Swimming Pool & Spa International Conference 2009

Paper 7.2

Current issues associated with swimming pools, spas and similar recreational water environments.

Katherine Pond, Researcher, Robens Centre for Public and Environmental Health, University of Surrey, Guildford

Synopsis

In 2006 the World Health Organization published the Guidelines for safe recreational water environments, volume 2: swimming pools, spas and similar environments (WHO, 2006). The Guidelines provide a referenced review and assessment of the health hazards associated with swimming pools, spas, hot tubs, plunge pools, natural spas and physical therapy pools; their monitoring and assessment; and activities available for their control through education of users, good design and construction, and good operation and management. The Guidelines provide both specific guideline values, for example on recommended sampling frequencies for microbial testing, and good practices, such as preventative and management actions to prevent drowning.

The wide variety of hazards that the Guidelines cover highlight the multiple issues that need to be considered in the management and regulation of swimming pools, spas and similar recreational water environments. It is clear from this limited survey that regulations and guidelines vary considerably across Europe and there is considerable scope to harmonise the European approach to pool safety to protect public health.

Introduction

Although the risk of illness or infection associated with swimming pools, spas and similar recreational water environments is primarily through faecal contamination of the water and outbreaks are relatively uncommon, the WHO Guidelines address a wide range of other hazards including drowning and physical hazards, chemical contamination, contamination of associated facilities and air quality. They were developed over a period of ten years and involved over 60 experts in 20 countries. This is the first edition of the Guidelines. As with other WHO Guidelines as new experiences and developments in science become available these will be fed into the eventual revision of the Guidelines.

This paper reports the outcome of a short survey to assess current issues associated with swimming pools and similar recreational water environments and to gauge awareness of the WHO Guidelines and their usefulness to practitioners in the field. The results will be fed back to WHO for inclusion in any forthcoming review process.

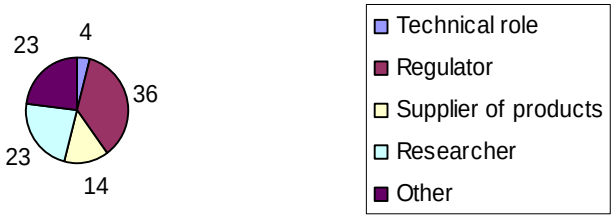
Method

A questionnaire was developed by the Robens Centre for Public and Environmental Health, University of Surrey (WHO Collaborating Centre for Water Quality and Human Health), with input from Mihaly Kadar, National Institute of Environmental Health,

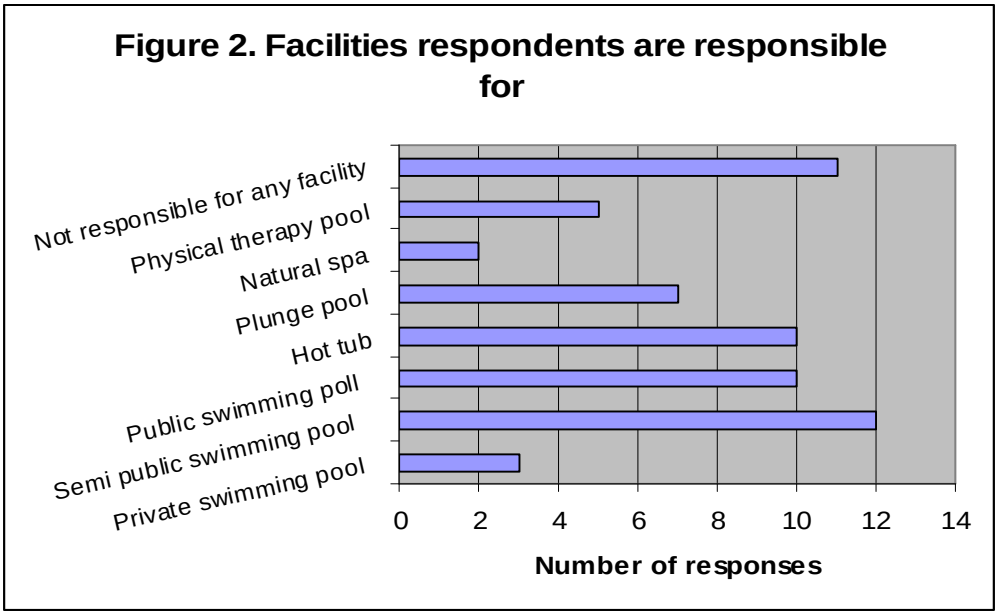
Budapest, Hungary, using surveymonkey – a tool to create and publish online surveys. The questionnaire was reviewed by Jamie Bartram, World Health Organization and subsequently revised and posted on the website of the Robens Centre for Public and Environmental Health in December 2008 and remained on line until February 16 2009.
In addition, assistance was received from the Regional Adviser for Water and Sanitation at the WHO European Centre for Environment and Health to obtain the support of Parties to the WHO-UNECE Protocol on Water and Health who are obliged to set targets and monitor progress towards these targets for the quality of the aquatic recreational water environment (Art 6 para 2 (k)). The Bureau of the Parties accepted an offer by the Robens Centre for Public and Environmental Health to study the current management of recreational waters. A link to the questionnaire was provided on the website of the WHO Regional Office for Europe.
Finally, an invitation to participate in the survey was posted in the publicity material for the Swimming Pool and Spa Conference 2009.

