

## **DROWNING**

The International Life Saving Federation formally endorses the final recommendations of the World Congress on Drowning that was organised by Prof. Dr. Joost BIERENS, PhD, MD (The Netherlands) – Member of the ILS Medical and Drowning Report Commissions.

### **1. A new, more appropriate, world-wide uniform definition of drowning must be adopted**

A uniform definition of drowning is important for purposes of registration, diagnosis and research. The following definition was accepted: “**Drowning is the process of experiencing respiratory impairment from submersion/immersion in liquid.**” All organisations involved in epidemiological research and vital statistical data collection as well as rescue organisations and the medical community should consider and preferably accept this new definition as a basis for useful communication and include it in their glossary. Further consultation of drowning experts is needed to uniformly classify morbidity and mortality due to drowning.

### **2. There is a great need of adequate and reliable international registrations of drowning incidents**

International and national registration procedures of the number of drowning victims, immersion hypothermia victims, rescues, and hospital data are needed to better appreciate the world-wide burden of drowning. Also clinical data, for example on resuscitations and re-warming techniques, are needed to improve treatment. International organisations, such as The World Health Organisation (WHO), the International Red Cross and Red Crescent organisations (IRCRC), the International Life Saving Federation (ILS), the International Life Boat Institute (ILF) and Diver’s Alert Network (DAN), as well as national organisations, institutions and medical research consortiums are advised to set up and coordinate data-collection.

**3. More data must be collected and knowledge gained about drowning in low-income countries and societies**

According to repeated WHO reports, over 80% of all drownings occur in low-income countries or in low-income groups in high income countries. Nevertheless only few epidemiological data about these risk groups are available. The WHO, IRCRC, ILS, ILF and the European Consumer Safety Institute (ECOSA) are encouraged to expand the research on drowning risk factors in these low-income groups because this is expected to have a major impact in reducing the risk of drowning.

**4. Preventive strategies and collaboration are needed**

The vast majority of drownings can be prevented and prevention (rather than rescue or resuscitation) is the most important method by which to reduce the number of drownings. The circumstances and events in drowning differ across many different situations and in different countries world wide. Considerable differences exist in the locations of drowning and among different cultures. Therefore, all agencies concerned with drowning prevention – legislative bodies, consumer groups, research institutions, local authorities and designers, manufacturers and retailers - must collaborate to set up national and local prevention initiatives. These will depend on good intelligence and insightful research, and must include environmental design and equipment designs as a first route, in conjunction with education, training programs and policies which address specific groups at risk, such as children. The programs must be evaluated and the results of the evaluations must be published.

**5. All individuals, and particularly police officers and fire fighters, must learn to swim**

Knowing how to swim is a major skill to prevent drowning for individuals at risk. International organisations such as WHO, IRCF and ILS, and their national branches must emphasize the importance of swimming lessons and drowning survival skills at all levels for as many persons as possible. The relationships between swimming lessons, swimming ability and drowning in children needs to be studied. In addition, certain public officials who frequently come in close contact with persons at risk for drowning, such as police officers and fire fighters, must be able to swim for their own safety and for the safety of the public.

**6. Rescue techniques must be investigated**

Most of the current rescue techniques have evolved by trial and error, with little scientific investigation. Rescue organisations such as the ILS, ILF, IRCRC but also the International Maritime Organization (IMO) must be encouraged to evaluate the self-rescue and rescue techniques in their training programs in accordance with current scientific data on the effectiveness and efficiency. Based on the data, the best rescue techniques must be selected for education and training programs.

**7. Basic resuscitation skills must be learned by all volunteer and professional rescuers as well as lay persons who frequent aquatic areas or supervise others in water environment**

The instant institution of optimal first aid and resuscitation techniques is the most important factor to survive after drowning has occurred. Resuscitation organisations, such as organisations, in particular those related to International Liaison Committee on Resuscitation (ILCOR), as well as professional rescue organisations and other groups who frequent aquatic areas, must promote training programs in first aid and Basic Life Support for

anyone who frequently visits or is assigned to work in the aquatic or other water environment.

