Evaluation of risk factor in beaches

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ABSTRACT:
The purpose of the present work is to evaluate the risk factors of enjoying a beach. To fulfil a satisfactory prevention of the bathing zones, it is considered fundamental to know and to give information about all the risk factors that are associated with those bathing places. It was made, in first place, a list of all the risk factors possible to constitute danger in a beach. For that purpose, it was consulted the specialized literature. Afterwards, through a check list with all the items collected before, it was aimed to evaluate the importance of each parameter. Those parameters were grouped in four main general criteria: (i) the beach morphology; (ii) the beach equipment; (iii) the lifeguard service and (iv) the occasional aspects. Each of these variables was divided in different subgroups. To evaluate the importance of each one of the above-referred factors, it was built a survey that was validated before by Spanish and international experts. The sample of the present study was composed by 31 experts (7 and 24 from international and national scope, respectively). It was performed a descriptive statistical analysis of the data (average, frequencies and percentages), which allowed to identify that the presence of a lifeguarding service is the aspect most ranked to diminish the danger of a beach. The human resources of the lifeguarding service, and mainly their education, are very relevant. Additionally, it is also important the affluence and activities developed by the public, as well as the possibilities of the beach, against meteorology and infrastructures, in order to determine the danger.

KEY WORDS: Prevention, risk, beaches, security, aquatic activities.

INTRODUCTION

The involvement in aquatic activities is a social phenomenon that has been significantly increasing in the last years. This fact is due to the higher free time available in the actual societies, which lead to other activities than the professional ones. From this leisure activities, the involvement in sport and open air activities are frequent. Fallowing the Spanish National Statistic Institute (2004), the Spanish people spend around 48 min per day in sport or physical activities. Additionally to that information, the referred institute also stated that, in the last 10 years, the number of sportsmen inscribed in national federations related to aquatic activities increased from 194.013 in 1993 to 267.125 in 2003.

At the holidays the leisure time increases significantly which leads to the higher involvement in aquatic activities. This fact is very visible in spring and summer due to the favorable climacteric conditions. However, besides the good effects of the son, beach and aquatic activities on health, the possibilities of suffer an accident in this context increases (American Red Cross, 1995; Branche y Stewart, 2001; Brewster, 1995; Edmonds y Walter, 1999; Graver, 2004; Grenfell, 2002; Thanel, 1998: YMCA, 2001). Accident is understood as an important damage for the life of a human being, that implicate injuries which unable or which has a high economic cost and which would be prevented (Girasek, 1999; Langley, 2004; Saluja, Brenner, Morrongiello, Haynie, Rivera y Cheng, 2004). Following the World Health Organization (WHO, 2003) the most negative effects upon health of the use of aquatic activities are: eye injury, perforations, slip injuries, high impact injuries (namely spine injuries lieding to lower and/or upper limbs paralysis and head injuries) and drowning.

From all the above accidents, the most serious is the drowning. Drowning is, by definition, the experimentation of a non possibility to breathe due to immersion in water (Bierens, 2005; OMS, 2003) and it is considered one of the major causes of dead in the entire world (after the road accidents, it is considered the second most numerous cause with approximately 409.272 victims). In Europe it happens a total of 30.322 drowning accidents and, specifically, in Spain a total number of 588, being the 4^{th} cause of dead and the 2^{nd} one in children from 1 till 4 years old (OMS, 2000; Peden y McGee, 2003).

These accidents have a strong social repercussion and a high economical cost. In Spain, to our knowledge, there is no study about the economical cost of this kind of accidents. However, in the USA, several studies were made by the Centers for the Prevention and Control of Diseases (CDC), estimating a total cost (lost of productivity, medical care, administrative costs and lost of life quality due to injury or dead) for each dead between 2.790.000 and 3.610.000 USA dollars. Additionally, the cost of an injury that gives an incapacity to the subject, seems to be between 138.000 and 181.000 USA dollars, plus 15.000 USA dollars by month for the care of this person (Branche y Stewart, 2001; Mael, Seck y Russell, 1998; Nacional Safety Council, 2004).

In the scientific area, It is well accepted that prevention is the better way to reduce the above referred accidents (Bennett, Cummings, Quan y Lewis, 1999; Bhide, Edmonds y Tator, 2000, Bierens, 2005; Branche y Stewart, 2001; Brewster, 1995; Cohen y Swift, 1999; Hooper, Coggan y Adams, 2003; Mael, Seck y Russell, 1998; OMS, 2003; Palacios, 1998, 2000; Quan, Bennett, Cummings, Henderson y Del Beccaro, 2001; Royal Life Saving Society Canada, 2003; Saluja, Brenner, Morrongiello, Haynie, Rivera y Cheng, 2004; Thanel, 1998; Towner y Ward, 1998).

