'll find the first major benefit of diving alone - not having to co-ordinate your plans with a buddy, not 'anybuddy'. You can plan your dive to do what you want, when you want, where you want, and why, all without factoring 'anybody' else's preferences in.

You wanna go into cold dirty water? You got it - with no squeals from the less adventurous. You wanna dive only in the Tropics? You can have that too, without some macho dummy berating your preference.

Other long-term planning, that of checking equipment, health, and the expected weather, is the same as for buddy dives. Its purpose is to give the greatest chance for a successful dive by confirming that everything's ready for the dive beforehand.

Immediately prior to taking off for a solo dive, take the one action that comes closest to involving a sort of a buddy - tell someone who's staying home where you're going, for how long, and what to do if you don't return as scheduled. You might call that 'buddy' your *Search Organiser* - the one who will lead the way to your disabled boat, or your broken down dive van when you're late coming home. So file a dive plan, just as a flier files a flight plan and a boater a boat plan, to schedule some help in case of unforeseen breakdown.

The next step in planning comes at the dive site - deciding whether or not to dive. After comparing your current personal, physical and mental capabilities to the