Why Create the MAHC?

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NEHA, Las Vegas, NV
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Outline

- Rationale for the MAHC?
- How the MAHC was created?
- How the MAHC is structured?
- How jurisdictions can use it?
- What are the potential benefits?
- How will the MAHC be kept up to date?
- What does the future look like?
CDC’S COMMITMENT TO AQUATICS
Why the MAHC?
Keeping the Health Benefits of Swimming While Reducing Disease, Disability, and Injury

- One of top sports in the US – >300 million visits a year
- Low impact exercise improves joint use with arthritis and cardiovascular health
- Improves mood, bone health, quality of life and reduces disability
- Clear negative public health outcomes such as drowning, chemical and other injuries, spread of infectious diseases
CDC Historical Perspective

- CDC supporting aquatics since the 1950’s
CDC Historical Perspective

CDC’s Healthy Swimming Program 2001-2014

2001
WHY HAS CDC SUPPORT CONTINUED?
Drowning

- 2nd leading cause of unintentional death from injury (behind motor vehicle crashes) for ages 1-14\(^1\)
  - Average 3,533 people/year for 2005-2009\(^1\)
- More than 50% of drowning victims treated in EDs require hospitalization or transfer for further care. These injuries can cause severe brain damage and long-term physical and mental disabilities\(^2,3,4\)
- Deaths more common in males and African Americans (particularly ages 5-14)\(^2\)

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Diving Injuries: “No Diving”

- Diving into water that is too shallow can result in spinal cord injuries (SCIs)
- Diving momentum leaves little if any time for course correction if not trained
- ~10,000 SCIs/year, ~4.5% (1995-2000) from diving (~450/yr)\(^1\)
- Average cost of life-long support for a 25-year old quadraplegiac ~$2.8 million

\(^1\) DeVivo, 2003.
Air Quality: Disinfection By-Product Formation

- Di- and tri-chloramine production occurs when HOCl reacts with nitrogenous waste in urine, sweat, other waste
- Both are volatile & out-gas to envelope above pool
- Both are strong eye and lung irritants
  - Not just pools
  - Poultry and produce processing where chlorine used to disinfect or clean material
    - Chlorammines identified as occupational issue
  - Some data suggest a link to asthma

Pool Chemical-Associated Injuries

- CPSC’s National Electronic Injury Surveillance System (NEISS)
  - Estimates based on visits to ~100 hospital emergency departments (EDs) in the U.S.

- 4876 (95%CI 2821-6930) people in 2012 visited an ED for a pool chemical-associated injury
  - ~50% children

- 100% preventable

1 Hlavsa et al. MMWR 2014;63:427-430.
Disease Transmission

- Disease outbreaks
- Gastrointestinal infections
- Skin infections
- Ear infections
- Eye infections and irritation
- Respiratory infections and irritation
- Neurologic, urinary tract infections
Outbreaks of Acute Gastrointestinal Illness Associated with Recreational Water, United States, 1978–2010

Outbreaks of Acute Gastrointestinal Illness Associated with Treated Recreational Water, United States, 2001–2010

Chlorine sensitive:
Poor pool operation & maintenance

Cryptosporidium spp. ("Crypto") 76.2%
Norovirus 4.7%
Giardia 3.5%
Shigella spp. 4.1%
Other* 2.3%
E. coli 2.3%

Unidentified 7.0%

n=172; Other includes Salmonella, Campylobacter, Plesiomonas, and multiple pathogens; Hlavsa MC et al. 2014. MMWR 63(1):6–10.
Inadequate Pool Operation and Maintenance is NOT Uncommon

- Pool inspection data from 4 state and 11 local pool inspection programs
- Inspected >120,000 pools
- Conducted January 1–December 31, 2008
- 12.1% of routine inspections resulted in immediate closure of the pool pending correction of violation

- Little surprise that ~25% of GI illness outbreaks are operational breakdowns/errors

MAHC DEVELOPMENT
MAHC Genesis

- How can you effect change?

- 2004, Council of State and Territorial Epidemiologists position statement passed
  - Asked CDC to fund a meeting to develop recommendations for reducing RWI outbreaks

- 2005, CDC-sponsored workshop
  - “Recreational Water Illness Prevention at Disinfected Swimming Venues”; Atlanta, GA
MAHC Genesis

- Workshop recommendation #1
  - Create model guidance with broad national industry and public health input
  - Give open access to all users
  - Update regularly based on new data
  - CDC should sponsor process
MAHC Vision and Mission

- Healthy and safe aquatic experiences for everyone
- Provide user-friendly guidance to state and local officials to assist in transforming health department pool programs into data-driven, knowledge-based, risk reduction efforts to prevent disease and injuries and promote healthy recreational water experiences
MAHC Genesis

