DIRECT FROM CDC ENVIRONMENTAL HEALTH SERVICES BRANCH

Rob Blake, MPH, REHS

Jay Peters

Model Aquatic Health Code (MAHC) and International Swimming Pool and Spa Code (ISPSC)

Editor's Note: NEHA strives to provide up-to-date and relevant information on environmental health and to build partnerships in the profession. In pursuit of these goals, we feature a column from the Environmental Health Services Branch (EHSB) of the Centers for Disease Control and Prevention (CDC) in every issue of the *Journal*.

In this column, EHSB and guest authors from across CDC will highlight a variety of concerns, opportunities, challenges, and successes that we all share in environmental public health. EHSB's objective is to strengthen the role of state, local, and national environmental health programs and professionals to anticipate, identify, and respond to adverse environmental exposures and the consequences of these exposures for human health. The services being developed through EHSB include access to topical, relevant, and scientific information; consultation; and assistance to environmental health specialists, sanitarians, and environmental health professionals and practitioners.

The conclusions in this article are those of the author(s) and do not necessarily represent the views of the CDC or the International Code Council.

Rob Blake is chief of the EHSB at CDC and has been working in the environmental health field for more than 30 years. Jay Peters is a senior staff member with the International Code Council and leads the association's efforts to promote and support safety initiatives related to the disciplines of plumbing, mechanical, fuel gas, pools, and spas.

Swimming is the third most common form of physical exercise in the U.S. (U.S. Census Bureau, 2010). A lot of swimming occurs in facilities with inadequate public health protection, however. This is often due to local or state codes that are not up-to-date or are not based on the latest science. In 2010, the Centers for Disease Control and Prevention (CDC) reviewed 2008 data from four state and 11 local pool inspection programs. Pool codes in those jurisdictions were not uniform, resulting in inspection data recorded in different ways. The data analysis showed, however, that of approximately 120,000 inspections, more than 12% documented serious health and safety violations that resulted in immediate pool closure (Centers for Disease Control and Prevention [CDC], 2010).

This lack of consistent health regulation in state and local codes results in uncertainty and confusion for pool and spa owners, operators, suppliers, and users. And in some existing laws and regulations, gaps or outdated standards leave many people unnecessarily vulnerable to disease and injury. The need for a menu of regulatory and policy provisions becomes clear: a menu to help state and local governments review their laws and revisit the design, construction, operation, and maintenance of all aquatic venues within their jurisdictions.

Recent years have seen a steady increase in reported disease outbreaks tied to aquatic facilities (Dziuban et al., 2006). Table 1 contains examples of recreational water illnesses attributed to aquatic venues. Waterborne pathogens can cause a variety of ailments, many of which cause diarrhea. In fact, diarrheal disease is so common that some 5% of the public contracts it monthly (Roy, Scallan, & Beach, 2006). Annually, the incidence is up to 3.5 cases of diarrhea per person, with even higher rates for young children (Roy et al., 2006). Behaviors such as swallowing water, inadequate showering before entering the water, and the lack of toilet use and diaper changes all increase the likelihood of disease in aquatic venues.

The disease burden doesn't end there. Each year, from 2001 to 2008, more than 30,000 children aged 0–9 years sustained swimming-related injuries that were treated in emergency departments. Many injuries were fall-related (42.0%), followed

TABLE **1**

Examples of Recreational Water Illnesses and Documented Causes

Illness	Possible Causes
Acute gastroenteritis	*Cryptosporidium* Toxigenic *E. coli* *Giardia* *Shigella* Norovirus Chemicals
Dermal infections	*Pseudomonas* Fungi
Ear infections	*Pseudomonas*
Eye infections and irritation	Adenoviruses Chloramines
Respiratory infections and irritation	*Legionella* *Mycobacterium* Chloramines Chemicals
Neurologic infections	Echovirus
Hepatitis	Hepatitis A virus
Urinary tract infections	*Pseudomonas*

by struck by/against (31.4%), drowning (6.6%), and cut/pierce (4.1%) injuries—and nearly one-half of the injuries resulted in lacerations (46.9%) (Mack, 2009). It is likely that many of these injuries were preventable through better dissemination and enforcement of pool safety guidelines such as prohibitions against running on the pool deck (falls), glass objects near the pool (cut/pierce), and diving near other swimmers (struck by/against).

