CDC’s
Model Aquatic Health Code (MAHC)

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Outline

- Public health rationale for the MAHC
- What is the MAHC
- MAHC Adoption
- Keeping the MAHC up to date
- What’s New (Code changes, Committee work)
Public Health Rationale for the MAHC
Health Benefits of Water-Based Physical Activity

- **Fight obesity epidemic**
- **Might be only physical activity option**
  - Medical restrictions
  - Aging population
- **Improve physical and mental health across lifespan**
  - Manage chronic illnesses (e.g., alleviate joint and muscle pain in arthritis patients)
  - Maintain bone health
  - Reduce anxiety and depression
  - Improved cardiovascular health


Prevalence of Self-Reported Obesity Among U.S. Adults, by State and Territory — CDC, 2017

Source: [www.cdc.gov/obesity/data/prevalence-maps.html](http://www.cdc.gov/obesity/data/prevalence-maps.html)
Public Health Issues Detracting from Aquatics Benefits

- Drowning ~3500/people/yr\(^1\)
- Spinal cord injuries from diving (~450/yr\(^2\))
- Indoor air quality issues\(^3\)
- Pool chemical-associated injuries caused ~5000 people ED visits in 2012\(^4\)
- Waterborne outbreaks significantly increase\(^5\)
- High rate of pool (12.1%) and spa (11%) closures during routine inspections\(^6,7\)

Current Pool Code Situation in the U.S.

- Current code development at the state or local level
  - Little federal regulation, no federal jurisdiction
  - Significant variation across USA
  - Lack of uniform national standards
  - May or may not include regulated party/industry input

- Requires significant staff resources and time to research, prepare, and develop code language
  - Difficult to update; many codes out of date and don’t reflect evolving science

- Local HD (68% have pool codes) responsible for defending proposed changes (e.g., needs/benefits, cost impact)
What is the MAHC?
What is the Model Aquatic Health Code (MAHC)?

- Voluntary model public pool and spa code based on science and best practices created by CDC and national consortia of PH/industry
  - 1st Edition released August 2014
  - 2nd Edition released July 2016
  - 3rd Edition released July 2018
- Helps local and state authorities and aquatics sector make swimming and other water activities healthier and safer
What is the Model Aquatic Health Code (MAHC)?

- States/localities can use MAHC to create/update existing pool codes
  - Reduce risk for outbreaks, drowning, and pool-chemical injuries
  - Saves resources; no need to reinvent codes in each jurisdiction
- All-inclusive and addresses design, construction, operation, maintenance, policies, and management of public aquatic facilities
MAHC Scope

- All areas of public health concern
  - Public venues, NOT residential
  - Illness, injury, drowning
  - Water, air, & facility exposures that impact the health of swimmers and facility users
  - Leave other areas to building codes, etc.

- Facility types
  - Man-made, treated, recirculated water venues
  - Health care-based pools
  - Therapy pools
MAHC Building Blocks

- Data or best practices driven
  - Avoid prescription when possible
- Free and accessible for all
  - Posted on CDC’s Healthy Swimming website
- Implementable
  - Incremental change: “Evolution, not revolution“
- Updated regularly
  - Current update cycle is every 3 years
- Partnership-based
  - Built by public health and aquatics sector partnership
- Easy to understand with cited rationale for requirements
  - Code section accompanied by “Annex” that includes data and rationale for code requirements
MAHC Partnership Rationale

- Partnership will yield the best product, greatest buy-in, and will be most likely to be adopted
- Incorporating public input improves overall quality and national buy-in
- Developed as modules from 2007-2014 culminating in release of MAHC 1st Edition in August 2014
  - >150 people from across PH, aquatics, academia
  - Two rounds of public comment with over 4400 comments and >70% acceptance rate
## MAHC in Context

<table>
<thead>
<tr>
<th><strong>Document type?</strong></th>
<th>Model code, not a law</th>
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<tbody>
<tr>
<td><strong>Creation Process?</strong></td>
<td>CDC led, with substantial input from state and local public health, aquatics sector, and academia. Evolution NOT revolution</td>
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<td><strong>Public comment?</strong></td>
<td>Yes, two public comment periods plus 3rd comment period when users choose to adopt</td>
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<tr>
<td><strong>Can be updated?</strong></td>
<td>Yes, improvements based on data and expertise from public health and aquatics</td>
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<td><strong>Enforceable?</strong></td>
<td>Must be adopted by state or local authority first</td>
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<td><strong>All pools?</strong></td>
<td>No, only public facilities in adopting jurisdictions. Also, design and construction provisions mostly apply to new and remodeled construction</td>
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What’s Inside the MAHC?

