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# Follicular Dermatitis Outbreak Caused by *Pseudomonas aeruginosa* Associated with a Motel's Indoor Swimming Pool

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SEVERAL OUTBREAKS of follicular dermatitis caused by *Pseudomonas aeruginosa* 0:11 have been reported (1-5). All were associated with whirlpool baths. This report deals with an outbreak associated with a swimming pool and sauna, a previously unreported association.

In February 1978, a group of 16 snowmobile enthusiasts from Utah traveled together in several private cars to West Yellowstone, Mont., for a long weekend. They left Utah on Thursday, February 16, and spent the first night in a motel in Idaho Falls, Idaho. They did not swim there. Late Friday afternoon, after a snowmobile ride, they used the indoor pool and sauna at their West Yellowstone motel for more than an hour. On Saturday,

they again went for a ride and a late afternoon swim. On Sunday they drove to Idaho Falls and stayed in the motel where they had spent Thursday night. They returned home Monday.

## Rash Illness

Several members of the group noticed an itchy rash—white pustules on a red base—as early as Saturday afternoon. By Sunday night, many of them had the rash, and the two persons with the worst rashes went to the Idaho Falls hospital emergency room. The hospital physician described the rashes as follicular pustules of unknown etiology and prescribed Benedryl for the itching. A day later, a private physician in Utah also noted folliculitis, mostly over buttocks, chest, and axillae of two members of the group.

Only the two people who had forgotten their swimsuits and had not swum did not get the rash. The 16 persons had not purchased snowmobile clothing as a group. Members of the group notified the Montana Department of Health and Environmental Sciences about the outbreak of the rash.

The rash lasted 3 to 15 days. Several weeks after the initial onset two persons noted new crops of lesions occurring when they perspired profusely during heavy exercise.

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*Serotyping of the Pseudomonas aeruginosa isolates described in this study was done by Ms. Anita Highsmith, Epidemiologic Investigations Laboratory, Centers for Disease Control, Atlanta, Ga.*

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### **Investigation of Pool**

The pool and sauna were inspected on February 22 by staff of the Gallatin County (Mont.) Health Department. The pool's plastic liner has a 6-inch-wide lip at the top but no spillway or gutter. The area around the pool is carpeted with indoor-outdoor carpet, which extends 12 inches up the side of two wooden posts in the room. The pool water is filtered through wire mesh and sand and recirculated. No defects were noted in the filtration system.

The two saunas have wooden slats over concrete floors and wooden benches. The walls and ceilings are carpeted. The rooms are heated by hot rocks over an electric heater; they are dry saunas, so no water is poured over the rocks.

The pH of the pool water was 7.2, and the temperature was 90°F. (32.2°C). Total chlorine was 3.0 ppm, and no free available chlorine was found. The water looked clear. The carpet around the pool was wet almost everywhere, and the wood of the posts under the carpet was soggy and rotting. The saunas' carpeted walls were dry.

The motel operator said that chlorine was generally added to the pool in the evening, after it was closed,

and that chlorine residuals were almost never measured. The previous week the operator had noted that the water in the pool was cloudy, so on Tuesday and again on Wednesday he had added four cups of aluminum sulfate crystals to try to clear the water. Thursday the pool looked better, but Friday it looked cloudy again; thus on Friday night, after the pool was closed, he added extra chlorine bleach. The pool looked clear on Saturday.

### **Guest Questionnaire**

A list was obtained from the motel operator of all guests who were registered at the motel on either February 17 or 18. A cover letter and questionnaire were sent to 45 groups of guests. Of these questionnaires, 5 were returned as undeliverable, and 31 were returned with data on 56 persons, including 8 of the 14 in the snowmobile group with rashes. The respondents, who live in six States, were all adults, and there were equal numbers of men and women.

Fifteen respondents had had rash within 3 days after leaving West Yellowstone (table 1). A case was defined as a motel guest who described rash with two or more of these three characteristics: red, itchy, and white center. Fifteen guests met this definition. Ten of the 15 had

Table 1. Rash characteristics described by 15 West Yellowstone, Mont., motel guests

Characteristics	Number	Percent
Red	13	87
White center	13	87
Raised	11	73
Itchy	11	73
Round	7	47
Mosquito-bite-like	6	40
Stinging	5	33
Burning	3	20
Acne-like	3	20
Boils	2	13
Hot	1	7
Linear	1	7
Flat	0	0

had from 15 to 40 lesions on the lower trunk, upper legs, buttocks, arms, and axillae. Five of this group also had had lesions on the neck and face, and five others had had one to five discrete lesions on the trunk or limbs.

All respondents who has used the pool or the sauna had used both. The attack rate for respondents who had used the pool and sauna at least once was 42.8 percent (15 of 25), while the attack rate for those had never used the pool was 0 percent (0 of 11) ( $P = .0002$  by Fisher's exact test). Table 2 shows the attack rates for pool and sauna users by specific dates of use.

Both respondents who had swum on February 16 and had contracted dermatitis had also swum on February 17 and 18; they had developed rash after February 18. Of the six who had swum only on February 17, four had developed a rash. No respondents had swum only on February 18, nor had any cases occurred in guests who had swum only before February 17. We infer that infection probably occurred only on February 17.

Because of the high attack rates, showering after swimming and leaving one's suit on after swimming could not be evaluated as risk factors. All but one of those with rashes denied having sat on the poolside carpet.

