



# CONGRESO INTERNACIONAL DE SALVAMENTO Y SOCORRISMO, 2012

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## Drowning Prevention, Rescue and Treatment Recommendations for Governments, Local Authorities, Lifesaving Organizations and the General Public

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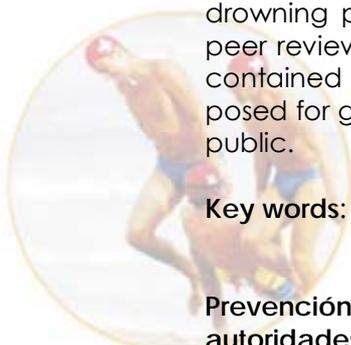
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## Drowning Prevention, Rescue and Treatment Recommendations for Governments, Local Authorities, Lifesaving Organizations and the General Public

### Abstract

The Conceptual Model of Public Health (Hungerford & Pollock, 2002) has been suggested for implementing public health policies. Evidence-based recommendations can be developed by applying this model to the existing knowledge base for drowning prevention, rescue and treatment. With this in mind, we evaluated 723 peer reviewed journal and magazine articles, handbooks and internet sources that contained published strategies relating to drowning. Recommendations are proposed for governments, local authorities, water safety organizations and the general public.



**Key words:** drowning, lifeguarding, water safety, aquatic risk management.

**Prevención de Ahogamientos, Rescate y recomendaciones para los gobiernos, autoridades y organizaciones que salvan vidas y público en general**

### Resumen

El Modelo Conceptual de Salud Pública (Hungerford y Pollock, 2002) ha sido sugerido para la implementación de políticas de salud pública. Evidencia a base de las recomendaciones se pueden desarrollar mediante la aplicación de este modelo a la base de conocimientos existente para la prevención de ahogamientos, rescate y tratamiento. Con esto en mente, se evaluaron 723 artículos publicados en revistas científicas, manuales y fuentes de Internet que contenían estrategias publicadas relativas a ahogarse. Las recomendaciones se proponen para los gobiernos, autoridades locales, seguridad en el agua organizaciones y el público en general.





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**Palabras clave:** ahogamiento, salvavidas, seguridad en el agua, gestión del riesgo acuático.

**Prevenção do afogamento, resgate e recomendações para os governos, autoridades e organizações de salvamento e do público em geral**

## Resumo

O modelo conceitual de Saúde Pública (Hungerford & Pollock, 2002) tem sido sugerida para a implementação de políticas públicas de saúde. Recomendações baseadas em evidências podem ser desenvolvidas através da aplicação deste modelo para a base de conhecimento existente para se afogando resgate, prevenção e tratamento. Com isso em mente, nós avaliamos 723 artigos revisados por pares e revistas, manuais e fontes da internet que continham estratégias publicadas relativos ao afogamento. As recomendações são pró-posou para governos, autoridades locais, organizações de segurança da água e do público em geral.

**Palavras-chave:** afogamento, salva-vidas, a segurança da água, gestão de riscos aquáticos.

Worldwide, many strategies have been proposed and implemented for prevention, rescue and treatment of drowning and near-drowning (e.g., Calabria, 2002; Tate & Lyford, 2002; Whittaker, 2002). Such strategies include prevention campaigns (e.g., Bennet, et al., 2006), lifeguard certification tests (Jones, 1994), changes in technology and rescue techniques (Giles, 1994), and educational meetings or workshops (e.g., Franklin & Mitchell, 2003). Strategies also include the publication of water safety newsletters (e.g., Nutec 1999; Royal Life Saving Society UK, 2002) and other relevant literature (e.g., Hunsucker, 1993; Carrera, 1997). Finally, other approaches have generated new water safety audio-visual materials (e.g., Terzopoulos, Avramidou & Avramidis 2004) and computer simulations for teaching lifesavers (e.g., De Vries, 2006).

Despite the implementation of those multiple strategies, drowning episodes still occur worldwide at epidemic rates. First, in terms of annual mortality, drowning is one of the leading causes of death, making it a serious public health problem (World Health Organization, 2003). For example, Asian research has shown that drowning kills more children annually than pertussis, measles, diphtheria, plague, cholera, dengue fever, and typhoid combined (UNICEF & TASC, 2004). Second,



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in terms of financial resources, the cost for hospitalizing and rehabilitating survivors of drowning is high (American Academy of Pediatrics, 1993; Walters, Fraser & Alleyne, 1993; Ellis & Trent, 1995; Barss & Gagnon, 2002). Third, a small number of drowning survivors expressed having a distressing near-death experience (Bush, 2006), others developed post-traumatic stress disorder (Grosse, 2001). Finally, in terms of social problems, 95% of all marriages break up within 5 years after the death of their drowned child (Borta, 1991).