Despite it is accepted that prevention is a efficient measure to diminish the occurrence of accidents, no scientific data exists about this specific thematic (Pitt y Cass, 2001; Quan, Bennett, cummings, Trusty y Treser, 1998). Adittionally, the small number of studies in this area do not show concluding results and are, mainly, experimental approaches that do not control the majority of the contextual variables (Dannenberg y Fowler, 1998; Pilsen, 2004).

The term prevention is very extensive; however it is understood as education and information in order to avoid accidents (Cohen y Swith, 1999), but the term prevention includes more meanings. These referred authors, following Haddon (1970), sated that the prevention of accidents is a series of actions and strategies conducted upon people, the reason of the accident, physical and social environment just before during and after the altercation

Runyan (1998) add another point of view, referring that it should be taken into account severel criteria related to the precvention of accidents, namely the eficciency of the preventive measures, the economic cost, …and the variability of the program. Add a third dimension in which should be take into account several criterions for taking decisions, as are the effectiveness of the decisions, spending money, the freedom of people who is oriented the program, the esteem collective, the preference of the community affected and the viability of the program.

In the area of aquatic activities, and the accidents related to this area, there is no national or international publications that include the three event phases: before, during and afterwards.
In this area, we consider the Palacios' definition (1998) as the actions and preparations that are taken previously for noticing, to inform or avoid an accident or situation that can increase the possibility of happening, whatever the aquatic environment and its surroundings. However, this definition do not contains the measures that are used in order to have the lower level of injuries possible with the accident.

Cohen and Swith (1999), Haddon (1970) and Runyan (1998), understand prevention as the decisions, mesurements and preparation that are taking in a preventive way for noticing, to inform and avoid an accident and, if it is happens, to try to reduce its consecuences.

There are a great number of prevention actions to avoid accidents and the majority of authors group them in three major groups: education, ambient modification and legislation (Towner y Ward, 1998). In the water environment, Brewster (1995) makes the classification in 6 major areas: preventive actions, , rules, the renewal of the installations, the design of the infrastructures and the education of the public. This last item is considered the most important and all the prevention campaigns refer, direct or indirectly, to this area (Azeredo y Stephens-Stidham, 2003; Bennett, Cummings, Quand y Lewis, 1999; Bhide, Edmonds y Tator, 2000; Frederick, Bixby, Orzel, Stewart-Brown y Willet, 2000; Green y Hart, 1998; Mitchell y Haddrill, 2004; O'Flaherty y Pirie, 1997; Quan, Bennett, Cummings, Henderson y Del Beccaro, 2001; Sznajder, Leduc, Janvrin, Bonnin, Aegerter, Baudier y Chevallier, 2003).

The signals and the publicity panels are a way of "in situ" education to the public, and considered a valorous way, just because many bathers are tourists not familiarization with the environment because the come from places without beaches o just because the characteristics of the beach are diffents and maybe the panels are the only possibility to get information about the beach (Brewster, 1995). For that reason, it has to be there showing clearly the main advices, recommendations and dangerous; however, How can we determine the danger of our beach

One of the key points to diminish the risk of accidents in beaches is to have into account the eenvironment in which it happens, because they are aquatic environment with constant transformation, (Short y Hogan, 1994). In Table 1, it is possible to observe the specificity of beaches comparing to other aquatic places (Brewster, 1995).

Table 1. Comparison between beaches and other aquatic sport facilities (following Brewster, 1995)

Variables	Swimming-pools/Aquatic parks	Beachs
Water temperature	It could be controlled	Depending of natural conditions
Water transparency	controlled	Depending of natural conditions
Difficulty of saving	There is contact with the subject imediattly entring the water or swimming short distance	It could require long distances and in adverse conditions
Natural dangers	None	They could be large ones and, sometimes, not visible
Water currents and wave action	Ninguna o predecibles y totalmente controlables	The waves and corrects are frequent, and could be the major
Level and hours of occupation	It could be controlled	Generally, it could not be controlled
Atmospheric conditions	Low effect	Possible sever effect

In accordance with Short (2001), the definition of risk factors are the ambient elements present in a beach that imposes the people a danger situation or a damage.