- **May 2007: Organize Steering Committee**
  - Develop organizational plan and structure
  - Program outline/guidance, Strawman blueprint
  - Develop 2 modules as guidance examples
- **Fall 2008: Organize Technical Committees**
  - Appoint Chairs, recruit membership
- **Spring 2009: Initial Technical Committees start work with ~140 volunteers using modular approach**
- **Fall 2010 to Summer 2013: 12 more modules created and posted for 1st 60-day public comment period**
### MAHC Development: Process and Timeline

**14 Modules**

<table>
<thead>
<tr>
<th>Sequence</th>
<th>Description</th>
<th>Date</th>
<th>Comments</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-14</td>
<td>Develop modules; Post for 1st round of public comment</td>
<td>10/2010-7/2013</td>
<td>1428</td>
<td>Completed</td>
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<tr>
<td>11-14</td>
<td>Revise-repost all modules. 2979 comments: 76% of comments asking for change accepted</td>
<td>3/2014</td>
<td>1428</td>
<td>Completed</td>
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<tr>
<td>1-14</td>
<td>Merge all modules; Post “Knitted” Version for 2nd (final) round of public comment</td>
<td>3/2014</td>
<td>1428</td>
<td>Completed</td>
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<tr>
<td>1-14</td>
<td>Revise and post MAHC 1st Edition 1428 comments currently being addressed</td>
<td>Summer 2014</td>
<td></td>
<td>Completed</td>
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</table>
MAHC Structure

- **Chapters**
  1) Preface
  2) User Guide
  3) Glossary, Acronyms, Initialisms
  4) Design and Construction
  5) Operation and maintenance
  6) Policies and Management

- **Code:** enforceable language
  - 303 pgs; 258 text, 232 code language

- **Annex:** rationale and references for code language
  - 367 pgs, 283 text
# 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>
</tr>
<tr>
<td>Public comment?</td>
<td>Yes, two public comment periods plus 3rd comment period when users choose to adopt</td>
</tr>
<tr>
<td>Can be updated?</td>
<td>Yes, improvements based on data and expertise from public health and aquatics</td>
</tr>
<tr>
<td>Enforceable?</td>
<td>Must be adopted by state or local authority first</td>
</tr>
<tr>
<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>
</tr>
</tbody>
</table>
Public health partners believe regulatory role makes involvement critical from construction to operation to ensure health and safety at aquatic facilities.

Must work hand in hand with building code officials.

ICC/IAPMO (International Code Council; International Association of Plumbing and Mechanical Officials)

CDC signed MOUs with both groups.

CDC voting member of both groups.

Work to minimize conflict and overlap.

- Have gone through ICC code and changed MAHC to minimize conflicts or will change ICC.
Other Support Features

- Guidance and toolkits for operators
- Design and interpretation assistance
- Research agenda for aquatics
HOW CAN JURISDICTIONS USE THE MAHC
Jurisdictional Support Features

- MAHC can be adopted in total, by piece, or not at all
- MAHC can be altered to fit jurisdictional needs
- MAHC is intended to save jurisdictional time to create or update codes
  - No need to recreate the wheel
- Design and interpretation assistance
- Guidance and toolkits for regulatory programs
  - Operations and administrative code guidance
  - Inspections and forms
ANTICIPATED OUTCOMES
Short Term Outcomes: Immediate After Guidelines Adopted

- Automated controllers and feeders
- Chemical feeder-recirculation interlocks
- Diaper changing station criteria
- Training for pool operators & inspectors
- Preventive maintenance checks
- Policies: employee illness, body fluid response, pool surface cleaning to reduce biofilm
Short Term Outcomes: New Construction or Substantial Alteration After Guidelines Adopted

- Secondary disinfection for increased risk aquatic venues
- Slower filtration rates
- Improved flow meters
- Improved backwash rates
- Improved chemical storage/handling
- Inclusion of rinse showers
- Minimum distances for bathrooms
Intermediate Outcomes: System Improvements

- Fewer pool/facility closures
- Improved collection and use of inspection and surveillance data
- Development of a research agenda to fill gaps
- Enhanced collaboration among stakeholders
- Data-based uniformity in key areas
Long-Term Public Health Outcomes

- Fewer outbreaks of recreational water illnesses resulting from exposure to contaminated swimming water
- Fewer drowning incidents in aquatic venues
- Fewer injuries from pool chemicals/disinfection by-products
- Fewer ED visits due to swimming-related issues
UPDATING THE MAHC
How Will the MAHC Be Kept Up-To-Date?

- CDC owns, revises, and publicly posts the MAHC
- Need to renew and update to keep up with change
- Self-sustaining mechanism to advise on change
- Needs a conduit to gather input on what is needed
  - Public health, aquatics, academia, general public
- Conduit needs to gather national input, decide on scientific merit, and summarize changes needed for CDC to decide on acceptance
- Model after Conference for Food Protection that oversees FDA Model Food Code
The Conference for the Model Aquatic Health Code (CMAHC)

- **Role:** Serve as a national input clearinghouse to advise CDC on keeping the MAHC up-to-date and support use

- **Vision**
  - An up-to-date, knowledge-based MAHC that supports healthy and safe aquatic experiences for everyone and is used by pool programs across the U.S.

