



Weekly

July 2, 2004 / 53(25);553-555

Surveillance Data from Public Spa Inspections --- United States, May--September 2002

Approximately 5 million public and private hot tubs, whirlpools, and spas* are used in the United States (1). Extensive spa use combined with inadequate maintenance contribute to recreational water illnesses (RWIs) caused by pathogens such as *Pseudomonas* spp., *Legionella* spp., and *Mycobacterium* spp. (2--5). In the United States, local environmental health inspectors periodically inspect public spas to determine their compliance with local or state health regulations. During inspections for regulatory compliance, data pertaining to spa water chemistry, filtration and recirculation, and management and operations are collected. This report summarizes spa inspection data from six sites in the United States during May 1--September 1, 2002. The findings underscore the utility of these data for public health decision-making and the need for increased training and vigilance by operators to ensure high-quality spa water for use by the public.

Data from 5,209 inspections of spas were collected from the Florida Department of Health, Bureau of Water Programs (n = 4,463); the Los Angeles County Recreational Water Program, California (n = 588); the City of St. Paul Office of License, Inspections, and Environmental Protection, Minnesota (n = 53); the Wyoming Department of Agriculture (n = 49); the Allegheny County Department of Health, Pennsylvania (n = 35); and the St. Louis County Department of Public Health, Minnesota (n = 21). The sites selected were a convenience sample of spa inspection programs with computerized data available. The data were merged into an SAS database, including date of inspection, water chemistry data (e.g., disinfectant residual and pH level), mechanical system data (e.g., operating filters and water turnover rates), and policy and management data (e.g., record keeping and operator training). A violation was noted when an inspection item was not in compliance with state or local regulations. Other inspection items (e.g., support facilities and injury control) were not addressed in this analysis.

A total of 5,378 violations were documented during the 5,209 inspections; 2,736 (52.5%) inspections occurred in spas for which the location (e.g., hotel or motel) was known (Table 1). Approximately half (56.8%) of the inspections (2,958 of 5,209) had one or more violations (median: one; range: one to eight). Eleven percent (500 of 4,533) of inspections resulted in the immediate closing of spas, pending correction of the violation item(s). Water chemistry violations constituted 50.7% of all violations (2,725 of 5,378); followed by filtration and recirculation systems, 32.2% (1,732 of 5,378); and policy and management, 17.1% (921 of 5,378). Various violations for policy and management issues were documented; during inspections, 23.3% (162 of 695) of spa operators lacked required training, and 12.7% (654 of 5,153) had inadequate record keeping. For the 52.5% of inspections for which spa location could be ascertained, a range of violations occurred (Table 2). For known locations collecting disinfectant residual data, the highest percentages of violations occurred in campgrounds (21.9%) and hotel/motel spas (19.6%). The percentage of inspections that documented pH level violations, which can compromise disinfectant efficiency, ranged from 14.1%--16.2% in known locations. Of those inspections that revealed violations that warranted spa closure, the highest percentages also were in campgrounds (15.1%) and hotel/motel spas (12.2%).

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Editorial Note:

Environmental health inspections can identify weaknesses in the management and inspection of spas. In this report, the proportions of spa inspections in violation of local ordinances (56.8%) or requiring immediate closure (11.0%) are similar to those documented for public swimming pools (54.1% and 8.3%, respectively) (6). The inspections document a gap in the training of spa operators; more than 20% of spa inspections cited operators who had not received adequate training. These data emphasize that spa operators can protect the health of users by adhering to maintenance procedures and obtaining appropriate training; regular public health enforcement of these items is necessary.

The findings also demonstrate the utility of maintaining spa inspection data in a computerized format that can be analyzed routinely and used to evaluate spa inspection programs. CDC and state and local health departments are developing guidance for systematic data collection to maximize the utility of data analysis for setting spa inspection program priorities. Consistency of data collection should allow for enhanced surveillance of spas and better evidence-based public health decision-making.

The findings in this report are subject to at least two limitations. First, the results from this analysis might not be generalizable to the entire United States because of the data's limited geographic variability (>85% of the inspections were in Florida), and these data are from the 2002 swim season. Second, data collection from the various localities revealed that database structures and variables differed and that collected data were not always entered in the database.

Poor disinfectant and pH control, high temperatures that quickly dissipate disinfectant, small water volumes, poor hygiene, high bather loads, inadequate maintenance, and opportunities for environmental contamination of the water can lead to proliferation and to pathogen contamination in the spa environment (7,8). RWIs spread through spa use are typically skin and respiratory infections in contrast to gastrointestinal illnesses commonly associated with full-body recreational activities found in swimming pools. During 1999--2000, a total of 13 reported outbreaks of infectious diseases, affecting 183 persons, were attributable to public and private spa use (2).