To better analyze the risk factors of a beach it was created an some check lists that allow to have systematized and precise data (Anguera, Arnau, Ato, Martínez, Pascual y Vallejo, 1998). Complementarily to these check lists it was made a direct observation “in situ” by 2 experts. This instrument was created based upon other check list presented in the specialized literature (Palacios, 1998, Palacios, Abraldes, Sánchez y Barbeito, 2005; Palacios, Barcala, García, Sánchez, Abruñedo y Vales, 2004), and increased the number of item taken into account. The studies of Brewster (1995), Graver (2004), Méndez (2000), Royal Life Saving Society Canada (2003) and Short (1993, 2001) were decisive to its elaboration..

The referred document its organizad in 5 areas:

- **General information about the beach:** including the city, the name of the beach, if there is a quality assurance and also the beginning and ending hour of observation.
- **Beach Morphology:** This category involves all the aspects related with morphology and beach physical factors. This category is divided in three points: dry zone, water zone and common criteria.
- **Beach Equipment:** In this category are involved all the points in relation with the infrastructure (access, parking, supply of water, water closed…) and the utilities (bar, sailing clubs, tourist information…).
- **Lifeguarding service:** Here are included all the aspects in relation with the Lifeguarding service of the beach. Its analysis is divided in three blocks: Human resources, Material resources and planification and evacuation.
- **Occasional aspects:** In this point we group several aspects based on weather conditions and beachgoers activities.

Because of there are many opinions related to the important of each variable, in relation to the effect in the increase or decrease of dangerous, we suggest evaluate these factors, for

determining the dangerous that can be each beach taking into account all criterions described above.

METHODS

The valuation of the risk factors of the beach was done with a survey administrate to expert at international and Spanish level in this area. The condition of expert was established for having the University grade of PhD. and trajectory of specialist in Life guarding or the accreditation of three years, as minimum, of experience as Life guarding coordination.

The evaluation sheet qualified, with a number of one to five, the blocks and variables indicating their incidence on the risk of the beach. The sample of the present study was 31 experts (seven from international scope and 24 from national scope). The statistic analysis done is descriptive (average, frequencies, and percentages of each one of the variables and blocks), letting us identify the important and/or percentage of risk of each variable.

We sent to them the project by mail and email with a page in which they should evaluate with a number form 1 to 5, each variable include in the project. In this way, after getting all evaluation from the experts, we jointed it and established the dangerous of each variables analyzed. 31 experts participated in the study, 24 nationals and 7 internationals.

The data were analyzed with package Microsoft Excel 2003, for Windows version XP. The descriptive statistics analysis was done in each variable of the study, so we identified the important and/or dangerous of each variable.

RESULTS

The questionnaire of data was used to show the results obtained. It includes the meaning and percentages of dangerous from all variables studied

The present document tries to valuate these factors that affect in the beach hazards. These can influence in the danger of a beach by being present (for example: the presence of rip currents) or by being absent (for example: the absence of lifeguards in a beach). Because there are a lot of factors to consider, we have classified them in four categories of information. These are:

1. **Beach Morphology:** This category involves all the aspects related with morphology and beach physical factors. This category is divided in three points: dry zone, water zone and common criteria.
2. **Beach Equipment:** In this category are involved all the points in relation with the infrastructure (access, parking, supply of water, water closed…) and the utilities (bar, sailing clubs, tourist information…).
3. **Lifeguarding service:** Here are included all the aspects in relation with the Lifeguarding service of the beach. Its analysis is divided in three blocks: Human resources, Material resources and planification & evacuation.
4. **Occasional aspects:** In this point we group several aspects based on weather conditions and beachgoers activities.

According to this first information, we would like that you value every one of these points, in relation with the importance that have to you on the risk of injury in a beach. You should fill

in the boxes with a number from one to five (1-5). Don´t forget that one means very low danger and five means very high danger.

1. Beach Morphology	**28.79%**
2. Beach Equipment	**15.15%**
3. Lifeguarding service	**31.82%**
4. Occasional aspects …….....	**24.24%**

Going deeply in each one of the categories previously discussed, we would like you to indicate your valuation about the criteria of every one of the categories, where it will be indicated the presence or the absence of every one, since it will increase or decrease the danger of the beach.

1. BEACH MORPHOLOGY: This point involves all the angles in relation with the relief and the beach orography. We divide its analysis in three great blocks:

a) **Dry zone:** It includes all the factors of the part of the beach that is not covered by water. Principally sand and rocks. In this point we center in texture, thickness, the presence of cliffs etc.

b) **Water zone:** It involves all the points of the part of the beach covered by the sea. We distinguish three zones: surface, sea floor and waves, currents and tides.

c) **Common criteria:** In this point all the elements that could be find in the two zones are analyzed. These are fauna, flora and recreational equipment.