Sadly, tragic injuries, including fatal and nonfatal drowning, also occur in aquatic venues. The CDC's Wide-ranging OnLine Data for Epidemiologic Research (WONDER) found that each year in the U.S., more than 600 persons drown in swimming pools (CDC, 2012). Most are children 1–4 years of age, but African-Americans 5–19 years of age drown at higher rates (CDC, 2011). In June 2002, the drowning death of a young girl entrapped in a pool suction fitting prompted national legislation aimed at preventing suction-fitting entrapment injuries and deaths. In June 2011, the story of a woman drowning in a Boston public pool made national headlines because her body was not noticed for two days. These examples highlight the need for injury prevention measures and for adequate pool operation and maintenance.

The Model Aquatic Health Code

In response to the growing body of evidence that aquatic venue public health and safety is inadequate, CDC sponsored a workshop in Atlanta, Georgia, in February 2005. Workshop participants recommended the following:

- Data-driven, knowledge-based, risk-reduction efforts to prevent disease and injuries.
- A model code that would give health jurisdictions needed information for creating local and state codes.
- Regular updating of the model code based on new data.
- Open access to information in the model code.

The workshop ideas led to the development of the Model Aquatic Health Code (MAHC) to promote safe design and operation at aquatic venues. A steering committee was created along with technical committees to address the various draft code modules. The committees comprise volunteer subject-matter experts and, inclusively, stakeholders from many walks of life. The MAHC Web site (www.cdc.gov/healthywater/swimming/pools/mahc/) allows for open, timely, and transparent data sharing. And during public comment periods, interested parties are encouraged to participate in the draft code construction and editing process.

MAHC committees were encouraged to construct draft code sections that were 1) easy to read, 2) cross referenced, and 3) supported by the scientific literature. The overall process borrowed heavily from the process the Food and Drug Administration Conference for Food Protection uses for the creation and biennial update of its Model Food Code.

The MAHC is expected to lead to the following:

- Reductions in recreational water-related illnesses.
- Adoption of minimum aquatic venue health standards throughout the U.S.
- Mandatory training and education for pool operators.
- Improved surveillance systems.
- Improved data collection.
- Data-based decision making.
- Systems-based approaches to facility design, maintenance, and operation.
- Construction of a research agenda supporting regular MAHC updates.

As of March 2012, all 14 modules were in various degrees of steering committee review. Nine modules are posted (www.cdc.gov/healthywater/swimming/pools/mahc/structure-content/). CDC requires agency clearance of each module. The target date for initial posting of all the MAHC modules is June 2012. After the first 60-day comment period on each module, the modules will be revised, knit into a single MAHC document, and posted for another 60-day public comment period. After a second revision, the complete first edition will be available. Existing modules are already available for use as a tool for aquatic health law and regulation review.

International Swimming Pool and Spa Code

While the MAHC has been under development, the International Code Council (ICC) and organizations such as the Association of Pool and Spa Professionals (APSP) have provided some level of aquatic venue protection, mostly for injury prevention. ICC is a 50,000+ member nonprofit association of public safety officials such as code and fire officials who are concerned with the built environment. ICC has developed approximately 15 model codes and several American National Standards Institute (ANSI) standards. Many of these code provisions and

standards have been adopted internationally and at the state and local level in the U.S. ICC's model International Building Code (IBC) and International Residential Code (IRC) both contain provisions for swimming pool safety, including provisions for suction entrapment, glazing, plumbing, and fencing.

In 2009, in partnership with APSP, ICC began development of the International Swimming Pool and Spa Code (ISPSC)—a comprehensive pool and spa code to address all facets of pool safety and construction. The new ISPSC includes not only public pools and spas, but also residential pools and spas, exercise spas, and even water parks.

ISPSC development has progressed rapidly. ISPSC uses ICC's consensus code development process to build on existing language from the IBC and IRC and APSP's established ANSI consensus standards. During a series of public meetings in 2009 and 2010, a committee of health and safety experts, pool and spa manufacturers/contractors, product testing laboratories, and pool and spa operators developed the first version. The resulting document was subjected to a full, formal round of code development using ICC's well-established code development process.

Baltimore, Maryland, (November 2010) and Dallas, Texas, (May 2011) hosted public code development hearings. In late October 2011, at the final public hearing in Phoenix, Arizona, the membership discussed and voted on the final version. All public comments have been Web-site posted, and the final comment period is now complete. With the content finalized, the 2012 ISPSC will be published in 2012 and will be available for state and local adoption.

