

Network for Aquatic Facility Inspection Surveillance Data on Immediate Closures and Violations: Unlocking the Potential Power of Aquatic Inspection Data

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Thank You!!!

- **Arizona**
 - **Maricopa**
 - **Mohave**
 - **Pima**
 - **Yuma**
- **California**
 - **San Bernardino**
 - **San Diego**
 - **Orange**
- **Florida**
- **New York**
- **Texas**
 - **Austin**
- **CDC**
 - **Taryn Mecher**
 - **Sarah Collier**
 - **Gouthami Rao**
 - **Beth Dunbar**
 - **Michael Beach**
 - **Jasen Kunz**
 - **Katie Fullerton**

Outline

➤ Background

- Overview of swimming
- National surveillance of recreational water–associated illness and injury

➤ Methods & Results

➤ Discussion

- Explain implications, examine limitations, share conclusions

BACKGROUND

Swimming in the United States

- **National Sporting Goods Association (2009)**
 - **Swimming: 4th most popular sports activity**
 - **50,226,000 people, ages ≥ 7 years, swam ≥ 6 times***
 - **At least 301,356,000 swimming instances**
- **Centers for Disease Control and Prevention**
 - **Preliminary data: at least 1 BILLION total annual days in recreational water**
- **Pkdata (2011)[†]**
 - **309,000 U.S. public aquatic venues (e.g., pools)**

*Source: www.census.gov/library/publications/2011/compendia/statab/131ed/arts-recreation-travel.html

† Source: The Association of Pool & Spa Professionals. U.S. swimming pool and hot tub market 2011.

Health Benefits of Water-based Physical Activity*

- Fight U.S. obesity epidemic
- Might be only physical activity option
 - Medical restrictions
 - Aging population
- Improve physical and mental health across lifespan
 - Manage chronic illnesses
 - Alleviate joint and muscle pain
 - Maintain bone health
 - Reduce anxiety and depression

* Source: www.cdc.gov/healthywater/swimming/health_benefits_water_exercise.html

Public Health Goal

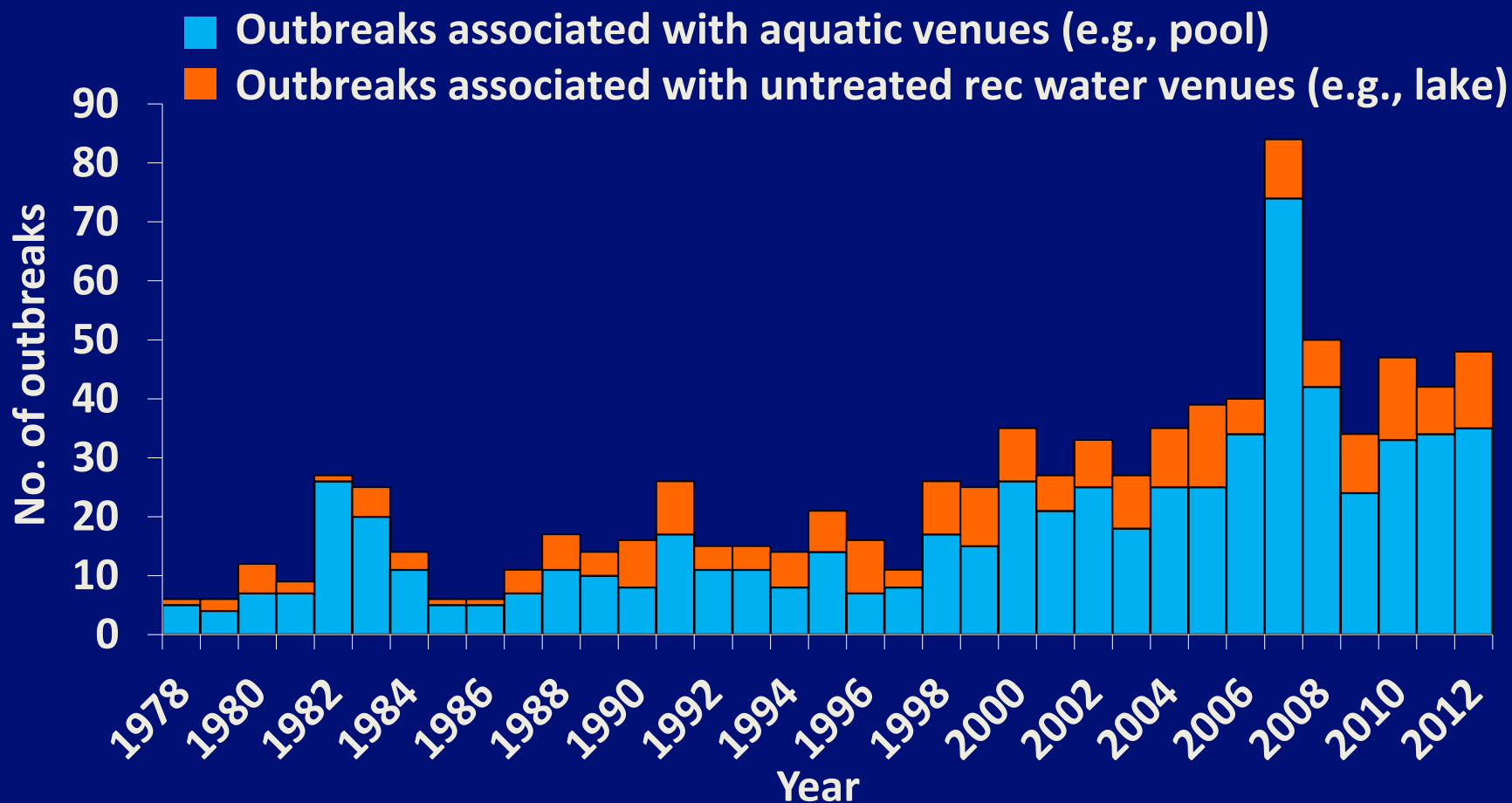
- Maximize health benefits and minimize risk for illness and injury
- Need to do surveillance to*:
 - Characterize epidemiology
 - Estimate magnitude
 - Document distribution
 - Track natural history
 - Inform and evaluate prevention efforts to optimize illness and injury prevention