The high temperature of water in spas makes them particularly vulnerable to depletion of disinfectant, which facilitates pathogen amplification. Pathogens such as *Pseudomonas* spp. can multiply rapidly when the disinfectant residual falls below 0.5 mg/L or the pH rises above 8.0 (7). Pathogens also can reside in biofilm layers that form in spa pipes and surfaces, where they can be protected from disinfection (9), which necessitates routine scrubbing and maintenance to decrease biofilm formation (Box). Because domestic acquisition of *Legionella* spp. appears to be travel-related (3), venues (e.g., campgrounds and hotels or motels) should pay particular attention to operator training and maintenance of their spas.

Spa users also should play a role in reducing their risk for illness (Box). Improved public education about the health risks associated with spa use can reduce the risk for illness and increase advocacy for improved maintenance and monitoring by operators. However, successful prevention strategies must be multifaceted and address spa design, operator and inspector training, maintenance, hygiene, as well as public education. Additional information and health communication materials designed to reduce the spread of RWIs are available at <http://www.cdc.gov/healthyswimming>.

References

1. National Spa and Pool Institute. Beyond backyards, past public pools; the economic impact of the pool and spa industry. Available at http://www.nspi.org/news_room/news_releases/825.cfm.
2. CDC. Surveillance for waterborne-disease outbreaks---United States, 1999--2000. In: CDC Surveillance Summaries (November 22). MMWR 2002;51(No. SS-8).
3. Fields BS, Benson RF, Besser RE. *Legionella* and Legionnaires' disease: 25 years of investigation. Clin Microbiol Rev 2002;15:506--26.
4. Rickman OB, Ryu JH, Fidler ME, Kalra S. Hypersensitivity pneumonitis associated with *Mycobacterium avium* complex and spa use. Mayo Clin Proc 2002;77:1233--7.
5. Mangione EJ, Huitt G, Lenaway D, et al. Nontuberculous mycobacterial disease following hot tub exposure. Emerg Infect Dis 2001;7:1039--42.
6. CDC. Surveillance data from swimming pool inspections---selected states and counties, United States, May--September 2002. MMWR 2003;52:513--6.
7. Jones F, Bartlett CL. Infections associated with whirlpools and spas. Society for Applied Bacteriology Symposium Series 1985;14:S61--S66.
8. Spitalny KC, Vogt RL, Witherell LE. National survey on outbreaks associated with whirlpool spas. Am J Public Health 1984;74:725--6.
9. Donlan RM. Biofilms: microbial life on surfaces. Emerg Infect Dis 2002;8:881--90.
10. CDC. Suggested Health and Safety Guidelines for Public Spas and Hot Tubs. Atlanta, Georgia: U.S. Public Health Service, 1985.

* Any structure, basin, chamber, or tank, located either indoors, outdoors, or both, containing a body of water for recreational and therapeutic use, which usually contains a waterjet or aeration system. The spa is operated at high temperatures and usually not drained, cleaned, or refilled after each use. Jurisdictions usually exclude from regulation those units found at residences or facilities used by or under the direct supervision and control of licensed medical personnel. These structures also can be referred to as hot tubs or whirlpools but are generically referred to as spas in this report.

Table 1

TABLE 1. Number and percentage of spa inspections* reporting specific violations of state or local health regulations, by type of violation and spa location† — United States, May–September 2002

Type of violation/Action	Known spa location‡		Unknown spa location¶		Total**	
	No.	(%)	No.	(%)	No.	(%)
Water chemistry						
Disinfectant residual	463	(17.0)	426	(17.3)	889	(17.1)
pH level	427	(15.7)	330	(13.4)	757	(14.6)
Other water chemistry††	455	(16.6)	448	(18.1)	903	(17.3)
Mechanical system						
Filtration/Recirculation system§§	739	(27.0)	680	(27.7)	1,419	(27.3)
Policy/Management						
Test kit	48	(1.8)	57	(2.3)	105	(2.0)
Operator training	85	(22.5)	77	(24.3)	162	(23.3)
Log/Record keeping	281	(10.3)	373	(15.4)	654	(12.7)
Spa closed upon inspection						
	269	(11.4)	231	(10.6)	500	(11.0)

* Numbers reported are for those sites collecting data on the specified violation. Although 5,209 inspections were conducted, the number of inspections collecting data for each specific violation (denominator) varied because of a lack of uniform data collection among sites. In addition, each aggregate variable might include multiple violations, and single spa inspections could have multiple violations. As a result, percentage totals do not add to 100%.