We would like you to indicate into the box the level of danger that have for you the presence of the criteria cited, and also the relevant points of each one of them. Their valuation will be by the same way than in the previous part, where one means very low danger and five means very high danger.

a) Dry Zone		**27.27%**
Sand ….....	**37.04%**	
Rock	**62.96%**	
b) Water Zone		**48.48%**
Surface	**23.53%**	
Sea floor	**29.41%**	
Currents, Waves and tides	**47.06%**	
c) Common criteria		**24.24%**
Fauna ….....	**30.00%**	
Flora .....…….....	**23.33%**	
Recreational equipment	**46.67%**	

2. BEACH EQUIPMENT: In this point all the criteria in relation with the infrastructure (access, parking, water supply, water closed...) and utilities (bar, nautical clubs, tourists information...) that can be found in a beach are included.

a) Infrastructure: It involves all these resources built in a beach by human to secure better conditions of accessibility (promenades, beach access, parking....) supplies (water, public telephones…) and hygiene (water closed, bins…).

b) Utilities: Here there are included all the complements which a beach should have. In these we include hotel business, nautical activities, tourist information, cleaning utilities and public security.

We would like you to valuate in the boxes below the influence that the absence of these aspects have in the danger of a beach by the same way that previous point. Remember that one means very low danger and five means very high danger

a) Infrastructure		**43.75%**
Access	**35.71%**	
Supplies	**25.00%**	
Hygiene	**39.29%**	
b) Utilities		**56.25%**
Hotel business	**12.28%**	
Nautical activities ….....	**26.32%**	
Tourist information	**19.30%**	
Cleaning utilities	**22.81%**	
Public security ……....	**19.30%**	

3. LIFEGUARDING SERVICE: In this point are included all the elements that are part from the lifeguarding service. These are divide in:

a) Human resources: In this point are involved all the elements in relation with the staff of the Lifeguarding Service. Professional training, experience and job conditions.

b) Material resources: In this point are included all the materials that have relation with the Lifeguarding service. These are grouped in relation with their function:

- **a. Prevention materials:** In this point are included all kind of materials who have the purpose of inform, warn and sign the characteristics, hazards and rules of behavior in a beach in order to avoid accidents and injuries.
- **b. Scanning materials:** Here are included all these material who have the purpose of make easy to the lifeguard the scanning of the beach.
- **c. Rescue materials:** In this point we analyze all the materials used for undertaking an aquatic rescue.
- **d. First aid materials:** Here we analyze all these materials that are used for providing the first aids.

c) **Planning:** In this point we analyze all the aspects who must be considered in the organization of a rescue. Principally this analysis centers on the action protocol and the evacuation resources of the Lifeguarding service.

Please, you should valuate the absence of these factors by the same way that in previous points with a number between one and five, where one means very low danger and five means very high danger.

a) Human resources		**36.84%**
Professional training	**37.74%**	
Experience .....….....	**30.19%**	
Job conditions	**32.08%**	
b) Material Resources		**31.58%**
Prevention material	**24.24%**	
Scanning materials ….…....	**24.24%**	
Rescue materials	**25.76%**	
First aid materials	**25.76%**	
c) Planning		**31.58%**
Action protocol	**54.29%**	
Evacuation resources	**45.76%**	

4. OCCASIONAL ASPECTS: In this point we consider all these elements of the beach that are punctual and change depending of a serial of circumstances that could increase or decrease the danger of the beach. These are:

a) **Weather conditions:** This point involves the atmospherics conditions of the zone. We emphasize in environment and aquatic temperature, wind, and also another atmospheric conditions who affect the risk of injury in the beach (humidity, rain, fog…).

b) **Beachgoers:** In this point are registered all the variables who have relation with beachgoers. We analyze principally the number of beachgoers and the activities that they realize in the beach.

Finally, we would like you to valuate these points by the same way that in previous points. Remember that one means very low danger and five means very high danger.

a) Weather conditions		**40.74%**
Temperature	**37.84%**	
Wind .....….....	**35.14%**	
Other atmospheric conditions	**27.03%**	
b) Beachgoers.....		**59.26%**
Flow.....	**51.61%**	
Activities….....	**48.39%**	

CONCLUSIONS

According to the result we conclude that:

- The experts appreciate the lifeguard service as the main cause in order to avoid the danger of each beach, given less important to the morphology, temporal aspects and equipment of its.
- Related to the morphology, the water is more dangerous that the dry area
- Related to the equipment, the service of the beach has a higher danger than its infrastructure
- The lifeguard service, human resources and their formation are the aspects more important in order to decrease the danger in the aquatic area
- The expert consider that the affluence and activities of the people are more dangerous than the meteorology of the beach

REFERENCES

American Red Cross. (1995). *Lifeguardin Today*. St. Louis: Mosby.