* Source: Teutsch SM. *Considerations in Planning a Surveillance System*. 2nd ed. Principles and Practice of Public Health Surveillance. 2000.

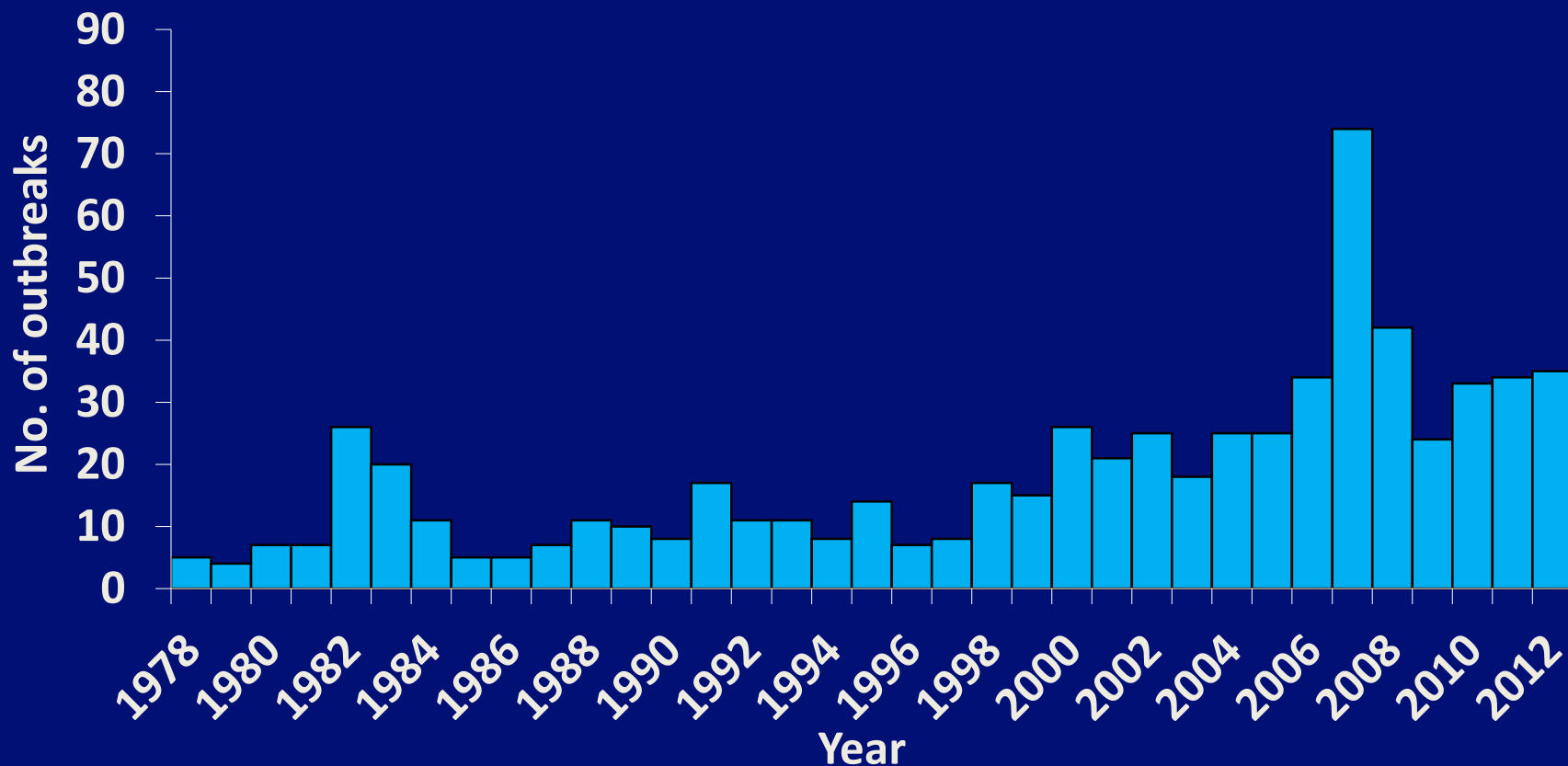
Recreational Water–associated Outbreaks

- **Recreational water–associated outbreak**
 - **Occurrence of similar illness in ≥ 2 persons**
 - **Epidemiologically linked by location and time of exposure to recreational water**

Recreational Water–associated Outbreaks, by Year and Type of Exposure — United States, 1978–2012 (n=879)*

