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Tools To Help Conquer the Model Aquatic Health Code

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 this column on environmental health services from the Centers for Disease Control and Prevention (CDC) in every issue of the *Journal*.

In these columns, authors from CDC’s Water, Food, and Environmental Health Services Branch, as well as guest authors, will share insights and information about environmental health programs, trends, issues, and resources. The conclusions in these columns are those of the author(s) and do not necessarily represent the official position of CDC.

All authors are from the Water, Food, and Environmental Health Services Branch in the National Center for Environmental Health. CDR Joe Laco is an environmental health scientist with the U.S. Public Health Service. Shannon McClenahan is a former Oak Ridge Institute for Science and Education (ORISE) fellow. Brian Hubbard is the Safe Water Section team lead.

Swimming and other water-related activities are excellent ways to get the physical activity and health benefits needed for a healthy life. In the U.S., we swim and bathe over 300 million times in pools, oceans, lakes, rivers, and hot tubs/spas each year, and most of the time it is healthy, safe, and enjoyable. There are, however, risks associated with swimming and other recreational water activities. In fact, the number of outbreaks associated with recreational water has increased substantially over the last few decades (Centers for Disease Control and Prevention, 2011). Drowning, near-drowning, and pool chemical injuries continue to occur. These occurrences underscore the need to build, maintain, and inspect public pools, hot tubs/spas, and water parks to help keep

bathers and aquatics staff healthy and safe.

The Model Aquatic Health Code (MAHC) is a guidance document based on the latest science and best practices. It was developed to help local and state authorities and the aquatics sector make swimming and other aquatic activities healthier and safer. States and localities can save time by voluntarily using the MAHC to create or update existing pool codes to reduce the risk of outbreaks, drownings, pool chemical exposures, and other injuries. The MAHC guidelines are all-inclusive and aim to prevent illness and injury in the design, construction, operation, and management of public aquatic facilities.

The Centers for Disease Control and Prevention (CDC) regularly update the MAHC in partnership with the Council for

the Model Aquatic Health Code (CMAHC, www.cmahc.org), which collects, assesses, and relays national input on MAHC versions. The updates keep the MAHC current with the latest advances in the aquatics industry while also responding to public health reports of disease and injury. The 2018 MAHC (3rd edition) is currently in use and the next edition will be released in summer 2021. To prepare for the new edition, CMAHC received input for MAHC change requests in late 2019 and early 2020. Proposed changes will be presented and discussed at the 2020 CMAHC conference in Houston, Texas, in October. At that time, CMAHC members will vote to accept or reject change requests to be incorporated into the 2021 MAHC (4th edition).

Even though the MAHC provides excellent prevention strategies, it is long and can be difficult to digest, which can pose challenges for users and potential adopters. Useful material that addresses a certain topic can be found in multiple sections of both the Code Language and the Annex (supporting rationale) documents.

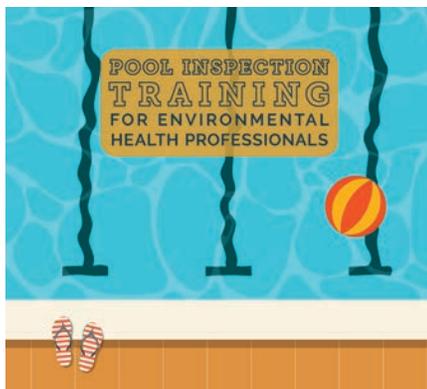
To better serve state and local pool officials, CDC worked with many partners to develop resources to make the MAHC easier to use and navigate. The tools listed include an inspection form, electronic applications, reporting forms, and MAHC-specific checklists. They are posted on CDC’s MAHC website at www.cdc.gov/mahc/networks-tools-forms.html#adoption.

