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
Why Develop Model Pool Code Guidance? Supporting the Health Benefits of Swimming!

- One of top sports and exercise activities in the US
  - > 1 billion days/visits a year by over 1/3 of U.S. population
- Low impact exercise improves joint use with arthritis and cardiovascular health
- Improves mood
- Improves quality of life and reduces disability
- Maintains bone health for post-menopausal women

For more information, see http://www.cdc.gov/healthywater/swimming/health_benefits_water_exercise.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 and Regulation Situation

- Current code development at the state or local level
  - Little federal regulation, no federal jurisdiction
- May or may not include regulated party/industry input
- Requires significant staff resources and time to research, prepare, and develop code language
- Local HD responsible for defending proposed changes from needs/benefits and cost impact standpoint
WHAT IS THE MAHC?
What is the Vision for Aquatics? Why Are We Here?

- Public pools/waterparks/spas in every community
  - Well operated and they remain open on inspection
- Everyone knows how to swim
- All age groups enjoy health, social, and family benefits
- Healthy and safe experiences for everyone
  - Improving swimmer ability, knowledge, and hygiene
  - Reducing drowning
  - Reducing chemical and other injuries
  - Limiting disease outbreaks
- The MAHC can achieve the long range vision using incremental change to move aquatics towards the vision
  - Examples: Improved shell designs, filtration systems, water and air quality, bather supervision
How Do We Get There?
What is the MAHC?

- Voluntary model public pool and spa code based on science and best practices created by CDC in a nationwide public health and industry partnership
- States and localities can use the MAHC to create or update existing pool codes
  - To reduce risk for outbreaks, drowning, and pool-chemical injuries
  - Save resources; no need to reinvent codes in every jurisdiction
- All-inclusive; addresses design and construction; operation and 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

- Incremental change is most likely to be adopted by state and local jurisdictions
- 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>Document type?</th>
<th>Model code, not a law</th>
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<tbody>
<tr>
<td>Creation Process?</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>Public comment?</td>
<td>Yes, two public comment periods plus 3rd comment period when users choose to adopt</td>
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<td>Can be updated?</td>
<td>Yes, improvements based on data and expertise from public health and aquatics</td>
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<td>Enforceable?</td>
<td>Must be adopted by state or local authority first</td>
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<td>All pools?</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
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 proposed via 2017 CRs for inclusion 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
  - Reporting of events to health department
PROTECTING AQUATIC FACILITY USERS: INDOOR AQUATIC FACILITY VENTILATION DESIGN AND AIR QUALITY
Protecting Pool Users from Poor Air Quality: How Does the MAHC Help?

- 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 CRYPTOSPORIDIIUM
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

- 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 fit into regulatory process and timeframe: adoption can take \( \geq \) 2 years; Food Code sped up after 3-6 years

- **Endorsements**
  - NACCHO 2015; NEHA 2017; CSTE 2017; WWA Kelly Ogle Safety Award 2017; Several aquatics industry/sector endorsements pending

- **Adoption**
  - Full adoption: NM (08/01/2016 after 2+ years prep); National Park Service; US Dept. of Defense; Nova Scotia, Canada
  - Partial adoption: GA, FL, DE, PWTAG/UK
  - In review for potential full/partial adoption: numerous jurisdictions such as AL, AZ; CO; IA; IN; MD; MN; NY; OH; OR; TN; Southern Nevada/Las Vegas; Fairfax County, VA; Ontario, Canada; Mexico State/Mexico; Colombia
Visible Groundswell Following MAHC Release: Becoming a Standard While Waiting for Adoption

- Operational adoption: Use in operations, MAHC-compliant operational materials, and operational assistance
  - e.g., YMCA operations manual, Great Wolf Lodge operational guidance, Jeff Ellis & Assoc. guarding materials
- 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
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

- **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?

- 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
MAHC RENEWAL: KEEPING THE MAHC UP-TO-DATE
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

- Administration & Operation
  - Bylaws, Board of Directors, Executive Director
  - Membership over 700 and costs $30/year
  - Committees include Technical Review Committee and Ad Hoc Committees

- Modeled after Conference for Food Protection that oversees FDA Model Food Code
The Conference for the Model Aquatic Health Code (CMAHC)

- **Role**
  - National clearinghouse for data-driven, science-based information from public health and aquatic industry experts to improve and support use of the MAHC

- **Vision**
  - An up-to-date, science-based, sustainable, easily understood MAHC that is implemented by pool programs across the U.S. to support healthy and safe aquatic experiences for everyone
The Conference for the Model Aquatic Health Code (CMAHC)

- **Mission**
  - Collect, assess, and relay input on MAHC revisions back to CDC for final acceptance
  - Provide advocacy and needed support to health departments and other partners on using the MAHC
  - Solicit, coordinate, and prioritize research needs

- **Works through**
  - Conference discussing Change Requests every 3 years
  - Technical reviews of potential changes
  - Ad Hoc and Standing Committees to drive work
CMAHC Operational Outline for Proposing Changes to the MAHC

- Input
- Change Request
- Technical Review & Discussion
- CMAHC Triennial Conference Presentations
- CDC Board of Directors
- Voting
- 7 Technical Support Committees
- Ad Hoc Committees
- Standing Committees
WHAT’S NEW?
Selected New MAHC Content for 3rd Edition (subject to CDC acceptance)

- **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*
  - Indoor Aquatic Facility Ventilation Design and Air Quality *Ad Hoc Committee*

- **Additional committees planned**
  - CMAHC/APSP *Standing Committee*
  - Spray Ground/Spray park (Interactive Water Venue) Design *Ad Hoc Committee*
  - Pool Shell Design *Ad Hoc Committee*
Annex Revision and Update **Standing Committee**

- **Objectives and Outcomes**
  - Expand and improve the science- and evidence-based language in the Annex that is key support for MAHC adoption and MAHC users.
    - Review the MAHC Code and Annex to determine if existing Annex content needs updating and, where no Annex information is provided, if content is needed.
    - Identify subject matter experts to update and/or write new Annex sections
    - Manage completion of Annex language by subject matter experts
Indoor Aquatic Facility Ventilation Design and Air Quality Ad Hoc Committee

- Objectives and Outcomes
  - Identify and assess the factors affecting air quality at indoor aquatic facilities, including:
    - Air handling/air distribution system design, effectiveness, and operation
    - Water quality/water chemistry
    - Pool water treatment operation and maintenance
    - Pool types (flat water, agitated water, water features, hot water)
      - Evaporation rate calculation.
    - Bather load
    - Spectator areas
CMAHC UPDATES
Committees

- Indoor Aquatic Facility Ventilation Design and Air Quality  Ad Hoc Committee
  - Objectives and Outcomes (continued)
    - Review and evaluate current Model Aquatic Health Code (MAHC) requirements to determine if identified factors affecting air quality are adequately addressed.
    - Develop revisions to the MAHC design and operational standard/best practice recommendations and corresponding Annex content to address ventilation/air quality design and operational criteria, as appropriate.
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
Contact Information

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QUESTIONS ?