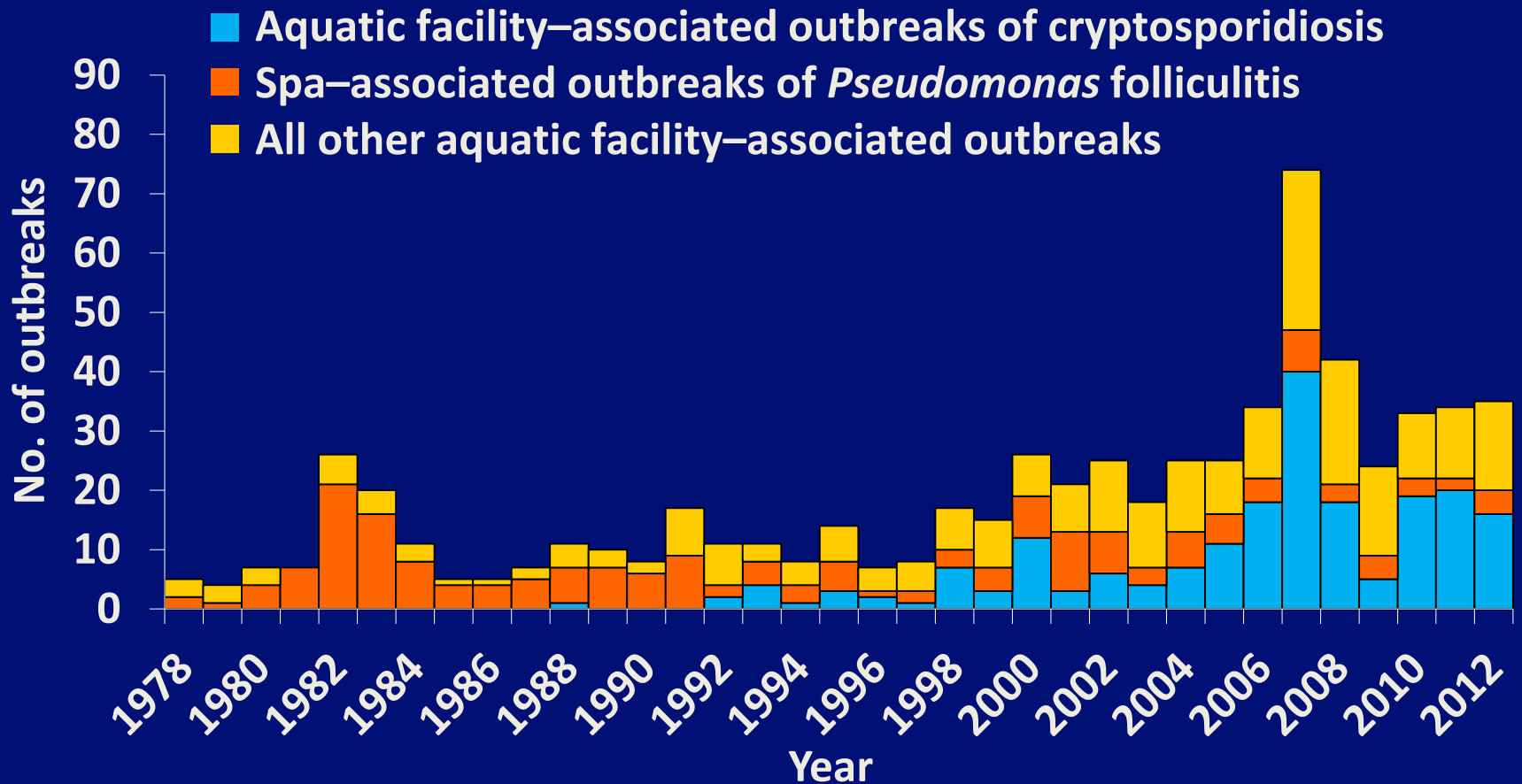


Aquatic Facility–associated Outbreaks, by Year — United States, 1978–2012 (n=650)*



Source: Hlavsa MC *et al*, 2015. MMWR 64(24): 668-672

Aquatic Facility–associated Outbreaks, by Year — United States, 1978–2012 (n=650)*



Drowning

➤ Fatal drowning*

- ~4,000 annual deaths due to drowning
- Leading cause of injury death in children ages 1–4 years
 - More than half of drownings occur in a pool

➤ Nonfatal drowning†

- ~5,800 annual emergency department (ED) visits
 - More than half of patients ages 1–4 years
- About two thirds of drownings among children ages 1–4 years occur in a pool

*Source: Xu J, 2014. NCHS Data Brief 1-8.

† Source: <http://www.cpsc.gov/en/Research--Statistics/Sports--Recreation/Pool-and-Spas/Pool-and-Spas-Injury-Statistics/>

Pool Chemical–associated Health Events*

- ~3,000–5,000 annual U.S. ED visits
 - About half of patients ages <18 years
- Patients injured when
 - Handling chemicals without proper protective equipment
 - Mixing incompatible chemicals
 - Not securing chemicals away from children

Model Aquatic Health Code (MAHC) Timeline

- **2005: Council of State and Territorial Epidemiologists (CSTE) called on CDC to develop model code**
- **2007–2014: CDC and New York State Department of Health spearheaded multi-stakeholder effort to develop model code**
- **August 2014: First edition of MAHC released**
- **July 2016: Second edition: 2016 MAHC released**

Preventing Aquatic Facility–associated Illness & Injury

➤ Problem

- Unable to assess MAHC's public health impact with current surveillance data for years or decades

➤ Solution

- Need another surveillance system in interim
- Inspection data as real-time assessment of
 - Operation and maintenance of public aquatic venues
 - Violations = risk for illness and injury

METHODS

National Aquatic Facility Inspection Surveillance (NAFIS)

➤ Summary statistics

- Number of public aquatic venues and routine inspections
- Percentage of inspections resulting in immediate closure or that identified ≥ 1 violations