MAHC Aquatic Facility Inspection Report (Form)

Model inspection form with approximately 50 MAHC elements for healthy and safe pool

FIGURE 1

Online Pool Inspection Training for Environmental Health Professionals

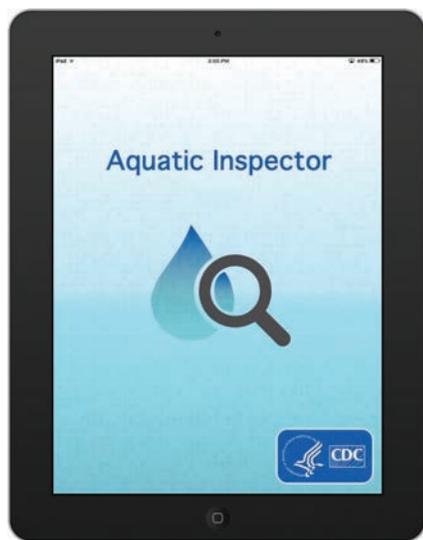


BENEFITS OF POOL INSPECTION TRAINING FOR ENVIRONMENTAL HEALTH PROFESSIONALS

- Improve pool inspections in your community by better understanding and applying the Model Aquatic Health Code (MAHC) and the MAHC inspection form.
- Take the courses you want and when you want to in this online training.
- Obtain continuing education contact hours (optional) from the National Environmental Health Association upon completing the lessons and final evaluation.
- Walk through a pool inspection using the MAHC inspection form.
- Learn about the various elements and systems of operating safe aquatic facilities including recirculation systems, filtration systems, water disinfection, water chemicals, equipment room, hygiene facilities, and records room.

FIGURE 2

Aquatic Inspector Application for iPads



AQUATIC INSPECTOR APP

- Is free and compatible with iPad (iOS 9 or later).
 - Note, the Aquatic Inspector app is only for iPads and might not show up in App Store searches on smartphones.
- Offers the complete and searchable Model Aquatic Health Code text.
- Can take and link photos to inspection reports.
- Can record data on site and print, save, and share inspection reports.

operation and management to minimize illness and injury risk and protect public health.

Cheat Sheet

Instructional guide for each inspection item found on the MAHC Aquatic Facility Inspection Report.

Cross-Reference Guide

The Cross-Reference Guide links the MAHC Aquatic Facility Inspection Report to content

in the Code Language and Annex documents. The guide allows an inspector to quickly locate Code Language requirements and supporting information in the Annex needed to develop a comprehensive and detailed inspection report.

Online Pool Inspector Training

This online training (Figure 1), developed in partnership with the National Environmental Health Association (NEHA), provides the

basics of performing an aquatic facility inspection. Based on the 2016 MAHC (2nd edition), the training addresses aquatic facility systems and walks the user through a pool inspection using the MAHC-based inspection form.

Aquatic Inspector App

The Aquatic Inspector app (Figure 2) provides a digital version of the MAHC inspection form, along with embedded MAHC text. The app allows environmental health practitioners to integrate the latest science and best practices into routine, follow-up, and investigative inspections of public treated aquatic venues.

MAHC Network

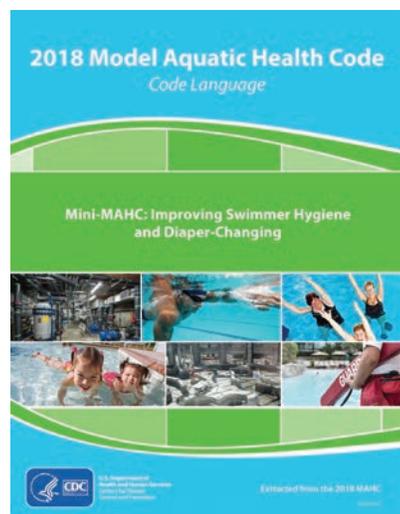
The MAHC Network, established through a CDC partnership with National Association of County and City Health Officials, is a community of MAHC users, subject matter experts, and others hoping to learn about the code. Members receive updates on the code, have access to and provide input into newly developed resources, and join bimonthly webinars featuring the code and user experiences.

Mini-MAHCs

CDC developed Mini-MAHCs (Figure 3) to make the MAHC more concise and easier to use and to tackle specific public health concerns. The Mini-MAHCs focus on content in the Code Language and Annex documents and allow a user to quickly locate information to address important topics. All Mini-MAHCs reference content from the 2018 MAHC. Four

FIGURE 3

Mini-MAHC Cover



Did You Know?