Anguera, M. T., Arnau, J., Ato, M., Martínez, R., Pascual, J. and Vallejo, G. (1998). *Métodos de investigación en psicología.* Madrid: Síntesis.

Azeredo, R. and StephensStidham, S. (2003). Design and implementaction of injury prevention curricula for alementary schools: lessons learned. *Injury Prevention*, 9(3), 274-278.

Bennett, E., Cummings, P., Quand, L. and Lewis, F. M. (1999). Evaluation of a drowning prevention campaign in King County, Washington. Injury Prevention, 4(s1), 17-25.

Bhide, V. M., Edmonds, E. E. and Tator, C. H. (2000). Prevention of spinal cord injuries caused by diving: evaluation of the distribution and usage of a diving safety video I high schools. *Injury prevention,* 6(2), 154-156.

Bierens, J. (2005). *Handbook on drowning. Prevention, rescue and treatment.* Netherlands: Springer.

Branche, C. M. and Stewart, S. (2001). *Lifeguard Effectiveness: A report of the working group*. Atlanta: Centers for Disease Control and Prevention, National Center for Injury Prevention and Control.

Brewster, B. C. (1995). *The United States Lifesaving Association Manual of Open Water Lifesaving*. Huntington Beach, California: Precinte Hall.

Cohen, L. and Swift, S. (1999). The spectrum of prevention: developing a comprehensive approach to injuty prevention. *Injury Prevention,* 5(2), 203-207.

Dannenberg, A. L. and Fowler, C. J. (1998). Evaluations of interventions to prevent injuries: an overview. *Injury Prevention*, 4(2), 141-147.

Edmonds, C. W. and Walker, D. G. (1999). Snorkelling deaths in Australia, 1987-1996. *Medical Journal of Australia,* 171(11-12), 591-594.

Frederick, K., Bixby, E., Orzel, M.N., Stewart-Brown, S. and Willett, K. (2000). An evaluation of the effectiveness of the Injury Minimization Programme for Schools (IMPS). *Injury Prevention*, 6(2), 92-95.

Girsek, D. C. (1999). How members of the public interpret the word accident. *Injury Prevention*, 5(1), 19-25.

Graver, J. (2004). *Aquatic Rescue and Safety. How to recognize, respond to and prevent water-related injuries*. EEUU: Human Kinetics.

Green, J. and Hart, L. (1998). Children's views of accident risks and prevention: a qualitative study. *Injury Prevention*, 4(1), 14-21.

Grenfell, R. (2002). Drowningmanagement and prevention. *Australian Family Phycisian,* 31(12), 990-993.

Haddon, W. (1970). On the escape of tigers: an ecologic note. *American Journal of Public Health*, 60(5), 2229-2234.

Hooper, R., Coggan, C. A. and Adams, B. (2003). Injury Prevention attitudes and awareness in New Zealand. Injury Prvention, 9(1), 42-47.

Instituto Nacional de Estadística (2004). Defunciones según la causa de muerte. Extraído el 10 de enero de 2005 desde http://www.ine.es/inebase/menu3_soc.htm#8.

Instituto Nacional de Estadística. (2004). *Nivel, calidad y condiciones de vida. Encuesta de empleo del tiempo*. Extraido el 10 de enero de 2006 desde http://www.ine.es/inebase/cgi.

Langley, J. (2004). Challenges for surveillance for injury prevention. *Injury Control and Safety Promotion*, 11(1), 3-8.

Mael, F. A., Seck, M. E. and Russell, D. P. (1998). *A work behavior-Oriented Job Análisis for Lifeguards*. Atlanta: National Center for injury Prevention and Control, Centers for Disease Control and Prevention.

Méndez, A. E. (2000). Prevención en playas de Mar. Lecturas: Educación Física y Deportes, 5(18). Extraído el 21 de diciembre de 2005 desde http://www.efdeportes.com/ef18b/playas.htm

Mitchell, R. and Haddrill, K. (2004) From the bush to the beach: water safety in rural and remote New South Wales.*Australian Journal of Ruarl Health*, 12(6), 246-250.