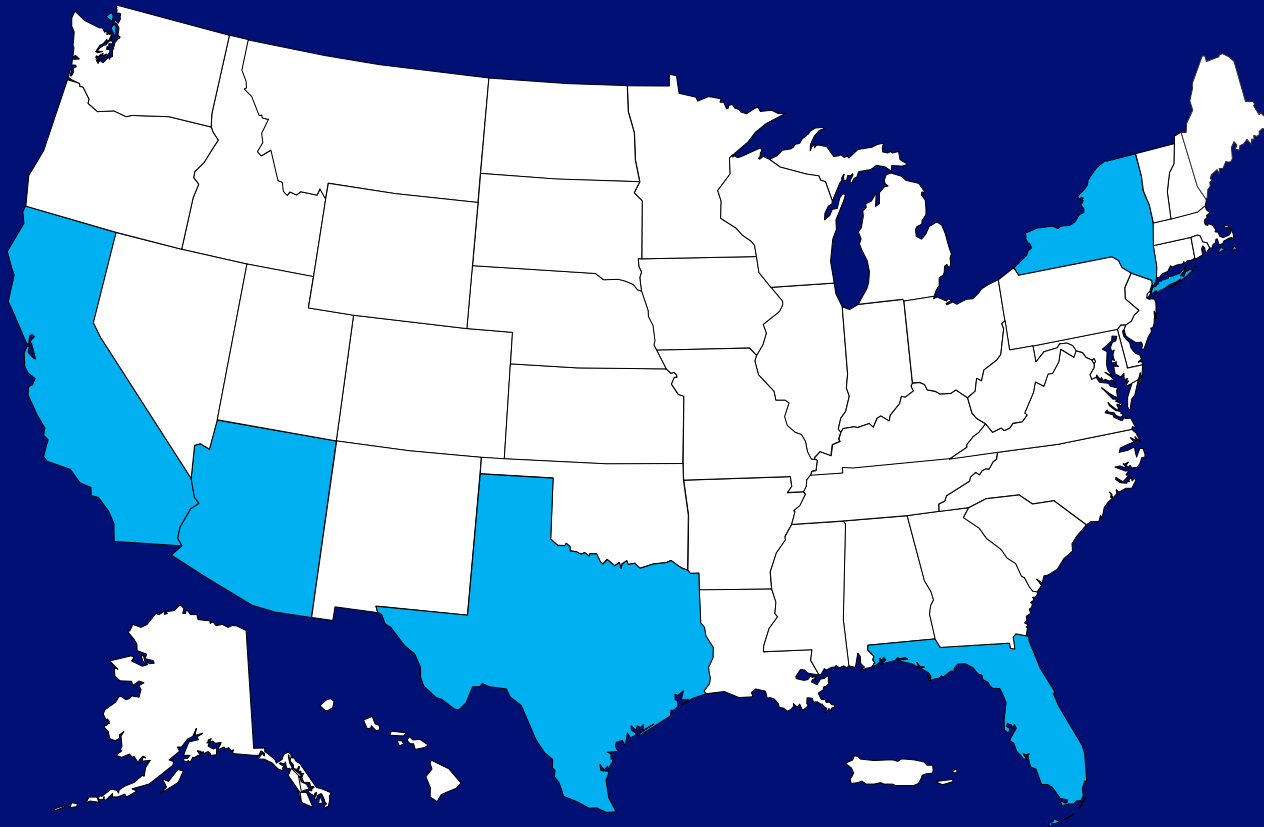
➤ 15 critical risk-reduction MAHC elements

- Aquatic facility–associated illness
- Drowning
- Pool chemical–associated health events

➤ Overall and stratified analysis

- Venue type (e.g., pool, hot tub/spa)
- Pool category (e.g., wading pool, interactive water play venue)

2013 Surveillance Participants



NAFIS Flowchart

Determine Inspection Items



Request Data



Reformat & Standardize Data



Analyze Data



Report Findings to Jurisdiction & Obtain Approval



Aggregate Multiple Databases into One

RESULTS

Overall Pool & Spa Routine Inspection Results

- 84,187 routine inspections of 48,632 venues
- 12.3% (8,118/66,098) public pool and hot tub/spa inspections resulted in immediate closure
- 78.9% (50,974/64,580) inspections identified ≥ 1 violations
 - Median 2 (range: 0–21) violation(s) identified per inspection

Preventing Aquatic Facility–associated Illness

	% No. Violations/No. Inspections*
Proper free available chlorine or bromine concentration	11.9% (7,662/64,580)
Proper pH	14.9% (9,236/62,141)
Recirculation pump approved, in good repair, or operating	1.4% (220/15,231)
Filter approved, in good repair, or operable	1.9% (287/15,231)
Automated chemical feeder in good repair or operable	5.2% (3,031/57,967)

* Since not all jurisdictions had data available to examine each critical inspection item, the denominators vary.