1) Preface
2) User Guide
3) Glossary, Acronyms, Initialisms
4) Design and Construction
5) Operation and Maintenance
6) Policies and Management
7) MAHC Resources
8) Appendices
The Vision
What is the Public Health Vision for Aquatics?

- Public pools/waterparks/spas in every community
  - Economically viable for communities
- Everyone knows how to swim
- All age groups enjoy health, social, and family benefits
- Improved swimmer knowledge of injury/disease prevention, hygiene
- Expectation of good operation; facilities remain open on inspection
- Healthy and safe experiences for everyone
  - Reduced drowning
  - Reduced chemical and other injuries
  - Reduced disease outbreaks
MAHC: Addressing Current Issues
Reducing the Risk of Chlorine Outgassing Events
Reducing the Risk of Chlorine Outgassing Events: How Does the MAHC Help?

- Chemical feeder interlocks between two of following:
  - Recirculation pump, flow switch in line, controller and flow cell

- Chemical storage requirements
- Air handling standards
- Reporting of events to health department
Reducing the Risk of Chlorine Outgassing Events: How Does the MAHC Help?

- Based on reported incidents, additional safeguards now included in 2018 3rd Edition:
  - Visual alarm or other indication if feeder turns off via interlock
  - Bathers removed if pumps shut off
  - No bathers for 5 minutes after pumps turned on or while backwashing
  - Monthly testing of feeder interlocks
Protecting Aquatic Facility Users:
Indoor Aquatic Facility Ventilation Design and Air Quality
Criteria for air handling design, construction, and installation
- Must be designed, constructed and installed to support health and safety of building’s patrons
- Compliance with ASHRAE 62.1
- Air distribution design
- Humidity control
- Disinfection by-product removal
- Purge capacity

Operation & maintenance requirements
Reducing the Risk and Spread of Cryptosporidium
Reducing the Risk of *Cryptosporidium* Outbreaks: How Does the MAHC Help?

- **New construction**
  - “Increased risk” venues (kiddie pools, splash pads) required to have secondary disinfection (UV, ozone)---Crypto highly chlorine tolerant but susceptible to UV and ozone
  - Hygiene facilities within 200 (under 5 yo area) or 300 (adult) feet
Reducing the Risk of *Cryptosporidium* Outbreaks: How Does the MAHC Help?

- **Upon Adoption**
  - Diaper changing stations to improve hygiene, limit exposure

- **Operation and Policy**
  - Fecal incident response for diarrheal incidents (presumed crypto) requires closure and hyperchlorination
  - Messaging to bathers
Protecting swimmers from drowning
Protecting Swimmers from Drowning: How Does the MAHC Help?

- Lifeguard zones of surveillance part of original plan design so all zones have unrestricted vision
  - LG zones of surveillance performance-based with identified performance criteria
- During re-design, major renovation design professional must alert owner that addition of features, etc. that obstruct zone may require additional staffing
- Lifeguard zones of surveillance must be assessed to ensure glare does not obstruct vision
- Breaks every hour to increase vigilance
MAHC Adoption
MAHC Adoption Status

- **Key considerations**
  - States must review and use regulatory process and time-frame: adoption can take > 2-4 yrs

- **Adoption**
  - Four majority adoptions and six partial adoptions by five states, two counties, and three U.S.G agencies. At least 22 states/counties are in the process of, or considering, adoption. (www.cdc.gov/mahc/policy.html)
Public Health and Adoption: Mini-MAHCs

- Adopt MAHC or components of MAHC that address key emerging issues
  - Crypto control posted
  - Under development
    - Hygiene
    - Chlorine/acid mixing/gassing events
    - Lifeguarding improvements
    - Ventilation and air quality
    - Supervision and training
    - Flotation tanks
    - Noise reduction
Support Statements

- **Endorsements** ([www.cdc.gov/mahc/policy.html](http://www.cdc.gov/mahc/policy.html))
  - New 2018: NSPF, Commercial Energy Specialists, ChlorKing Water Systems
  - Public Health: NACCHO 2015; NEHA 2017; CSTE 2017
  - Aquatics Sector: WWA “Kelly Ogle” Safety Award 2017
  - Reaching out to aquatics groups to grow list of support from aquatics sector

- **Continued movement to becoming standard of care**
  - e.g., YMCA: if no local code then follow MAHC

- **CDC**
  - Continued support by senior management and encouragement to promote adoption more widely
Visible Groundswell Following MAHC Release: Becoming a Standard While Waiting for Adoption