**8. Uniform glossary of definitions and a uniform reporting of drowning resuscitation must be developed and used**

To increase the understanding of the dying process and the resuscitation potential in drowning, a uniform reporting system must be developed and used for the registration of resuscitation of drowning. International resuscitation organisations, such as ILCOR-related organisations and medical groups, must establish a uniform reporting system, facilitate its use, be involved in the analysis of the data and support of recommendations based on the studies.

**9. Hospital treatment of the severe drowning victim must be concentrated**

The optimal treatment of drowning victims includes dealing with specific severe complications such as the Acute Respiratory Distress Syndrome, pneumonia, hypoxic brain damage, hypothermia and cervical spine injuries. Due to the limited exposure and experience of most physicians with drowning victims, these victims should ideally be treated in specialised intensive care centres for optimal treatment and promotion of clinical research.

**10. Treatment of the patient with brain injury resulting from cardiopulmonary arrest attributable to drowning must be based on scientific evidence. Due to the absence of interventional outcome studies in human drowning victims, current therapeutic strategies must be extrapolated from studies of humans or animals having similar forms of acute brain injury**

The following recommendations for care of drowning victims who remain unresponsive due to anoxic encephalopathy are made on the basis of best available scientific evidence. The highest priority is restoration of spontaneous circulation. Subsequent to this, continuous monitoring of core and/or brain (tympanic) temperature is mandatory in the emergency department and intensive care unit (and in the pre-hospital setting to the extent possible). Drowning victims with restoration of adequate spontaneous circulation who remain comatose should not be actively re-warmed to temperature values  $>32-34^{\circ}\text{C}$ . If core temperature exceeds  $34^{\circ}\text{C}$ , hypothermia ( $32-34^{\circ}\text{C}$ ) should be achieved as soon as possible and sustained for 12-24 hours. Hyperthermia should be prevented at all times in the acute recovery period. There is insufficient evidence to support the use of any neuro-resuscitative pharmacologic therapy. Seizures should be appropriately treated. Blood glucose concentration should be frequently monitored and normoglycemic values maintained. Although there is insufficient evidence to support a specific target  $\text{PaCO}_2$  or oxygen saturation during and after resuscitation, hypoxemia should be avoided. Hypotension should also be avoided. Research is needed to evaluate specific efficacy of neuroresuscitative therapies in drowning victims.

**11. Wearing of appropriate and insulating life jackets must be promoted**

Without floating aids, a subject generally drowns within minutes due to swimming failure in cold water. Therefore, the development of insulating and safe garments for aquatic activities is needed. Life jackets should always be worn when immersion can occur to prevent submersion in an early stage. When only non-insulating floating aids can be used, the victim should consider whether swimming ashore is achievable.

**12. The balance between safety and profitability of recreational diving must remain critically observed**

It was agreed that self-regulation within the world-wide recreational diving industry continues to be the practical route for further improvement but that there is a need to counter the perception that there is a conflict between commercial interest and safety.

**13. Safety of diving fishermen needs more attention**

Subsistence fishermen, who are predominantly found in the poor countries around the world, use equipment that is minimal and their training, regulations and medical support appear to be zero.

To improve diving-fishermen safety and reduce drowning there is a need to collect data on accidents and drowning among representative samples of diving fishermen around the world.

This should be followed up with international non-governmental organisations, other charities and appropriate UN development initiatives so that existing academic societies, training organisations and others could deliver suitable medical and diving advice and training for fishermen compatible with the limits of available local resources.