Given these negative consequences, a number of questions are raised. For example, which variables not only contribute to the design of an effective policy on drowning but also must be considered by governments, local authorities, lifesaving organizations and the general public? Are there any pre-existing frameworks that can systematically interconnect all those involved parties to reduce drowning events and rates?

The application of the Conceptual Model of Public Policy (Hungerford & Pollock, 2002) offers a potential solution to addressing high drowning rates. This model is comprised of three interrelated variables: the knowledge base, the social strategy and the political will. *Knowledge base* is defined as the accumulated information on drowning prevention, rescues and treatment. *Social strategy* relates to established goals and the plan for transforming the knowledge base into policies and practical programs that address drowning problems. Finally, *political will* is a measure of institutional support for those policies and programs. All these variables interrelate and interact to influence public policy associated with drowning prevention, rescue and treatment. Successfully employing the Conceptual Model of Public Policy begins with a thorough interrogation of knowledge base, which is then used to create the political will and the social strategy. Therefore, the aim of the present article was to expand and clarify the knowledge base associated with drowning to make recommendations to governments, local authorities, water safety organizations and the general public for implementing social strategies related to drowning prevention, rescue and treatment.





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## Method



The method of this study was an extensive review of the published evidence presented in the literature. It was important that this type of research serve as the foundation for the current research design because the aim for the development of these recommendations was to identify what is currently available and implemented around the world. The terms 'drown,' 'aquatic emergency,' 'risk factors,' 'lifeguard,' 'water safety,' 'lifesaving,' 'rescue,' 'strategies,' 'risk assessment,' and 'models' were used as key words in the literature search undertaken. This search used academic and professional aquatic safety textbooks that are routinely available in libraries, electronic databases typically available in academic libraries (e.g., Medline, Sport Discus with Full Text, PsychINFO and PubMed) covering studies that assessed the prevention, rescue and treatment of drowning. To optimise inclusion, this review included not only studies with successful programs or strategies but also studies with negative and/or unconfirmed outcomes. As a result 723 peer-reviewed journal articles, magazine articles, handbooks and internet sources were assessed and evaluated. Those recommendations that were generated were then placed in four emerging clusters categorized as 'governments,' 'local authorities,' 'water safety organizations,' and the 'general public'.

## Drowning Prevention Recommendations for Governments

Governments need to take a series of actions. First of all, new legislation needs to be put in place to ensure that clear and standardised water safety signs are displayed at every aquatic venue, that pool fencing is made mandatory and adequate and that stringent qualifying criteria are employed for lifeguards, instructors and directors of water safety authorities (Calabria, 2002; Avramidis, 2010). Also other legislation needs to be put in place that will require refresher training of rescuers every 1 to 2 years, provide weekly staff training at the workplace, provide only equipment that meets international recommendations, develop national standards on aquatic safety (guidelines, common manual for achieving standardization and syllabus for all independent aquatic safety authorities; see Hunsucker, 1993; Avramidis, 2004; 2008a). Furthermore, governments need to ensure passenger



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briefings before flights and to ensure that all life preservers and helicopter floats, particularly for above-water operations, are all fit-for-purpose (see Nutec, 1999; Federal Aviation Administration, 2007). These regulations should also apply to all aspects of merchant and cruise ship activity.

Second, it would be desirable to discuss certain risk factors such as lack of safe procedures during childhood (Irwin, 1989). Therefore, water safety and swimming lessons may be included in the Physical Education national curriculum of primary schools (Hargreaves, 2010; Matsui, Goya, & Satake, 2012). Third, it would be useful to provide emergency services - such as the fire brigade and the police - with appropriate equipment (e.g. rocket thrust, rescue tube, first aid kit, automated external defibrillator, oxygen and pocket mask), a basic level of swimming (i.e. be able to swim competently fully clothed a certain distance), first aid skills, and lifesaving, as they often are the first people on the scene (see O'Dwyer, & Connolly, 2010; Connolly, 2012).

Fourth, penalties for breaching the law about water safety need to be reviewed to ensure that they discourage people from risking their, or others' safety. Consideration must be made so their lives are not put at risk from not attempting to rescue others (e.g., provisions 306 and 307 of the Greek Penal Code; see Farsedakis, 1995; Kontaxis, 1987). Fifth, it would be useful for the Ministries of Health and Education to work co-operatively to produce public statement announcements that encourage safe behaviour in all aquatic situations where lives may possibly be at risk (see Avramidis, 2012). These statements would discourage TV series and film producers from presenting inappropriately risky behavior in or around the water. At the same time, they should be encouraged to formulate programs that promote safe behavior and increase the knowledge and understanding of the audience and participants through Entertainment Education (see Singhal, & Rogers, 2004; Whittier, Kennedy, St. Lawrence, Seely & Beck, 2005).