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Preventing Drowning & Entrapment

	% No. Violations/No. Inspections*
Fencing, walls, gates, and doors in good repair or self-closing and self-latching gates and doors	5.1% (3,303/64,580)
Water clear or main drain visible	1.3% (420/32,105)
Main drain covers compliant with VGB Pool and Spa Safety Act or with ASME/ANSI A112.19.8 or covers/grates of suction outlets secured in place or in good repair	1.2% (739/64,018)
Qualified or adequately staffed lifeguards	0.0% (10/23,056)
Appropriate safety equipment (e.g., hook, ring) or in good repair or first aid kit present	12.7% (7,845/61,648)

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Preventing Pool Chemical–associated Health Events & Other Non-Drowning/Entrapment Injuries

	% No. Violations/No. Inspections*
Chemicals labeled, stored safely, or secured	4.6% (471/10,264)
Hot tub/spa temperature ≤104°F (40°C)	7.5% (1,037/13,783)
Protected overhead electrical wires or GFCI–electrical outlets	0.3% (162/50,142)

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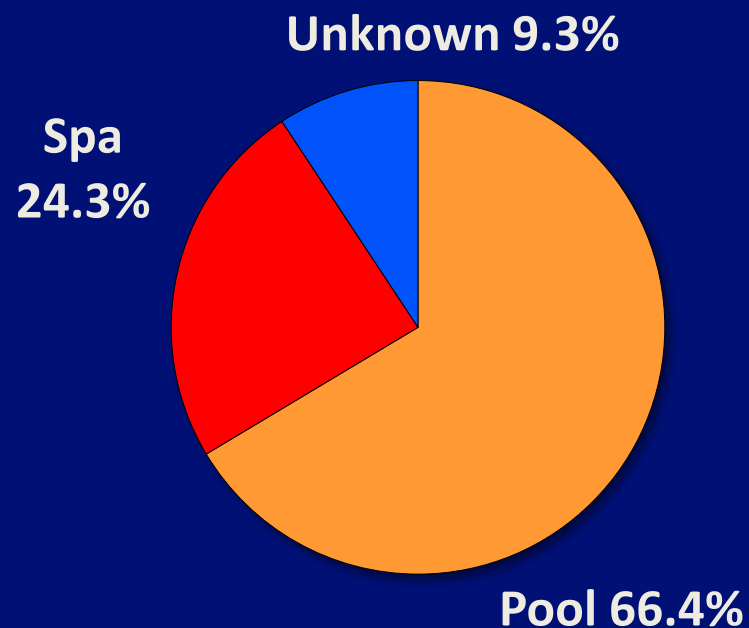
* Since not all jurisdictions had data available to examine each critical inspection item, the denominators vary.

General Health & Safety

	% No. Violations/No. Inspections*
Qualified operator or responsible supervisor on site	1.1% (291/25,495)
Substantial alterations or equipment replacement approved	0.4% (214/54,495)

* Since not all jurisdictions had data available to examine each critical inspection item, the denominators vary.