Results
Twenty-nine responses were received, not all comprehensively completed, from professionals related to swimming pools or similar recreational water environments. Figure 1 shows the distribution of professions answering the questionnaire - the majority (36%) were regulators, followed by researchers (23%). The countries represented in the survey were: United Kingdom, Czech Republic, Hungary, Estonia, Switzerland, Germany, Principality of Andorra, Georgia, Netherlands, Romania and Greece.

Figure 1. Professions of respondents (% of total)



Forty-eight per cent of the respondents were not directly responsible for any facility. The remainder were responsible for a semi-public swimming pool (i.e. a pool within a hotel, school, health club, cruise ship etc); a public swimming pool; or a hot tub (Figure 2).



Regulations relating to public and private swimming pools, hot tubs, spas and physical therapy pools were investigated. The majority of known regulations were for swimming pools. Only one respondent was not aware of any regulations or Guidelines specifically for *public* pools in their country.

Public pools

95% of respondents were aware of some form of regulations or Guidelines specifically for public pools (swimming pools or plunge pools) in their country. Nationwide mandatory regulations were reported to exist in all countries for which responses were received covering various aspects of public pools. Nationwide voluntary standards are also in existence in a number of countries (Table 1). Local voluntary standards were only reported from Switzerland 9for air quality) and the UK (for monitoring of water quality). Local mandatory standards were only reported by Switzerland (for monitoring of water quality).

Table 1. Regulations or Guidelines specifically for public pools by country.

	Nationwide voluntary Guidelines/technical standards for public swimming pools by countries	Nationwide mandatory standards
Construction material requirements	Germany, Switzerland, Hungary, Czech Republic, UK, Romania	UK, Netherlands, Greece, Georgia, Principality of Andorra, Switzerland, Czech Republic, Romania
Water microbiology	UK, Germany, Switzerland, Romania	Switzerland, Netherlands, Greece, Georgia, Principality of Andorra, Germany, Estonia, Hungary, Czech Republic, Romania
Water chemistry	Germany, UK, Switzerland, Romania	Switzerland, Netherlands, Greece, Georgia, Principality of Andorra, Germany, Estonia, Hungary, Czech Republic, Romania
Filter type	Germany, UK, Netherlands, Switzerland, Hungary, Czech Republic, Romania	Switzerland, Greece, Romania
Filter durability	Germany, Netherlands, UK, Czech Republic, Romania	Switzerland, Greece, Estonia, Romania
Disinfection systems	Germany, Switzerland, Czech Republic, UK, Romania	Switzerland, Greece, Georgia, Principality of Andorra, Romania
Air quality	Netherlands, UK, Germany, Romania	Principality of Andorra, Czech Republic, Romania
User hygiene	Netherlands, Germany, Romania	Greece, Georgia, Principality of Andorra, Switzerland, Romania
Process equipment	Germany, Netherlands, Switzerland, Hungary, Czech Republic, Romania	Switzerland, Greece, Romania
Circulation system components	Germany, Netherlands, Hungary, Czech Republic, Romania	Greece, Netherlands, Romania,
Electrical requirements	Germany,	Netherlands, Georgia, Principality of Andorra, Hungary, UK
Monitoring of water quality	Germany, UK, Switzerland, Romania	Switzerland, Netherlands, Greece, Principality of Andorra, Estonia, Hungary, Czech Republic, Romania
Monitoring of air quality	Germany, Netherlands, Romania	Netherlands, Romania
New materials	Netherlands, Germany,	
Biocides	Germany, Switzerland, UK	Switzerland, Netherlands, Greece, Principality of Andorra, Estonia, Czech Republic
Water treatment processes	Germany, Switzerland, Czech Republic, UK, Romania	Switzerland, Greece, Netherlands, Romania
User intensity/load	Germany, Netherlands, UK, Czech Republic, Romania	Switzerland, Netherlands, Greece, Principality of Andorra, Estonia, Hungary, Czech Republic, Romania
Water circulation/exchange intensity	Germany, UK, Switzerland, Czech Republic, Romania	Switzerland, Netherlands, Greece, Principality of Andorra, Hungary Estonia, Czech Republic, Romania
Other		Greece, Netherlands, Georgia, Czech Republic