- Operational adoption: Use in operations, MAHC-compliant operational materials, and operational assistance
- Variances granted: MAHC-based variances/waivers given liberally to requestors while discussing adoption (e.g., FL, NY, CT)
- Surrogate pool code: States without a pool code pointing to MAHC for design, operation, management guidance (e.g., MS)
- Acceptance of design requirements: MAHC design features becoming accepted and not immediately removed from designs due to cost
  - Clients signing liability waivers if they require removal (e.g., secondary disinfection on increased risk venues)
- Being referred to as standard of care
- Expanding into business products and opportunities
MAHC Adoption Challenges

- Misinformation
  - *FACT*: Design & Construction (Section 4) does *not* retroactively apply to existing facilities.
    - New construction or substantial alteration only, except
      - Chemical feeders, automated controllers, interlocks, diaper changing stations.
  - *FACT*: The MAHC was created using a consensus process.
    - Created and maintained using a national, multi-partner, inclusive, consensus process and the best available science and best practices
MAHC Adoption Challenges

- Misunderstanding of technical content
  - CDC/CMAHC available to clarify and/or explain any provision of the MAHC
  - MAHC Annex useful
MAHC Adoption Challenges and Successes

- Stakeholders must be engaged in the process
  - Misunderstanding can result when stakeholders are not engaged in the process
  - Many in the aquatics sector/industry are advocating for and endorsing adoption of the MAHC
    • Very useful during rule making process!
  - Clear role for aquatics sector advocacy to speed adoption
  - If you have public meetings, CMAHC can assist in getting participation of aquatics industry representatives
How will the MAHC be kept up-to-date?
How Will the MAHC Be Kept Up-To-Date?

- CDC owns, revises, and publicly posts the MAHC
- Need to renew and update
  - Self-sustaining mechanism
- Needs a conduit to gather input on improvements
  - Public health, aquatics, academia, general public
- Conduit needs to
  - Gather national input, decide on scientific merit, and summarize changes needed for CDC to accept into next MAHC edition
The Conference for the Model Aquatic Health Code (CMAHC)

- What is CMAHC?
  - 501c(3) non-profit organization

- Why does it exist?
  - Organized in 2014 to manage updates to the MAHC

- Modeled after Conference for Food Protection that oversees FDA Model Food Code; holds conference every 3 years

- Mission
  - Collect, assess, and relay input on MAHC revisions back to CDC
  - Provide advocacy and needed support to health departments and other partners on using the MAHC
  - Solicit, coordinate, and prioritize research needs
CMAHC Operational Outline for Proposing Changes to the MAHC

1. Input
2. Change Request
3. Technical Review & Discussion
4. CMAHC Triennial Conference Presentations
   - 7 Technical Support Committees
   - Voting
   - Board of Directors
   - CDC

Additional Committees:
- Ad Hoc Committees
- Standing Committees
WHAT’S NEW?
Selected New MAHC Content for 3rd Edition

- **Acoustical Design Requirements**
  - Addresses the finishes, construction assemblies, and MEP (mechanical; engineering/plumbing) system noise in indoor aquatic facilities

- **Floatation Tank Design and Operational Requirements**
  - Addresses unique design & operational aspects, establishing minimum requirements to address potential for pathogen transmission and other health and safety related concerns
CMAHC Committees

- New committees established
  - Annex Revision and Update Standing Committee
  - CMAHC/ISPSC Consistency Standing Committee
  - Indoor Aquatic Facility Ventilation Design and Air Quality Ad Hoc Committee
- Additional committees planned
  - Spray Ground/Spray park (Interactive Water Venue) Design Ad Hoc Committee
  - Pool Shell Design Ad Hoc Committee
CMAHC Certification Program

- Certifies that services or products comply with the relevant or applicable standards and procedures outlined in the MAHC (www.cmahc.org/cmahc-certification-program.php)
  - Includes a thorough product evaluation based on the MAHC content related to the specific product or service. Aquatic services and products must meet or exceed all applicable MAHC standards

- Certified first product in September 2018
  - Counsilman-Hunsaker “Facility Manager” web-based app.
    - C-H partnered with NSPF on app

- Several other groups want CMAHC certification
  - NSPF to be first for operator training
Conclusions & Future Directions
Anticipated Public Health Outcomes

- Saves state/local resources creating/updating codes
- Fewer pool/facility closures
- Improved collection and use of inspection data
- Development of a research agenda to fill gaps
- Data-based uniformity in key areas
- Fewer outbreaks of recreational water illnesses resulting from exposure to contaminated swimming water
- Fewer drowning and pool chemical incidents
MAHC
More Information: Search on “CDC MAHC” or visit the Healthy Swimming MAHC Website: www.cdc.gov/mahc
Email: mahc@cdc.gov

CMAHC
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Questions ?