

National Survey on Outbreaks Associated with Whirlpool Spas

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Abstract: A national survey of state epidemiologists sought information on reported outbreaks of illness associated with non-residential whirlpool spas for the period April 1972–July 1, 1982. Reports were received from 49 states. Of the 74 whirlpool-associated outbreaks reported, 72 were characterized as having patients with papular or pustular rash and two were associated with cases of Pontiac fever. (*Am J Public Health* 1984; 74:725–726.)

Introduction

There have been several reports in the literature of outbreaks associated with whirlpool spas^{1–14}; however, information on all investigations conducted by health agencies has not been collected. As a first step in the appraisal of this health problem, the Vermont Department of Health initiated a national survey of state health departments. In this report, the term whirlpool spa denotes a shallow pool containing warm water using hydrojet circulation and an air-induction system. The pools are not drained, cleaned, or refilled after each use. Home fill-and-drain tub spas or hospital hydrotherapy units are not included in this category of whirlpool spas.

Methods

State epidemiologists or their designated informant were asked to report in writing or by telephone any outbreaks of illness associated with public, non-residential, whirlpool spas that had occurred between April 1972,¹ the first reported outbreak in the United States, and July 1, 1982. An outbreak was defined as two or more people developing any illness associated with a whirlpool spa. For each outbreak, each state epidemiologist was asked to complete a questionnaire about the nature of illness, number and sex of ill persons, the average incubation period, average duration of illness, and date that outbreak occurred. Information was also asked about the type of business establishment housing the whirlpool spa, the construction of the implicated spa, type and method of disinfection, results of bacterial cultures from ill persons and spas, results of spa disinfectant level obtained during the state environmental investigation, and frequency that disinfectant level was checked by spa owner. Oregon State had already initiated a comprehensive whirlpool spa investigation and is not included in this report.

Results

Reports were received from 49 (98 per cent) of the 50 states. Of the 74 whirlpool spa outbreaks reported, 72 (97 per cent) were characterized as having cases with papular or pustular rashes. Other symptoms included otitis externa,

mastitis, lymphadenitis (especially axillary), conjunctivitis, fever, malaise, and headaches. The other two outbreaks were associated with the development of Pontiac fever.

The available information for each outbreak differed for the 72 reports of rash illness. The median number of cases for all 72 outbreaks was 7 (range 2–100). Fifty-three per cent of the persons with illness were males in the 18 outbreaks for which sex was reported. For 18 outbreaks, the median of the average incubation period was 49 hours (range 24–120 hours). For 15 outbreaks, the median of the average duration of the rash was 7 days (range 4–14 days).

A trend of increasing numbers of outbreaks being reported to the state health department beginning in 1972 is evident from Figure 1. Sixty-eight per cent of the outbreaks occurred in the months of January through April. Thirty-nine (54 per cent) of the 72 rash outbreaks occurred in six states: Washington (11), Michigan (9), Minnesota (6), Massachusetts (5), Colorado (4), and Idaho (4).

Forty-three (60 per cent) of 72 outbreaks occurred in commercial residences such as apartments, inns, or motels; 24 (33 per cent) occurred at health or athletic clubs; and five (7 per cent) occurred at commercial whirlpool spa establishments. In 24 outbreaks, the construction material of the spas was reported: 13 were built of concrete and/or tile, five of wood, four of fiberglass, and two of other types of construction material. For 17 outbreaks, the type of filter used in the spas was reported: 10 used sand filters, five used cartridge filters, and two used diatomaceous earth filters. The type of disinfectant was reported for 34 outbreaks: 27 used chlorine and seven used bromine. In six outbreaks, continuous application of disinfectant was utilized; in 19 outbreaks, disinfection occurred episodically through tablet erosion or batch application.