Private pools

In terms of private pools, only 30% of respondents were aware of any regulations or Guidelines specifically for private swimming pools in their country. These are primarily nationwide voluntary Guidelines/technical standards relevant for the following aspects of the pools (Table 2), although Switzerland has local mandatory standards for some aspects and the UK has nationwide mandatory standards for electrical requirements (not shown).

Table 2. Regulations or Guidelines specifically for private pools by country

	Nationwide voluntary Guidelines/technical standards	Local Mandatory standards
Construction material requirements	Netherlands, Germany, UK	
Water circulation/ exchange intensity	Germany, UK	Switzerland
Monitoring of water quality	Germany	Switzerland
Filter durability	Germany	Switzerland
Filter type	Germany	Switzerland
Microbiological standards for water quality	Germany,	Switzerland
Chemical requirements for water quality	Germany	Switzerland
Biocides	Switzerland	Switzerland
Disinfection systems	Germany	Switzerland
Water treatment processes	Germany	Switzerland
User intensity/load		Switzerland
User hygiene		
Process equipment (eg UV light)		Switzerland
New materials		
Electrical requirements	Germany	
Air quality		
Other		
Circulation system components	Germany	
Monitoring of air quality		

Hot tubs

More controls appear to exist for hot tubs - 57% of respondents were aware of such regulations/Guidelines in their country, with the majority of the controls being nationwide voluntary Guidelines or technical standards (Table 3). Local voluntary controls exist in the UK for user hygiene (not shown).

Table 3. Nationwide voluntary Guidelines or technical standards for hot tubs by country.

	Nationwide voluntary Guidelines or technical standards	Nationwide mandatory regulations	Local Mandatory
Water circulation/ exchange intensity	Netherlands, Germany, UK, Switzerland, Czech Republic, Romania	Netherlands, Switzerland, Czech Republic, Romania	Switzerland
Disinfection systems	Germany, UK, Switzerland, Czech Republic, Romania	Romania	Switzerland
Monitoring of water quality	Netherlands, Germany, UK, Romania	Czech Republic, Romania	Switzerland
Filter type	Germany, UK, Czech Republic, Romania	Romania	Switzerland
Water microbiology	Netherlands, UK, Germany, Switzerland, Romania	Germany, Netherlands, Czech Republic, UK, Romania	Switzerland
Water chemistry	Netherlands, Germany, UK, Switzerland, Romania	Netherlands, Germany, Czech Republic, Romania	Switzerland
User intensity/load	Germany, UK, Czech Republic	Netherlands, Czech Republic	Switzerland
Filter durability	Germany, UK, Czech Republic	Romania	Switzerland
Biocides	Germany, UK, Switzerland	Netherlands, Czech Republic	Switzerland
Water treatment processes	Netherlands, Germany, Switzerland, Czech Republic, Romania	Romania	Switzerland
Process equipment (eg UV light)	Netherlands, Germany, UK, Czech Republic		Switzerland
Construction material requirements	Netherlands, Germany, Czech Republic, UK, Romania	Netherlands, Czech Republic, Romania	
Circulation system components	Netherlands, Germany, Czech Republic, Romania	Romania	
Electrical requirements	Netherlands, Germany	UK	
Air quality	Germany, Romania	Czech Republic, Romania	
User hygiene	Germany, Romania	Romania	Switzerland
New materials	Germany,		
Monitoring of air quality	Romania	Romania	
Other		Czech Republic	

Physical therapy pools

Respondents were split almost equally concerning awareness of regulations/Guidelines for physical therapy pools, with 48% of respondents being aware of such controls and 52% being unaware.