† Locations included gyms, campgrounds, schools, and hospitals.

‡ Range (R) in number of inspections collecting violation data for each spa location = 378–2,736.

¶ R = 317–2,473.

** R = 695–5,209.

†† Aggregate variable: A positive could include one or more violations in any area (algae, bacterial quality, cyanurate levels, disinfectant/pH chemical feeders, total alkalinity, calcium hardness, and turbidity).

§§ Aggregate variable: A positive could include one or more violations in any area (backwash, cross connections, filter, flow meter, pressure gauges, recirculation system, and turnover).

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Table 2

TABLE 2. Number and percentage of spa inspections* reporting specific violations of state or local health regulations, by type of violation and spa location — United States, May–September 2002

Type of violation/Action	Hotel/ Motel†		Condo/ Apartments‡		Private club/Gym¶		Campgrounds**	
	No.	(%)	No.	(%)	No.	(%)	No.	(%)
Water chemistry								
Disinfectant residual	188	(19.6)	238	(16.6)	23	(9.1)	14	(21.9)
pH level	147	(15.4)	232	(16.2)	36	(14.2)	9	(14.1)
Other water chemistry††	144	(14.9)	259	(18.1)	34	(13.4)	15	(22.4)
Mechanical system								
Filtration/Recirculation system§§	267	(27.6)	383	(26.8)	66	(26.0)	16	(23.9)
Policy/Management								
Test	17	(1.8)	26	(1.8)	1	(0.4)	3	(4.5)
Operator training	7	(12.3)	72	(25.4)	6	(17.6)	NC¶¶	
Log/Record keeping	87	(9.0)	160	(11.2)	27	(10.6)	6	(9.0)
Spa closed upon inspection								
	111	(12.2)	123	(10.7)	25	(11.4)	10	(15.1)

* Numbers reported are for those sites collecting data on the specified violation. Although 5,209 inspections were conducted, the number of inspections collecting data for each specific violation (denominator) varied because of a lack of uniform data collection among sites. In addition, each aggregate variable might include multiple violations, and single spa inspections could have multiple violations. As a result, percentage totals do not add to 100%.

† Range (R) in number of inspections collecting violation data for each spa location = 57–966.

‡ R = 283–1,431.

¶ R = 34–254.

** R = 64–67.

†† Aggregate variable: A positive could include one or more violations in any area (algae, bacterial quality, cyanurate levels, disinfectant/pH chemical feeders, total alkalinity, calcium hardness, and turbidity).

§§ Aggregate variable: A positive could include one or more violations in any area (backwash, cross connections, filter, flow meter, pressure gauges, recirculation system, and turnover).

¶¶ Not collected.

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Box**BOX. Recommendations for operating and using public spas****Spa operation**

- Obtain state or local authority--recommended operator training. Suggested national training courses are listed at <http://www.cdc.gov/healthyswimming/courses.htm>.
- Maintain free chlorine or bromine levels continuously between 2–5 parts per million (10).
- Test disinfectant levels at least daily (hourly when in heavy use).
- Maintain the pH level of the water at 7.2–7.8 (10).
- Scrub spa surfaces if they have a slime layer.
- Maintain the filtration and recirculation system according to manufacturer recommendations.
- Drain and replace all or portions of the water on a weekly to monthly basis, depending on usage and water quality.
- Treat the spa with a biocidal shock treatment on a daily to weekly basis, depending on water quality and frequency of water changing.
- Cover spas, if possible, to minimize loss of disinfectant and reduce the levels of environmental contamination (e.g., debris and dirt).
- Maintain accurate daily records of disinfectant and pH measurements.
- Educate spa users about appropriate use (e.g., signs and handouts).

Spa users

- Shower or bathe with soap before entering the spa.
- Observe limits, if posted, on the maximum allowable number of bathers.

Additional spa safety

- Prevent the temperature from exceeding 104°F (40°C).
- If pregnant, consult a physician before spa use, particularly in the first trimester.
- Exclude children aged <5 years from using spas*.
- Maintain a locked safety cover for the spa when possible.
- Prevent entrapment injuries with appropriate drain design and configuration.

*Additional information is available at <http://www.aap.org/pubserv/backyd.htm>.

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This page last reviewed 7/1/2004