Like all ICC model codes, the ISPSC will be updated every three years. Accordingly, planning is already underway for the 2015 ISPSC. Anyone can submit proposed code changes for that document. Proposed changes are due by January 3, 2013. Hearings on those changes will occur throughout calendar year 2013. In early 2014, the ICC will release the 2015 ISPSC for adoption and use.

MAHC and ISPSC's Interrelationship

CDC and ICC officials are exploring ways the MAHC and ISPSC can complement each other and avoid potential overlaps and conflicts. The key issues in the interrelationship between MAHC and ISPSC are to identify clearly the respective roles of building and health officials and to promote mutual respect and coordination so that the public has access to safe and healthy aquatic venues. In December 2010, CDC and ICC agreed that

- building officials should have principal responsibility for design and construction, but health officials should be involved in the process and
- health officials should have principal responsibility for operation and maintenance, but building officials should be involved with renovations and facility upgrades.

As of the publication date of this article, many jurisdictions had already considered both the ISPSC and MAHC elements for adoption. That these efforts mesh with one another thus becomes imperative—any conflicts or provisions that could lead to confusion or to serious injury need to be eliminated. This collaboration needs to be ongoing. For the second, 2015 ISPSC version, CDC and ICC are looking into coordinated code strategies that address design and construction as well as operation and maintenance issues. The ICC is considering CDC environmental health representative membership on the ICC pool code committee charged with reviewing changes for the 2015 ISPSC.

To improve coordination between the codes, CDC, NEHA, and other national organizations that represent environmental health professionals are likely to become more involved in the ICC processes. CDC will have no veto power, nor should CDC's involvement be construed as ICC code endorsement. By bringing the latest scientific findings into the process, however, CDC involvement will promote public health protection. In fact, this cooperative relationship could be the key to creating, adopting, implementing, and regulating safe aquatic venues.

The move to broaden collaboration between building and health officials may have begun with pools and spas. In addition, health and building officials would undoubtedly benefit from such collaboration in other areas of the built environment. For example, the ICC creates many other model codes such as the International Private Sewage Disposal Code and the International Green Construction Code. These codes contain important, health-related provisions for items such as air quality, drinking water quality, property maintenance, and carbon monoxide detection. In these and other areas, public health will benefit from closer collaboration between the distinct but connected communities of public health experts and building officials. Clearly, the goal of both groups is to improve public health and safety.

With this in mind, CDC and ICC plan to coordinate their respective model pool code efforts. If we work together to support state and local jurisdictions that plan to review or revise their aquatic health laws using the MAHC and the ISPSC, we can help to protect as many people as possible and ensure that people in the U.S. will continue to be safe and healthy while participating in their third-favorite form of physical exercise.

Corresponding Author: Rob Blake, Environmental Health Services Branch Chief, Division of Emergency and Environmental Health Services, National Center for Environmental Health, 4770 Buford Highway, N.E., Mailstop F-60, Atlanta, GA 30341-3717. E-mail: RGBlake@cdc.gov.

References

Centers for Disease Control and Prevention. (2010). Violations identified from routine swimming pool inspections—selected states and counties, United States, 2008. *Morbidity and Mortality Weekly Report, 59*(19), 582–587.

Centers for Disease Control and Prevention, National Center for Injury Prevention and Control. (2011). *Home and recreational safety.* Retrieved from http://www.cdc.gov/HomeandRecreationalSafety/Water-Safety/waterinjuries-factsheet.html

Centers for Disease Control and Prevention. (2012). *Wide-ranging OnLine Data for Epidemiologic Research (WONDER).* Retrieved from http://wonder.cdc.gov/mortsql.html

Dziuban, E.J., Liang, J.L., Craun, G.F., Hill, V., Yu, P.A., Painter, J., Moore, M.R., Calderon, R.L., Roy, S.L., & Beach, M.J. (2006). Surveillance for waterborne disease and outbreaks associated with recreational water—United States, 2003–2004. *Morbidity and Mortality Weekly Report Surveillance Summary, 55*(12), 1–30.

Mack, K.A. (2009). *Swimming related injuries among children age 0–9 years treated in emergency departments, NEISS-AIP 2001–2006* [abstract]. Washington, DC: American Public Health Association.

Roy, S.L., Scallan, E., & Beach M.J. (2006). The rate of acute gastrointestinal illness in developed countries. *Journal of Water and Health, 4*(Suppl. 2), 31–69.

U.S. Census Bureau. (2010). *Statistical abstract of the United States. Recreation and leisure activities: Participation in selected sports activities 2006.* Retrieved from www.census.gov/compendia/statab/2010/tables/10s1212.pdf