No local mandatory controls are known to exist for physical therapy pools in any of the countries that responded; most responses relate to nationwide voluntary Guidelines/technical standards; although nationwide Mandatory regulations were known to exist for some aspects of physical therapy pools in some countries.

Table 4. Guidelines or technical standards for physical therapy pools by country.

	Nationwide mandatory regulations by number of response and countries	Nationwide voluntary Guidelines/technical standards by countries	Local voluntary Guidelines/technical standards
Construction material requirements	Netherlands, Romania	Germany, UK, Romania	
Water microbiology	Netherlands, Germany, Romania	UK, Germany, Czech Republic, Romania	
Water chemistry	Netherlands, Germany, Romania	Germany, UK, Romania	
Filter type		Netherlands, Germany, Czech Republic	Netherlands
Filter durability		Netherlands, Germany	Netherlands
Disinfection systems	Netherlands, Romania	Germany, UK, Romania	
Air quality	Romania	Netherlands, Germany, Romania	Netherlands
User hygiene	Romania	Netherlands Germany, Romania	UK, Netherlands
Process equipment	Netherlands	Netherlands, Germany	Netherlands
Circulation system components	Netherlands, Romania	Netherlands, Germany, Romania	Netherlands
Electrical requirements	Netherlands, UK	Germany	
Monitoring of water quality	Netherlands, Romania	Germany, UK, Romania, Czech Republic,	
Monitoring of air quality	Romania	Netherlands, Germany, Romania	Netherlands
New materials		Netherlands, Germany,	Netherlands

Biocides	Netherlands	Netherlands, Germany, Czech Republic	
Water treatment processes	Romania	Germany, Romania	
User intensity/load	Netherlands, Romania	Netherlands, Germany, UK, Romania	Netherlands
Water circulation/exchange intensity	Netherlands, Romania	Germany, Czech Republic, UK, Romania	
Other			

Natural spas

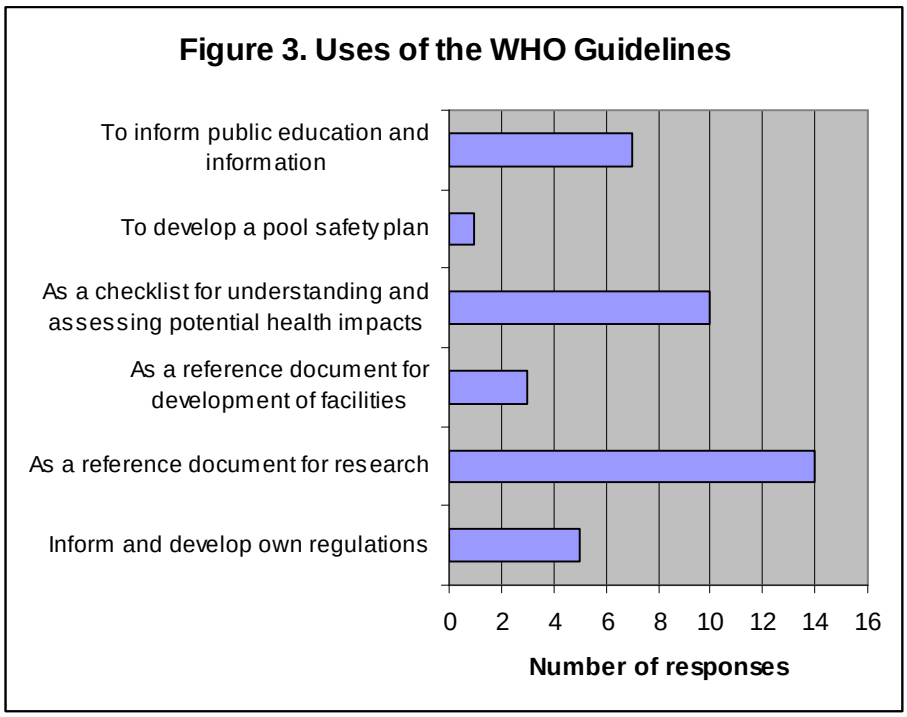
Most respondents (74%) were unaware of any regulations/Guidelines for natural spas. The Netherlands, Georgia and Germany are the only countries where any controls exist. Where these do exist they are either nationwide mandatory regulations or nationwide voluntary guidelines or technical standards.