### Bacteriological Studies

Two members of the Utah group had material from their pustules cultured by their personal physicians. Material from one person grew nothing; material from the other grew *Pseudomonas aeruginosa*.

Four bits of carpet from the edges of the swimming pool were cultured by the Montana State Microbiology Laboratory. There were approximately  $2.8 \times 10^7$  organisms per gram of carpet. A single *P. aeruginosa* strain was the predominant organism on each piece of carpet,

Table 2. Attack rates for rash among 35 survey respondents who used pool and sauna, by date of use, West Yellowstone, Mont., February 1978

Date	Cases among total users	Attack rate (percent)
February 12	0 of 1	0.0
February 13	0 of 4	0.0
February 14	0 of 6	0.0
February 15	0 of 10	0.0
February 16	2 of 7	28.6
February 17	14 of 16	87.5
February 18	8 of 8	100.0
February 19	0 of 6 <sup>1</sup>	0.0

<sup>1</sup> Family members of motel operator, not included in survey.  
Note: Total cases exceed 15 because of persons who swam on 2 different days.

although large numbers of two other pseudomonads were present on each piece as well.

The skin isolate and the carpet isolate were confirmed as *P. aeruginosa* by the Bureau of Laboratories at the Centers for Disease Control and were identified as serotype 0:11 by the Epidemiologic Investigations Laboratory at CDC.

No organisms were cultured from a pool water sample obtained on February 22.

### Corrective Action

At the direction of officials of the Gallatin County Health Department, the pool was superchlorinated, drained, and refilled; the hair and lint filters were cleaned; the pressure sand filter was back-washed; and the carpet was thoroughly cleaned with chlorine bleach. An automatic chlorinator was subsequently installed. No subsequent outbreaks of rash illness associated with this pool have been reported.

### Discussion

In all five reported outbreaks of pustular dermatitis associated with swimming pools and whirlpool baths (1-5), *P. aeruginosa* organisms of the serotype 0:11 have been isolated from the skin and from environmental samples. No other serotype was recovered from anyone. Material from cultures was obtained from no more than four people in each outbreak, as follows:

Reference No.	<i>P. aeruginosa</i> isolated from—
1	1 of 2 persons
2	2 of 2 persons
3	4 of 4 persons
4	1 of 2 persons
5	1 of 1 person

In four of these outbreaks, *P. aeruginosa* 0:11 was cultured from pool water and environmental samples, such

as drains and filters. In three outbreaks, only a whirlpool bath was involved; in the other two, swimmers had used both an indoor pool and a whirlpool, but epidemiologic evidence pointed more to the whirlpool than the swimming pool. The West Yellowstone outbreak is the first one lacking a whirlpool in which a swimming pool and sauna are implicated.

Persons who swam before February 17 and experienced a rash may have checked out of the motel early and thus were not surveyed. None complained of rash to the management, however, and in none of 17 pool users who remained at the motel until February 17 or 18, but did not use the pool on these days, did a rash develop.

We know of no published data to suggest what makes serotype 0:11 of *P. aeruginosa* an apparent pathogen in human skin. It is known that wild-type pseudomonads that have been subcultured on laboratory media grow well in distilled water and are more resistant to chlorine than are laboratory strains (6,7). Occluding moist skin experimentally leads to colonization with *P. aeruginosa* and to a papulovesicular rash (8). Poor control of chlorination and a reservoir of *Pseudomonas* organisms in a soggy rug may have allowed intermittent luxuriant growth of organisms in the swimming pool water. It is not clear exactly why such growth apparently occurred on February 17 or 18 and not before.

In an Atlanta, Ga., survey (9), 24 water samples from 8 whirlpools were studied; 17 were positive for *P. aeruginosa*. Many contained multiple serotypes, and seven included serotype 0:11. Ten contained only other serotypes.

Although only one positive culture for *P. aeruginosa* 0:11 was obtained from a patient in the West Yellowstone outbreak, the clinical and epidemiologic features are almost identical to those in the five previously described outbreaks. The accumulation of data makes it less and less likely that the apparent association of *P. aeruginosa* serotype 0:11 with this illness is fortuitous.

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## SYNOPSIS

HOPKINS, RICHARD S. (Colorado Department of Health), ABBOTT, DOUGLAS O., and WALLACE, LAURENCE E.: *Follicular dermatitis outbreak caused by Pseudomonas aeruginosa associated with a motel's indoor swimming pool. Public Health Reports, Vol. 96, May-June 1981, pp. 246-249.*

Fourteen cases of pustular dermatitis occurred in members of a snowmobile club who swam in a motel pool in West Yellowstone, Mont., in February 1978. Survey question-

naires identified seven additional cases in guests at the motel the same weekend. All those with rashes had used the swimming pool and dry sauna on February 17 or 18. Among 56 survey respondents, swimming pool and sauna use were significantly associated with illness ( $P = .0002$  by Fisher's exact test). *Pseudomonas aeruginosa* serotype 0:11 was isolated from a pustule on the skin of one club member and from four samples of the indoor-outdoor carpet that surrounds the pool.

A specific precipitating event for the outbreak was not identified, but disinfection practices at this facility (a single daily chlorination, no measurement of chlorine levels, toleration of grossly cloudy water, soggy pool-side carpet) may have established conditions in which *P. aeruginosa* could grow intermittently and cause disease. These cases are the first documented outbreak of *P. aeruginosa* dermatitis in which a whirlpool bath has not been implicated.