- **Mission:**
  - Collects, assesses, and relays national input on MAHC revisions back to CDC for final acceptance
  - Provides advocacy and needed support to health departments and other partners on using the MAHC
  - Solicits, coordinates, and prioritizes research needs
CMAHC Advantages

- Can play an advocacy role with health departments and legislatures
- Can fund raise and support MAHC adoption activities
- Can serve as national clearinghouse without over burdening government resources
- Can keep government attention on the perpetual need to renew the MAHC
  - Want to ensure CDC long-term interest, vs. having a person-specific program that can easily fall apart
- Can serve as advisory group to CDC without having to “own” or “alter” the MAHC (CDC’s role)
CMAHC Organizational Progress

- CMAHC incorporated as an independent 501(c)3 non-profit organization
  - CDC still owns, revises, and publicly posts the MAHC
- Board of Directors being finalized
- By-laws and CMAHC organization outlined
- Developing financial sustainability plan
  - NSPF signed on as Founding Sponsor
- CMAHC biennial meeting planning structure outlined
- Website launched (www.cmahc.org)
- Other functions to include outreach, technical assistance, research agenda, toolkit development
CMAHC Organization: Board of Directors and Updates

- 10 members
  - Regulatory: local (2), state (2)
  - Industry: builder (1), designer (1), operator large facility (1), hospitality (1 to be filled)
  - CDC (2), ½ vote each (tentative)

- CMAHC organization/biennial meeting planning begun
  - October 8, 2014 organizational meeting before WAHC meeting in Portland, OR
  - October 2015, 1st CMAHC Meeting held prior to WAHC
CMAHC Long-Term Strategy

- Develop a sustainable model for renewing the MAHC
  - Financially independent and sustainable. Must have broad funding base to be viable long-term and be viewed as an independent organization
  - Strongly partnered with CDC and other groups
  - National clearinghouse for advising CDC on data-based changes to MAHC
  - National CMAHC Conference held every 2 years to formulate proposed changes to MAHC
  - Serves as national support center for MAHC use
    - Technical assistance, toolkits, research
  - Coordinates development of MAHC research plan
CONCLUSIONS & FUTURE DIRECTIONS
MAHC, CMAHC, Pool Program, and Aquatics Industry Benefits

- Establishes system to renew and support wide adoption of the MAHC
- Saves state/local resources being used to essentially “reinvent the wheel” in separate jurisdictions across U.S.
- Scientifically or best practices based guidance
- Renewed on biennial basis
- Creates toolkit with forms/guides to assist facilities
- Provides “Administrative Code” guidance to facilitate pool program improvements
- Improves performance and data-based decision making by pool programs
MAHC, CMAHC, Pool Program, and Aquatics Industry Benefits

- Builds stronger relationships between regulators and aquatics industry
- Drives design, construction, and operational uniformity across jurisdictions
- Improves operation of lower end of aquatics sector that are more likely to have repeated violations and higher risks that hurt overall aquatics sector
- Builds stronger relationships with building code creators and officials
  - Working to smooth this process with ICC and IAPMO
Future Directions

- **Next 6 Months**
  - Finalizing MAHC 1\textsuperscript{st} Edition
  - Strong web presence and knowledge of CMAHC role and clear plan for collecting national input on MAHC

- **2015**
  - Convene 1\textsuperscript{st} CMAHC Biennial Conference
Future Directions

5-20 Years

- Wide use of MAHC domestically/internationally
- Diversified, stable funding for CMAHC
- MAHC renewal process robust and functional so members feel they have input
- CMAHC assists state and local HD’s in taking the first evolutionary steps in redefining and improving aquatics in the U.S.
- CMAHC process builds a strong coalition between public health and aquatics sector
- The process drives a robust research agenda
CDC Historical Perspective: 1959-2014

- CDC supporting aquatics since the 1950’s
U.S. Aquatics Pool Treatment Paradigm: 1920 to Present

- Chlorine/pH control
- Rapid Filtration
- Recirculation
- "shocking"
- Regulatory inspections
U.S. Aquatics Paradigm Evolution: Improved Design, Operation, Oversight

- Improved water quality
- Slower filtration rates, flocculation, backwashing
- Decreased chloramine formation/volatilization
- Improved halogen/pH control; secondary disinfection
- Focus on training, safety, prevention, cleaning, H₂O replacement
- Improved bather hygiene
- Increased regulatory oversight

- Automatic halogen/pH control
- Secondary disinfection

- Improved water quality
National Consensus Bridge to Healthy and Safe Aquatic Experiences for Everyone: 2015-2035
MAHC Acknowledgments

- CMAHC Interim Board of Directors
- MAHC Technical Committee Chairs & Members
- MAHC Steering Committee Members
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