**Several more specific recommendations have been proposed and need the full support of related organisations**

These recommendations refer to the further development of existing research projects such as:

- Global uniformity of beach signs and safety flags
- Risk assessment of beach hazards
- Determination of optimal visual scanning techniques
- Construction of the most adequate rescue boats, including alternatives such as jet boats, hovercrafts, with minimum risk of injuries for the drivers

Other recommendations were made to improve practical aspects related to:

- Legal aspects of drowning incidents
- Evacuation planning of large passenger ships
- Uniformity in training programs for lifeguards
- Fund raising for aquatic safety activities

All recommendations, together with the preparatory documents as consensus papers, reports of expert and research meetings, will be published in the Handbook on Drowning. The Handbook will be available in 2003. A large number of additional recommendations were elaborated before and during the World Congress on Drowning by the members of the task forces rescue and diving (breath hold, scuba and hose diving). These detailed recommendations are included in the appendices. All recommendations need full support from governments, organisations, institutions and individuals to enable reduction of the last remaining field of neglected injuries. Each year some 500,000 persons world-wide are still dying from drowning. This is too much.

## **Appendices to Recommendations of the World Congress on Drowning**

**Amsterdam 26 – 28 June 2002**

### **Overview recommendations task force Rescue**

During the preparation of the World Congress on Drowning, experts have prepared documents on a wide variety of topics. These topics have been further elaborated at the congress by the members of the task force rescue. Because of practical limitations in time, and the wide variety of subjects to be covered, there were no opportunities to include these recommendations in the final procedures.

### **Recommendations aimed at all national and international governmental bodies, including IMO, Search and Rescue organisations, the International Lifeboat Institution and prevention institutions**

1. The existing standard for the evaluation of hazard presented at beaches should be implemented as the world-wide standard to enable the development of appropriate drowning prevention strategies at beaches.
2. Communities throughout the world which can expect to face flooding, must prepare themselves and the emergency workers they designate, to effectively respond to flood rescue.
3. Search and rescue response must be ensured in areas around the world where there is significant maritime traffic, whether it be cruise liners, cargo ships, fishing boats or leisure craft.
4. The International Aeronautical and Maritime Search and Rescue Manual should be reviewed and incorporated by the sea rescue organisations of all of the nations of the world to ensure a coordinated and effective approach to maritime emergencies.
5. The Incident Command System, which has been developed to allow for effective oversight and organisation of emergency responses, should be adopted by all aquatic rescue organisations worldwide.

**Recommendations aimed at all national and international bodies in the area of rescue, including the International Red Cross and Red Crescent organisations, the International Lifeboat Institutions and the International Life Saving Federation**

1. Scientific study should be undertaken to form a basis for determining the skills and minimum competencies required to rescue another human in an aquatic emergency.
2. Further research is needed in the area of surveillance, scanning and vigilance by lifeguards from a physiological and psychological perspective to determine the best methods of instruction and practice.
3. Further research should be undertaken to identify appropriate use and training of the personal watercraft (PWC) in aquatic rescue.
4. Rescue communications must provide dependable, robust, integrated, and effective command and control for all involved segments of the response system, not simply point to point communications.
5. Sea rescue providers should ensure that their rescue craft keep pace with available technology, evaluating and embracing effective new types of surface rescue craft and air rescue craft.
6. It is recommended that common terms for spinal injury immobilization techniques be adopted by all lifesaving organisations and that the terms should be vice grip, body hug, and the extended arm grip. Studies should be conducted on each of these methods to establish the best possible methods of extrication.
7. All lifesavers should be taught the standing backboard technique, to allow for immediate stabilization of the spine of a person who walks up to the lifeguard complaining of spinal pain post trauma.
8. An international study of fund-raising activities by aquatic lifesaving organisations should be commenced to identify the most effective methods.

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### **Overview recommendations task force task force Diving (breath hold, scuba and hose diving)**

During the World Congress on Drowning, experts of the task force Breath hold, scuba and hose diving have finalised a consensus document on a variety of topics.

