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Hot Tub Folliculitis Strikes Softball Team

In August a woman's softball team, after participating in a post-season tournament, visited a Fairbanks health spa to soothe away tired, sore muscles. Within 24 hours, three of the 11 team members developed a rash. As team members talked to one another, they discovered other members with similar problems. Several members sought medical care and were treated for staphylococcal skin infections. We examined seven of the 11 team members who visited the spa, and interviewed all 11 team members by phone. Based on the history of hot tub use and symptoms of the affected women, we suspected hot tub folliculitis.

All seven members seen in the clinic had a rash illness. Lesions were discrete, erythematous, and papulopustular, and were scattered over thighs, buttocks, upper arms, chests, and breasts. One individual had inflammation of the Montgomery's follicles of the right breast. A significant finding among team members was swollen, indurated, tender axillary glands in four (36%) individuals. Other reported symptoms were fever (27%), muscle aches (27%), malaise (27%), pruritis (18%), and chills (9%). We did not find any otitis externa nor toe web infections.

Onset of symptoms ranged from 24 to 90 hours with a mean onset of 50 hours. Time spent in the tub ranged from 5 to 35 minutes with a mean duration of 20 minutes. All 11 members used the hot tub. Nine of the 11 also used the pool. These nine individuals reported alternating between tub and pool several times. Members reported that the hot tub water was "super hot" but cloudy. All members wore bathing suits. Three team members who did not enter the spa reported no illness. Specimens from one individual's lesions, the hot tub sidewall, filter and water, and the swimming pool water produced *Pseudomonas aeruginosa*, the well-documented culprit of hot tub folliculitis.

As part of our investigation we sent questionnaires to 49 spa members who reportedly used the spa on the same day as the softball team. Of 49 individuals sent questionnaires, 20 individuals responded. Of these 20, three women reported rash illness after using spa facilities. One of these individuals reported painful swelling of the breasts, and a second individual reported a painful red lump in her armpit.

Investigation of the facility revealed that the hot tub had not been cleaned for six days prior to the outbreak. The tub had a large user rate (50-75/day). Additionally, the owner reused disposable filters after backwashing them. Although chlorination and pH levels appeared adequate, often only one reading per day was recorded. The pool and hot tub were closed until proper disinfection and cleaning procedures were performed, including discarding all used filters. After cleaning, lab tests of the pool and hot tub were negative for pseudomonas. The spa was allowed to reopen.

This outbreak typifies hot tub pseudomonas folliculitis. Outbreaks often remain undiagnosed unless several members of a family, sports team, or other group of individuals notice a similar rash after common exposure. Such rashes are often misdiagnosed and mistreated. Once an outbreak is identified, high attack rates often are found. In this outbreak, team members suffered a 100% attack rate.

The rash associated with hot tub folliculitis is not unique in its appearance and is often misdiagnosed as contact dermatitis, scabies, staphylococcal infection, drug allergy, insect bites, or even herpes zoster. Lesions in many different stages are often present simultaneously. Each lesion progresses from a discrete follicular, pruritic papule to an erythematous papulopustule within 24 to 28 hours. Papules range from two to ten mm in diameter but usually have only a pinpoint pustule in the center. Papulopustules heal spontaneously either by draining or by regressing within two to five days, leaving fine desquamation and red, round macules.

A characteristic feature of this rash is its distribution. *Pseudomonas* has a predilection for apocrine sweat glands. Lesions are most often observed on the skin of the buttocks, hips, thighs and lateral trunk. Inflammation of Montgomery's follicles, modified apocrine glands located in the breast areola, is often observed. Tender, swollen, red axillary glands may be the presenting symptom to the health care provider. The rash does not occur on palms, soles, or mucous membranes. In addition to the rash, many infected individuals complain of headaches, malaise, fatigue, low grade fever, abdominal cramping, nausea, vomiting, sore throat, and sore eyes. Although not seen in this outbreak, otitis externa often occurs with pseudomonas folliculitis. Other signs which may occur are green nail syndrome, a distinct discoloration under the nail with green pigment, and toe web infections.

Superhydration of the stratum corneum, such as occurs from prolonged sitting in a hot tub, leads to high surface concentrations of pseudomonas that predispose the skin to lesions. The high temperature associated with hot tubs promotes sweating which enhances penetration of the skin by the organism. Skin entry may occur via minor abrasions sustained when the body is rubbed against the walls of the tub.

Risk factors for hot tub folliculitis are hard to evaluate. In many outbreaks attack rates are near 100% so there are no non-ill controls. Chronic skin disorders such as acne may predispose to or increase the severity of the pseudomonas infection. Compromised immune status has not been identified as a predisposing condition of pseudomonas folliculitis. In fact, most cases occur in exceptionally athletic and healthy individuals. The overall morbidity associated with outbreaks appears relatively minor. Most lesions resolve without medication.

The ability of *P. aeruginosa* to withstand relatively high temperatures (up to 41.4°C) and even high chlorine levels (total residual chlorine concentration of 3.0 mg/L) makes it difficult to eradicate the organisms from hot tubs and other public bathing places. A heavy bather load and turbulent water produce difficulties in maintaining satisfactory levels of chlorine. With heavy bather use, desquamated skin in the water provides a rich organic nutrient source for pseudomonas. Wooden tubs are particularly a problem. It is believed that once pseudomonas contaminates a wooden hot tub, eradication is impossible. Pseudomonas has been found in pores and cracks of the wood itself. Oregon has banned commercial use of wood-lined hot tubs.

Culture surveys of swimming pools show that *P. aeruginosa* is frequently present in low numbers and persists despite proper chlorination. The organism multiplies rapidly when the free chlorine level drops below 0.5 mg/L or the water pH is greater than

7.8. In addition, high temperatures and water agitation in hot tubs cause an increased loss of chlorine into the air. Continuous water filtration, automatic chlorination to maintain a free residual chlorine level of 1 ppm, frequent monitoring of the disinfectant level, maintenance of water at a pH of 7.2 to 7.8, and the frequent changing of water, especially during heavy use, are some helpful measures that should be applied to all public and private bath places to prevent this disease.

Physicians and other health care providers should be alert to the possibility of hot tub folliculitis. Diagnosed or suspected cases should be reported promptly to the Epidemiology Office. Prompt investigation may discover the source and prevent additional cases.

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