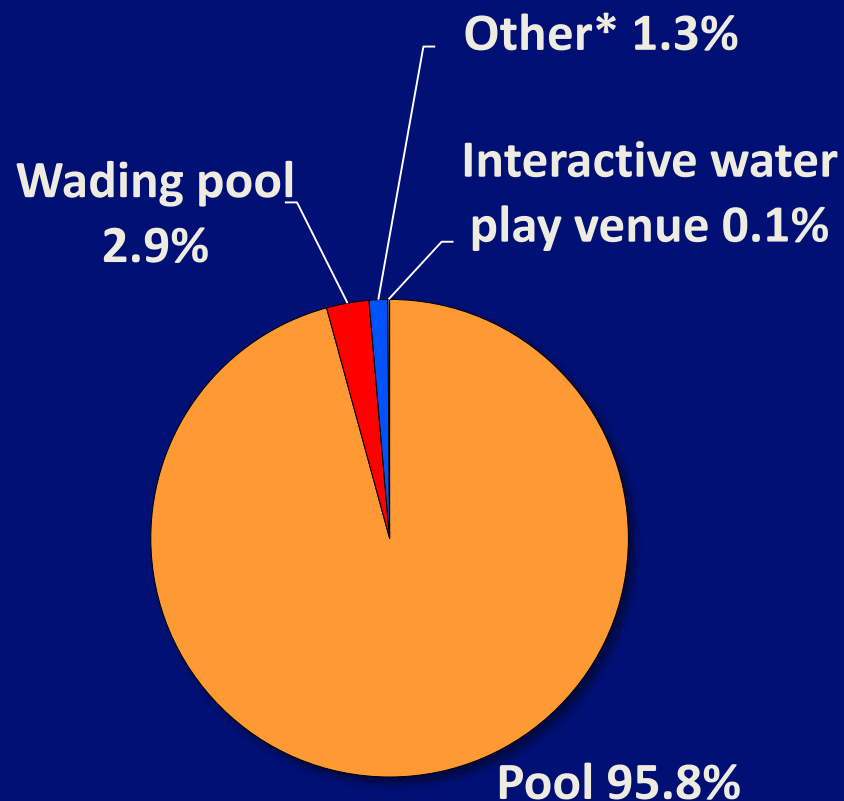
Routine Inspections, by Venue Type — United States, 2013



Key Venue-Specific Findings

- **Routine spa inspections**
 - **15.1% resulted in immediate closure**
 - **19.2% identified disinfection violations**
 - **27.5% identified pH violations**
 - **7.5% identified water temperature violations**

Routine Inspections, by Pool Category — United States, 2013



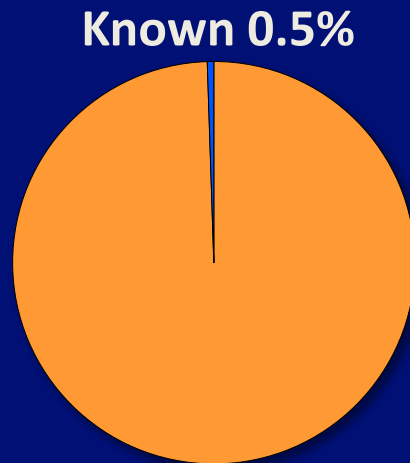
* Other pool type inspections include special purpose pools, water attractions, water activity, water slides, and lazy rivers.

Key Pool Category–Specific Findings

- **Routine kiddie/wading pool inspections**
 - **21.6% resulted in immediate closure**
 - **19.2% identified disinfection violations**
 - **26.0% identified pH violations**

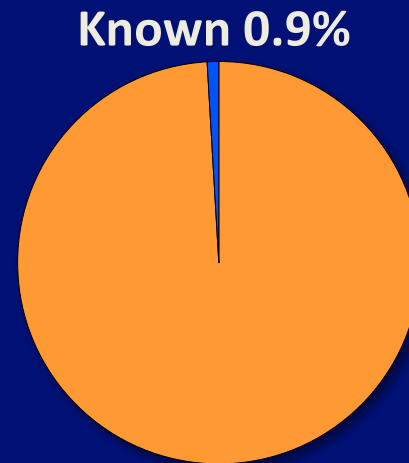
Routine Inspections, by Venue Type and Setting United States, 2013

Pool (n=55,913)



Unknown 99.5%

Spa (n=20,449)



Unknown 99.1%

DISCUSSION

Take Home Message #1

- Environmental health practitioners play vital role in preventing aquatic facility–associated illness and injury
 - Only 68% of U.S. local public health agencies regulate, inspect, or license public aquatic venues*

Take Home Message #2

- **Report=Call to all stakeholders to do better**
 - **Patrons and aquatic staff shouldn't get sick or hurt at public aquatic facilities**
 - **Minimize risk**
 - **Set minimum standards and increase them over time**
 - **Make it harder for "bad apples" to stay in the game**