Table 5. Guidelines or technical standards for natural spas by country

	Nationwide mandatory regulations by countries	Nationwide voluntary Guidelines/technical standards by countries
Construction material requirements	Netherlands, Georgia,	Germany
Water microbiology	Netherlands, Georgia, Germany	Germany
Water chemistry	Netherlands, Georgia, Germany	Germany
Filter type	Georgia,	Germany
Filter durability	Georgia,	Germany
Disinfection systems	Georgia,	Germany
Air quality		Germany
User hygiene		
Process equipment		Germany
Circulation system components		Germany
Electrical requirements	Netherlands	Germany
Monitoring of water quality	Netherlands	Germany
Monitoring of air quality		
New materials		
Biocides	Netherlands	Germany
Water treatment processes		Germany
User intensity/load	Netherlands	Germany
Water circulation/exchange intensity	Netherlands	Germany
Other		

Awareness and relevance of the WHO Guidelines for swimming pools, spas and similar recreational water environments.

Ninety-five per cent of respondents were aware of the WHO Guidelines for swimming pools, spas and similar water environments. In general, very positive comments regarding the Guidelines were received. They were reported to be relevant to 85% of respondents, with the majority using them as a reference document for research, or as a checklist for understanding and assessing the potential health impacts of projects involving the development of such facilities (Figure 3). Other specific uses were listed as ship inspections and for training and education; provision of the basis for new national and local regulations on swimming pools and spas; as a reference for additional indicators for the monitoring and formulation of a checklist for sanitary control.



It was considered by 90% of respondents that the Guidelines achieve the aim of helping to protect public health. In addition, the Guidelines are considered to be well organised (100% of respondents); the material easily understood (100%) and well focused (95%). The bibliography is generally considered to be comprehensive and up to date (81% of respondents).

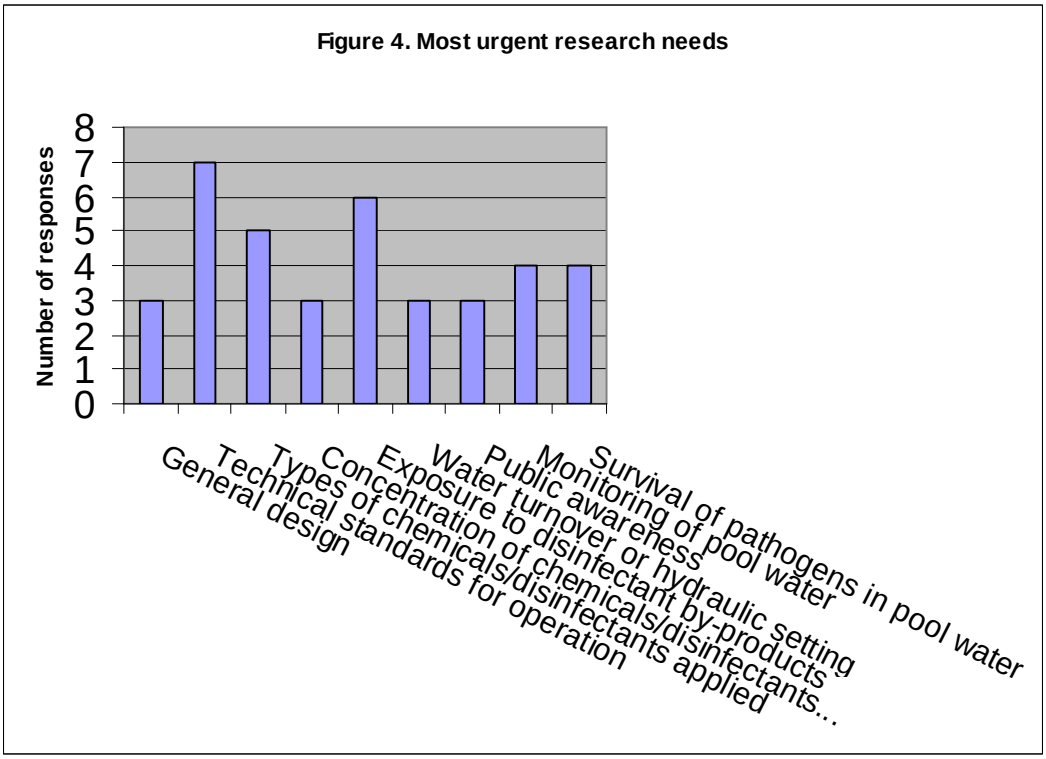
The most useful section of the Guidelines was considered to be the controls to reduce microbial hazards; followed by the controls to reduce chemical hazards. The least useful was the section on implementation of the Guidelines.