Sixth, even though lifeguard presence in aquatic areas and public training in resuscitation are two important preventive measures, these can still be developed (Spyridopoulos et al., 2004). For example, Health/Medical services and Physical Education/ Sport Science departments of universities could mandate courses on 'first aid', 'lifesaving' and/or specialties of 'lifeguarding' to ensure university students have academic and practical knowledge about lifesaving, lifeguard-



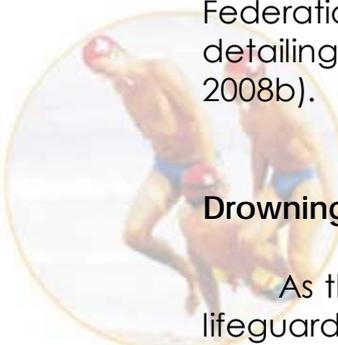
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ing and first aid (Colman, Avramidis, Pascal Gomez, Vervaecke, Persin, 2006; Avramidis, 2008b). However, it is also important that parents, teachers and doctors learn about the rates and risks around drowning. Improving health education to include a drowning prevention curriculum in co-operation with various health specialties will also create a healthy school environment for students (Ishii et al., 2002). Finally, increase funding for research and education on prevention, rescue and treatment of drowning and other related aquatic emergencies, because it will be cheaper to spend money preventively rather than on hospitalizing casualties (see Connolly, 2008).



## **Drowning Prevention Recommendations for Local Authorities**

There are also actions for local authorities. First, they should take responsibility for making funding available for additional professional lifeguards to provide more quality lifeguard surveillance (see Avramidis, 2010). Second, there need to frequently assess procedural maintenance; stricter penalties are needed for non-compliance with legislation and for discouraging any evidence of declining national standards (Avramidis, Butterly, & Llewellyn, 2009). National standards would need to meet at least the standards of the International Life Saving Federation, provide written operating procedures at every aquatic site detailing both normal operations and emergencies (Avramidis, 2010; 2008b).



## **Drowning Prevention Recommendations for Water Safety Organizations**

As the present findings stress the importance of professionalism in lifeguarding, we offer recommendations for water safety organizations. First, recognize that organizations from high-income countries are well-placed to assist lower-income countries (International Life Saving Federation, 2007b). Second, improve the current structure of training to initiate and then maintain higher certification standards (see Wood, 1999; Brewster, 2007). Third, provide regular staff training at the workplace (at least three hours/week) and annual qualification renewals for professional lifeguards and rescuers (Avramidis, 2004; 2008a; 2008b; 2009a; Ellis & Fick, 1992; Royal Society for the Prevention of Accidents & Royal Life Saving Society UK, 1993).





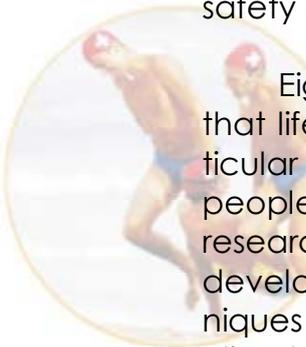
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Fourth, ensure that organizations qualifying, or employing professionals for water-based activities to prioritise teaching swimming, personal survival and lifesaving within both their education and emergency action plans (International Life Saving Federation Europe [ILSE], 2005). Fifth, provide lifeguard and other rescue equipment (e.g. rescue tubes, rocket thrusts, pocket masks, spinal boards, cervical collars, gloves, oxygen, defibrillators, power boats, surf boards, and jet skis) at appropriate locations and train staff in its use (McCloy & Dodson, 1980; ILSE, 2005). Sixth, ensure effective surveillance and rescue intervention by providing at least one lifeguard every 100 m during busy days and at peak times (see Fenner, & Harrison, 2002).



Seventh, the organization that awards beaches with the 'Blue Flag' can be stricter in ensuring quality lifeguard services. It would also be useful for the International Life Saving Federation to create a safety equivalent to the Blue Flag award, for the safety services of all aquatic environments (e.g., swimming pools, beaches, rivers, lakes etc.) and facilities (e.g., hotels, summer camps, aquatic sport clubs etc.). This will both increase income for various projects (research, education, etc.) and require local communities to meet internationally approved safety and rescue standards (ILSE, 2005; Avramidis, 2008c).