National Safety council. (2004). Estimating the Costs of Unintentional Injuries, 2003. Extraido el 10 de enero de 2005 desde http://www.nsc.org/lrs/statinfo/estcost.htm

O'Flaherty, J. E. and Pirie, P. L. (1997). Prevention of Pediatric Drowning and Near-drowning: a survey of members of the American Academy of Pediatrics. *Pediatrics*, 99(2), 169-174.

Organización Mundial de la Salud. (2000). *Facts about injuries. Drowning.* Geneva: Organización Mundial de la Salud.

Organización Mundial de la Salud. (2003). *Guidelines for safe recreational waters. Volume 1. Coastal and fresh waters*. Geneva: Organización Mundial de la Salud.

Palacios, J. (1998). Salvamento Acuático: un estudio de la realidad del salvamento y socorrismo en las playas de Galicia con Bandera Azul 1996-1997. A Coruña: Xaniño. (Formato digital).

Palacios, J. (2000). Salvamento Acuático. Teoría y recursos didácticos. A Coruña: Xaniño.

Palacios, J., Abraldes, J. A., Sánchez, M. and Barbeito, N. (2005). Estúdio de los factores de riesgo y de los recursos del servicio de salvamento y socorrismo em playas: propuesta de ficha de observación. *Previr: Actividades acuáticas y salvamento profesional*, 1(2), 31 – Separata.

Palacios, J., Barcala, R. J. García, J. L., Sánchez, M., Abruñedo, J. L. and Vales, C. (2004). *Estudio descriptivo de las condiciones de los servicios de salvamento y socorrismo de los ayuntamientos de Galicia acogidos al plan Sapraga 2003.* Comunicación presentada en las VI Jornadas Técnicos-Profesionales de Salvamento Acuático y Socorrismo, Mayo, Segovia, España.

Peden, M. M. and McGee, K. (2003). The epidemiology of drowning worldwide. *Injury Control and Safety Promotion*, 10(4), 195-199.

Pitt, W. R. and Cass, D. T. (2001). Preventing children drowning in Australia. *Medical Journal of Australia*, 175(11), 603-604.

Quan, L., Bennett, E. Cummings, P., Henderson, P. and Del Beccaro, M. A. (2001). Do parents value drowning prevention information at discharge from the emergency department?. *Annals of Emergency Medicine*, 37(4), 382-385.

Quan, L., Bennett, E. Cummings, P., Trusty, M. N. and Treser, C. D.(1998). Are life vests worn?. A multiregional observational study of personal fltation device use in small boats. *Injury Prevention*, 4(3), 214-225.

Royal Life Saving Society Canada. (2003). *Alert. Lifeguarding in Action.* Canada: Royal Lifesaving Society Canada.

Runyan, C. (1998). Using the haddon Matrix: introducing the third dimension. *Injury Prevention*, 4(4), 302-307.

Saluja, G., Brenner, R., Morrongiello, B. A., Haynie, D., Rivera, M. and Cheng, T. L. (2004). The role of supervision in child injury risk: definition, conceptual and measurement issues. *Injury Control and Safety Promotion*, 11(1), 17-22.

Short, A. D. (1993). *The Australian Beach Safety and Management program – Surf Lifesaving Australia's Aproach to Beach Safety and Coastal Planning*. Comunicación presentada en 11th Australasian Conference on Coastal and Ocean Engineering, Agosto, Australia.

Short, A. D. (2001). *Beaches of the South Australian Coast and Kangaroo Island. A guide to their nature, characteristics, surf and safety.* Sydney: Univerity of Sydney.

Short, A. D. and Hogan, C. L. (1994). Rip Currents and Beach Hazards; Their impact on public safety an implications for coastal management. *Jorunal of Coastal Research Special Issue*, (4), 197-209.

Sznajder, M., Leduc, S, Janvrin, M. P., Bonnin, M. H., Aegerter, P., Baudier, F. and Chevallier, B. (2003). Home delivery of an injury prevention kit for children in four French cities: a controlled randomized trial. *Injury Prevention*, 9(3), 261-265.

Thanel, F. (1998). *Near drowning - Rescuing patients through education as well as treatment.* Postgraduate Medicine, 103(6), 141-153.

Towner, E. and Ward, H. (1998). Prevention of injuries to children and young people: the way ahead for the UK. *Injury Prevention*, 4(1), 17-25.

YMCA. (2001). *On the Guard II*. EEUU: Human Kinetics.