- Drowning is a leading cause of unintentional injury-related death for children ages 1–14 years (Centers for Disease Control and Prevention, 2012). Nonfatal drowning can cause brain damage resulting in learning disabilities or even permanent loss of basic functioning (Spack, Gedeit, Splaingard, & Havens, 1997).
- Injuries linked to pool chemicals account for 3,000–5,000 emergency department visits each year (Hlavsa, Robinson, Collier, & Beach, 2014). One third to almost one half of those patients are under 18 years old (Vanden Esschert et al, 2019).
- Nearly 500 disease outbreaks linked to pools, hot tubs/spas, and water playgrounds were reported to the Centers for Disease Control and Prevention for 2000–2014 (Hlavsa et al, 2018).
- *Cryptosporidium* is a leading cause of treated recreational water-associated outbreaks in the U.S. and can cause diarrhea for up to 3 weeks (Hlavsa et al., 2018).
- Recent studies found that routine inspections resulted in immediate closure of 1 in 8 public pools (11.8%) and 1 in 7 public hot tubs/spas (15.1%) due to health hazards (Hlavsa et al, 2016).

Mini-MAHCs are currently available at www.cdc.gov/mahc/mini-mahcs.html:

- Reducing the Spread of *Cryptosporidium*
- Improving Swimmer Hygiene and Diaper Changing
- Preventing Pool Chemical Injuries
- Preventing In-Line Production of Toxic Chlorine Gas Events

CDC continues to support and work with NEHA and other partners to develop recreational water and MAHC-related tools. Currently NEHA is working with health departments across the U.S. to understand how they manage and publicly share aquatic facility inspection data. NEHA conducted a scan and identified only six states that published aquatic facility inspection data online and in a usable format. An additional tool emerging from NEHA's work will be an open data standard for sharing aquatic facility inspection data. 🐼

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References

Centers for Disease Control and Prevention. (2011). Acute illness and injury from swimming pool disinfectants and other chemicals—United States, 2002–2008. *Morbidity and Mortality Weekly Report*, 60(39), 1343–1347.

Centers for Disease Control and Prevention. (2012). Drowning—United States, 2005–2009. *Morbidity and Mortality Weekly Report*, 61(19), 344–347.

Hlavsa, M.C., Cikesh, B.L., Roberts, V.A., Kahler, A.M., Vigar, M., Hilborn, E.D., . . . Yoder, J.S. (2018). Outbreaks associated with treated recreational water—United States, 2000–2014. *Morbidity and Mortality Weekly Report*, 67(19), 547–551.

Hlavsa, M.C., Gerth, T.R., Collier, S.A., Dunbar, E.L., Rao, G., Epperson, G., . . . Beach, M.J. (2016). Immediate closures and viola-

tions identified during routine inspections of public aquatic facilities—Network for Aquatic Facility Inspection Surveillance, five states, 2013. *Morbidity and Mortality Weekly Report, Surveillance Summaries*, 65(5), 1–26.

Hlavsa, M.C., Robinson, T.J., Collier, S.A., & Beach, M.J. (2014). Pool chemical-associated health events in public and residential settings—United States, 2003–2012, and Minnesota, 2013. *Morbidity and Mortality Weekly Report*, 63(19), 427–430.

Spack, L., Gedeit, R., Splaingard, M., & Havens, P.L. (1997). Failure of aggressive therapy to alter outcomes in pediatric near-drowning. *Pediatric Emergency Care*, 13(2), 98–102.

Vanden Esschert, K.L., Haileyesus, T.,ARRIER, A.L., Donovan, M.A., Garofalo, G.T., Laco, J.P., . . . Hlavsa, M.C. (2019). Pool chemical injuries in public and residential settings—United States, 2008–2017, and New York, 2018. *Morbidity and Mortality Weekly Report*, 68(19), 433–438

Did You Know?

In late March 2020, NEHA distributed a rapid needs assessment to assess environmental health activities and needs in response to the COVID-19 pandemic. The findings have been summarized into a report and can be found at www.neha.org/NEHA-Issues-Key-Findings-COVID-19.