Implications for Public Health

- **Inspection=opportunity to educate operators about how and why to properly operate and maintain venues**
 - **Prevent repeat violations**
 - **Minimize venue-based risk for illness and injury**
- **Inspector training**
- **Increase awareness of and access to inspection results**
 - **Post prominently at venue and online**
 - **Provide inspection score or grade**

Implications for Aquatics

- **Inspection=opportunity to learn about how and why to properly operate and maintain venues**
- **Operator training**
- **Review 15 critical risk-reduction MAHC elements**
 - **Do they match your priorities?**
 - **Do they match your staff's priorities?**
- **Increase awareness of and access to inspection results**
 - **Post prominently at venue and online**

Implications for Public

- **Bathers and parents of young bathers need to take more active role in keeping themselves and others healthy**
 - **Check if results of recent inspection are available**
 - **Conduct own abbreviated inspection**
 - **Identify issues and notify**
 - **Operator**
 - **State or local public health agency**



Limitations

- **Results might not be generalizable to U.S. public aquatic venues nationwide**
 - **Only 16 of 1000's of local jurisdictions**
 - **But 15.7% of estimated 309,000 U.S. public aquatic venues**
- **Number of venues and of inspections of each venue vary across jurisdictions and some jurisdictions contributed more inspection records than others**
- **No overall standard across jurisdictions**

In Conclusion...at Local and State Level...

- **Determine magnitude of closures and violations to advocate for environmental health programs**

In Conclusion...at Local and State Level...

- **Characterize distribution of closures and violations by venue type, pool category, and setting**
 - **Direct planning and implementation of program: enforcement (e.g., risk-based inspections) and education**

In Conclusion...at Local and State Level...

- **Evaluate prevention efforts**

In Conclusion...at National Level

- **Share lessons learned with database vendors**
 - **Optimize data collection and storage to facilitate data analysis and interpretation**
 - **Analyses of 16 jurisdictions' data took 9 months of full-time reformatting and standardizing**
 - **Inability of all jurisdictions to readily access, extract, and send electronic inspection data**
- **www.cdc.gov/healthywater/swimming/pools/regulation/recommendations-pool-inspection-data-collection.html**

Environmental Health Leaders

- Environmental health practitioners should lead multidisciplinary teams (e.g., including epidemiologists and IT specialists) to unlock the full potential of pool and spa inspection data



In Conclusion...at National Level

- 2013 routine pool and spa inspection data
 - Snapshot of operation and maintenance of U.S. public aquatic venues
 - Baseline for evaluation of MAHC?

Aquatic Facility Permit #: _____ Aquatic Venue Identifier: _____ Date: ____ / ____ / ____

Model Aquatic Health Code Aquatic Facility Inspection Report Time: In ____ / Out ____

Name of Aquatic Facility _____ Address _____ City _____ State _____ Zip Code _____

Type Class Venue: ☐ Pool ☐ Hot tub/Spa ☐ Wading Pool ☐ Spray grounds ☐ Other _____

Risk Type ☐ 1 ☐ 2 ☐ 3

	Descriptions (Bold= critical violations)	Item	Demerit	In	Out	N/A	N/O
Pool/Spa Area	Enclosure: fencing, walls, gates and doors in good repair	1	10				
	Self-closing/Self-latching gates or doors operational	2	10				
	Protected overhead electrical wires/GFCI electrical receptacles	3	10				
	Grab rails, ladders secured; shell, deck in good repair	4	5				
	Float/safety line clearly present	5	5				
	"Depth" & "no diving" markers; stair stripes; in good repair and visible	6	5				
	Skimmers: Weirs and baskets installed; clean and operating; covers in good repair	7	5				
	Recirculation inlets functional	8	5				
	Main drain grate secured in place & in good repair	9	10				
	Water is clear, main drain visible	10	10				
	Starting blocks removed, covered, or access blocked	11	5				

SCORE:
_____%
Letter Grade:

Previous Score:
_____%

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Required Disclaimer

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

THANK YOU!

National Center for Emerging and Zoonotic Infectious Diseases
Division of Foodborne, Waterborne and Environmental Diseases