Eighth, water safety organizations should revise their syllabus, so that lifeguards or rescuers will be able to recognize and prevent particular sets of behavior in guarded aquatic environments of 'at risk people' (see Purnell, & McNoe, 2008; Moran, 2010). Ninth, create new research-based publications so that all involved are aware of relevant developments in operational strategies and procedures, rescue techniques and equipment (Langendorfer, 2007). Tenth, as the adverse climate conditions substantially increase the likelihood of drowning, encourage local emergency services to undertake a leading role in taking preventive and rescue measures that will facilitate the public and other specialized rescue teams to cope with the most likely aquatic emergencies (e.g., flooding, tsunami, shipwreck etc.; Weijers, Slomp & Poortvliet, 2006; Madern, Brons, & Kost, 2006; Van Der Torn & Jonkman, 2006).



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Finally, organizations involved in water safety, injury prevention need to accurately interpret drowning statistics (Connolly, 2008) to create their policy and to claim government funding. They should also rely on the description of the death instead of the code, as there are hidden 'drowning' incidents in the E codes of the International Classification of Diseases system (Langley & Smith, n.d.). Organizations need to conform to the International Life Saving Federation's position statements to better estimate the drowning problem. This will put them in a better position for claiming funding for prevention, rescue and treatment (e.g., International Life Saving Federation, 2007a) and for confirming the impact of their work. Facilitating on-line communication will foster and disseminate up-to-date research, and help to confirm the most cost-effective approaches are exchanged across the lifesaving scientific community (Stallman & Kjendlie, 2008).

Tenth, since lifeguards share the concerns of public health, safety and security-based jobs (e.g. police, fire, ambulance, rescue teams), adopt role-specific screening of physical and psychological health of current and potential lifeguard employees. This may be best adopted by a central statutory body. Such screening may integrate tests for visual acuity (Seiller, 1996, 1997) and for pathological and cardiac problems (Decree Law, 2000). Early identification of pre-existing risk factors is also desirable, to provide effective prevention for candidate lifeguards who are at risk of developing trauma-related disorders and psychopathological symptoms after trauma exposure (Heinrichs et al., 2005).

## Drowning Prevention Recommendations for the General Public

The general public can heed several issues. First, anyone engaged in an activity in or around water needs to consider their risk exposure, especially since untrained individuals are more likely to overestimate their capacity to either avoid or manage emerging crises (Avramidis, 2009b). Second, people participating in activities that appear to be non-aquatic, but that take place above or around the water (e.g., pilots, drivers, etc.), need to know not only how to swim but also to execute the related emergency procedures that their activity should they end up in the water (see Idris, 2006; Nemiroff, 2006).



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Swimming proficiency should be mandatory in all water-based professions (see ILSE, 2005).

Third, since the presence of skilled and well equipped lifeguards is clearly important, wherever possible engage in aquatic activities supervised by them. This concern also justifies favouring activities set up by authorities with established emergency action plans for aquatic emergencies and avoiding locations with doubtful safety services or histories (see Branche et al., 2001).

Fourth, parents should always supervise their children, especially those under 5 years old (Moran, Quan, Franklin, & Bennet, 2011). Fifth, despite distinctive differences and drowning patterns between genders, age groups, ethnicities, occupations, behavior, place of occurrence, activities, areas of residence, distance of the activity from the aquatic location, time of day, day of the week, and month, strongly encourage individuals to attend to safety measures, even when drowning seems unlikely (e.g. safety measures on board an airplane before take-off above the sea, a cruising ship etc.; see Boesten, 2006; Nemiroff, 2006). Finally, we hope that the findings of this review will be regarded as providing updated information about drowning (Myntti, Said, Aqlan & Al-Rubayh, 1991). This is important since positive responses to new accident-based research usually reduce drowning mortalities (see Wigglesworth, 2001).

## Conclusions

This review aimed to provide a number of evidence-based recommendations, and to outline the social strategies that integrate the actions of governments, local authorities, water safety organizations and the general public. The evidence confirms that drowning prevention, rescue and treatment can be enhanced by enacted a number of simple actions. Therefore, we can all be confident about responding to this comprehensive review of the world's most up-to-date evidence.



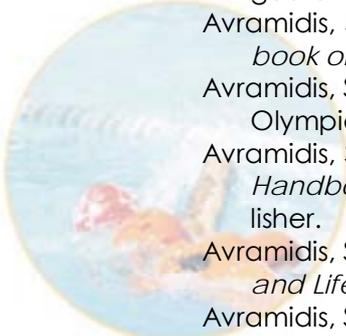
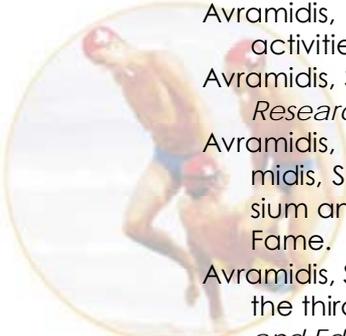


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