#### **It was agreed that**

1. Well-constructed national regulations have been effective where enforced and that any significant improvements in health and safety would arise only from a more inclusive definition of working divers and a wider application of existing procedures.
2. Self-regulation within the world-wide recreational diving industry continues to be the practical route for further improvement but that there is a need to counter a perception that there is a conflict between commercial interests and safety.
3. The training agencies comply with international quality assurance and control procedures (QA/QC) such as the International Standard ISO 9000 series and also encourage independent monitoring to assure the effective and safe use of existing and new procedures.
4. Subsistence fishermen who are predominantly found in the poor countries around the world, use equipment that is minimal and that their training, regulations and medical support appear to be zero. To improve diving-fishermen safety and reduce drowning there is a need to collect data on accidents and drowning among representative samples of diving fishermen around the world.

This should be followed up with international non-governmental organisations (NGOs), other charities and appropriate UN development initiatives so that existing academic societies, training organisations and others could deliver suitable medical and diving advice and training for fishermen compatible with the limits of available local resources.

5. The collection of diver morbidity and mortality data and the associated contributory factors for each incident is a necessary first step in reducing drowning incidents among divers. Also needed are the denominator data that will allow the calculation of risk.
6. Recreational divers are free to dive when, where and how they like but the diver also has an obligation to the public. Any underwater accident to a diver can put buddy divers and rescuers at considerable risk.
7. Greater stringency is needed in the assessment of the physical, mental and medical fitness of all who choose to dive. A single assessment of fitness for diving at the beginning of diver training should not be considered valid throughout the rest of the diver's life. Re-assessments are recommended at intervals that may diminish with advancing years and re-assessment may also be needed after illness or injury.
8. To give a medical opinion on a diver's fitness, the physician should have prior knowledge of the unique hazards faced by a diver. Whenever possible, the medical assessment should be conducted by a physician acknowledged as competent in this special subject. It is recommended the training of diving physicians, both for the medical examination of divers and also for the treatment of medical emergencies in diving, complies with guidance such as that published by the European Diving Technology Committee (ECHM) and the European Committee for Hyperbaric Medicine (EDTC). Periodical revision training is also important.
9. The mental, physical and medical standards of fitness in each category of diving should be harmonised internationally.
10. Greater emphasis should be placed at all levels of training on the causation and prevention of in-water fatalities.

11. After some 3 to 5 years without regular diving, the individual should be subject to a formal re-assessment of competence before re-entering the water.
12. The policy of training children as young as 8 years old to dive should emphasise the immaturity of mental outlook that many young persons may have when an emergency occurs.
13. Emergency procedures should be consistent with a variety of equipment in a variety of configurations.
14. Programs of refresher training should be established to maximise practical re-learning and updating of basic emergency skills. This is needed particularly after an individual's equipment has been modified.
15. Self-rescue and buddy-rescue procedures should be compatible with the equipment used and the environmental conditions.
16. Training of rescuers should include the procedures for recovery of the victim from the water into a boat and transfer of the patient from the deck of a boat to a helicopter or some other emergency transport vehicle.
17. Hand signals and basic procedures used in diving emergencies, whether at depth or on the surface, should be standardised and promoted through rescue and diving agencies throughout the world.
18. Rescuers must be made aware that the treatment of drowning in a diver might be complicated by other medical conditions such as carbon monoxide poisoning, envenomation and omitted decompression arising from that same dive.
19. National and international standards of medical care should be written for all medical emergencies in diving by suitable academic bodies.
20. Drowning is mostly a diagnosis of exclusion and often is a presumptive diagnosis based on purely circumstantial evidence. All diving-related deaths should be thoroughly investigated, including a complete autopsy, evaluation of the equipment and a review of the circumstances surrounding the fatality by knowledgeable investigators with appropriate training and experience.

The post-mortem examination of a drowned diver should be conducted by a pathologist who is knowledgeable about diving (or who is advised by a physician who is knowledgeable about diving).

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