For 40 outbreaks, at least one person had had a skin pustule cultured. In 39 of the 40 outbreaks, *Pseudomonas aeruginosa* was recovered from cultures from at least one person. For the outbreaks where serotyping was done, *P. aeruginosa* 0:11 was isolated from ill persons in 10 outbreaks, 0:6 in two outbreaks, 0:1, 0:4, 0:9, 0:10 and Fisher Devlin Type 1 in one outbreak each. Except for Fisher Devlin Type 1, serotypes are based on the International Antigenic Typing Scheme.¹⁵

In two of the 13 outbreaks for which complete environmental investigations were reported, *P. aeruginosa* was recovered despite a chlorine level of 2.2 mg/liter with a pH of 7.3 for one spa and a bromine level of 2.9 mg/liter with a pH of 7.6 for the other spa. Both of these spas had bromine and chlorine concentrations and pH levels within the ranges recommended for disinfection.¹³ For 22 outbreaks, the frequency of checking the spa disinfectant level was reported; nine owners checked disinfectant levels more than once a day, and 13 only once or not at all.

In addition to the 72 outbreaks, there were two outbreaks of Pontiac fever related to non-residential whirlpool spa use. One outbreak occurred in Vermont in 1981 involving 34 people who had visited an inn; the other outbreak occurred in Michigan in 1982 involving 14 people who had visited a racquetball club.^{13,14} In both outbreaks, *L. pneumophila* serogroup 6 was the suspected pathogen.

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Editor's Note: See also related editorial p 653 this issue.

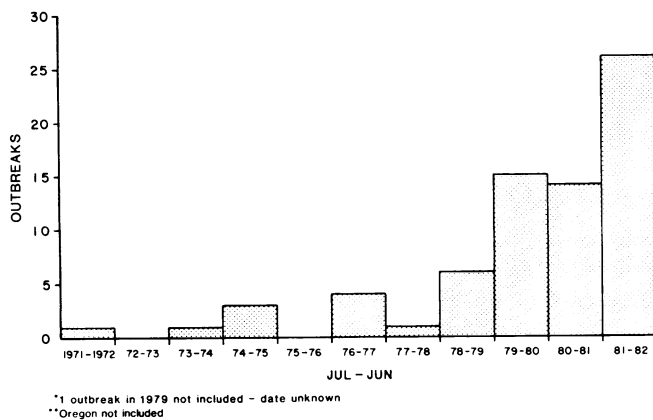


FIGURE 1—Rash Outbreaks* Associated with Whirlpool Baths, by 12-Month Period, United States,** July 1971–June 1982

Discussion

Outbreaks of rash illness associated with whirlpool spas are widespread throughout the United States. We confirm prior outbreak reports concerning the length of incubation period, duration of symptoms, relationship between illness and recovery of *P. aeruginosa*, the greater incidence of outbreaks during the winter months, and the increasing number of reported outbreaks.¹⁻¹¹ We note the large number of outbreaks of whirlpool spa-associated rash illness that are caused by non-0:11 *P. aeruginosa*.¹⁶

P. aeruginosa was isolated from two whirlpool spas having the recommended level of free available halogen residual and pH suggesting that the recommended Centers for Disease Control guidelines may be inadequate to eradicate the detectable levels of *Pseudomonas* in whirlpool water. Kush and Hoadley noted that superchlorination with approximately 50 mg/liter on one evening had no effect on the population of *P. aeruginosa* recovered during the following morning.¹⁷ Although it may be logical to assume that the risk for an outbreak increases with increased concentration of *Pseudomonas* in the water, little research has been conducted on this topic. Until this can be determined, the detection of any *Pseudomonas* could be indicative of a potential to cause rash illness.

The two outbreaks of Pontiac fever associated with whirlpool spa bathing demonstrate another problem associated with whirlpool spas. The suspected mechanism of *Legionella* transmission in these outbreaks is through aerosols generated by air injected into the spa water but many questions about this mode of transmission remain to be answered.

In summary, spa-associated outbreaks are a frequent source of rash illnesses. Many questions still remain about

the risk factors associated with this illness. These include the relative virulence of different strains of *Pseudomonas*, the quantity of bacteria in the bath, spa construction and type and method of disinfection, and other activities which might predispose bathers to illness.

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ACKNOWLEDGMENTS

We would like to thank all state health departments for their cooperation and assistance in this investigation. We would especially like to thank Stuart Castle for sharing with us information on an investigation he conducted; and Anita Highsmith, John Andrews, Kenneth Holt, and Loraine Good for their review of the manuscript.