Suggestions were made for additions to be made to a future revision of the Guidelines: more details on new disinfectants; additional information on training, regular duties and responsibilities of technical operating staff; philosophies of pool water processing; updating the bibliography and other aspects; more information on hot tubs and spas; more information on risks of contamination and how to deal with them.

Main problems associated with swimming pools, spas and similar recreational water environments.

This section was primarily answered in relation to public swimming pools (72% of responses). One respondent answered the section in relation to a private swimming pool and four respondents for hot tubs. In the past 12 months the most frequently reported problem associated with the facility in question was microbial contamination of the water, followed by chemical hazards associated with the water and physical injuries associated with users, and risks associated with plant and equipment malfunction.

Although 50% of respondents felt there is sufficient health based evidence to support regulations and management-related interventions for the facilities in question, a further 31% did not. The most urgent research needs were cited as technical standards for operation, exposure to disinfectant by-products and types of chemicals/disinfectants applied (Figure 4). In addition, specific topics for further research were cited as investigation into the links between trichloroamine in air of indoor pools and asthma; research into adequate treatment plant for spa polls to be used by the public; research on plant room safety.



Discussion

The response rate to the questionnaire survey was disappointing. However, some useful indications of current issues associated with swimming pools, spas and similar water environments in 11 countries have emerged from this limited survey as well as a brief evaluation of the WHO Guidelines for swimming pools, spas and similar recreational water environments.

Most of the respondents were regulators, without direct responsibility for managing a specific facility but with overall interest and knowledge about all types of pools. Regulations exist in all countries from which responses were received but these are inconsistent between national and local mandatory regulations, and national and local voluntary regulations. The regulations are applicable to various aspects of public and private pools and hot tubs but again, are not consistent throughout the countries that responded, although it appears that public swimming pools in all countries participating in the survey have microbiological and chemical standards for water quality. Other aspects of public pool safety are not consistently regulated throughout Europe – e.g. user hygiene, air quality and disinfection systems. Some inconsistencies were reported between respondents from the same country, perhaps reflecting different professional roles and knowledge.

Fewer regulations exist for private pools, natural spas, physical therapy pools and hot tubs. The hazards that exist in these types of pools vary and in the majority of cases the facilities are used safely. However, it is known that adverse health outcomes do occur, although the frequency of such events is not known.

In general, the WHO Guidelines for swimming pools, spas and similar recreational water environments achieve their aim of providing an authoritative referenced review and assessment of health hazards associated with these types of recreational water environments and appear to be well used. Indications are that sections of the Guidelines need updating and some additional information could be added. In many cases national regulations provide more stringent controls for swimming pools than the Guidelines propose – however, all WHO Guidelines are intended to provide a basis for standard setting and should be interpreted in light of local and regional circumstances.

Conclusion

The results of this limited survey seem to support a call for European cooperation aiming at a common approach to pool safety and protection of health and consumer interest seems pertinent as well as a harmonised system for health surveillance. Key research needs to support this aim were technical standards for operation, exposure to disinfectant by-products, types and concentrations of chemicals applied.

Reference

World Health Organization (2006). Guidelines for safe recreational water environments. Volume 2, swimming pools, spas and similar environments. Geneva, World Health Organization.