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Pseudo-outbreak of *Ochrobactrum anthropi* Bacteremia Related to Cross-Contamination From Erythrocyte Sedimentation Tubes

To the Editor—Blood cultures have an important role in clinical practice, but it is essential to be able to distinguish between true bacteremia and contamination resulting from inadequate aseptic technique, particularly when unusual microorganisms are recovered. We describe a pseudo-outbreak

of this kind at our hospital. Hospital Universidad Católica is a 500-bed, tertiary care teaching hospital in Santiago, Chile. Our health network also includes 13 outpatient clinics where specimens are collected, which are sent to a central clinical microbiology laboratory. During a 4 month period, 8 patients from the hospital and outpatient clinics had *Ochrobactrum anthropi* isolated from blood cultures (Table).

O. anthropi is a gram-negative bacillus that can be found in the environment, including in plants and water sources.[1] It is considered to be of low pathogenicity, and most of the reported infections occur in individuals with intravascular devices or impaired immunity.[2,3] Reported infections have included pacemaker lead–associated infection, endocarditis, postoperative endophtalmitis, necrotizing fasciitis, and osteochondritis of the foot after a wound. *O. anthropi* bacteremia has also been linked to contaminated infusates.[4]

The above-mentioned 8 cases represented a dramatic increase in the number of blood cultures positive for *O. anthropi* at our institution, and an outbreak investigation was initiated. A case patient was defined as any patient from whom *O. anthropi* was isolated in blood culture from January through April 2000 (ie, during the outbreak period). Case patients were identified at the university health network by microbiology reports and infection control surveillance. Rates of *O. anthropi* isolation for the outbreak period and the preoutbreak period (January 1998 to January 2000) were compared. Clinical information was collected by medical records review and health personnel interviews. Current practice and writ-

TABLE. Clinical Characteristics of 8 Case Patients Involved in a Pseudo-outbreak of *Ochrobactrum anthropi* Bacteremia

Characteristics	Case patients (N = 8)
Male sex	5 (63)
Age, median (range), years	40 (4-79)
Clinical diagnosis	
Febrile syndrome	4 (50)
Pneumonia	2 (25)
Other	2 (25)
Clinical ward	
Internal medicine	4 (50)
Outpatient clinic 1	1 (13)
Outpatient clinic 2	1 (13)
Outpatient clinic 3	1 (13)
Outpatient clinic 4	1 (13)
Proportion of blood cultures positive[a]	
1/1	3 (37)
1/2	3 (37)
1/3	1 (13)
1/4	1 (13)
Polymicrobial culture results	1 (13)
Time to positive culture results, median (range), h	29 (21-35)
Isolates clinically considered contaminants	8 (100)

NOTE.   Data are no. (%) of patients, unless otherwise indicated.
[a] No. of blood cultures positive for *O. anthropi* / total no. of blood culture bottles inoculated.

ten procedures for collecting blood culture specimens were compared.

All clinical and environmental bacterial isolates were identified to the species level using conventional biochemical testing and automated methods (Vitek GNI+ card; bioMérieux). They were also genotyped by pulsed-field gel electrophoresis (PFGE), as described elsewhere.[5] DNA was digested with SpeI and XbaI restriction enzymes, and the fragments were separated using a CHEF Mapper XA apparatus (BioRad). Gels were interpreted according to standard criteria.[6]

During the outbreak period, O. anthropi was isolated from 8 (0.25%) of 3,200 blood cultures, compared with 1 (0.005%) of 20,000 blood cultures during the preoutbreak period (P < .001). The 8 patients with cultures positive for O. anthropi came from different clinical services, and all positive cultures were processed in bottles from different lots. All isolates were considered to be contaminants by the attending physicians, and no patient received antimicrobial therapy to clear the organisms. We noticed that all case patients had simultaneous orders for a complete blood cell count and an erythrocyte sedimentation rate and that O. anthropi was only isolated from the first of 2 culture bottles in the set. We observed that some of the nurses involved in the obtaining samples from these patients had inoculated the erythrocyte sedimentation tubes before inoculating the culture bottles.

We randomly selected 50 noninoculated culture bottles and 12 sedimentation tubes from 3 different lots to be evaluated for possible contamination. None of the 50 noninoculated culture bottles incubated produced microbial growth. All 12 cultures of the anticoagulant (sodium citrate) from the erythrocyte sedimentation tubes yielded O. anthropi. Genotyping by PFGE showed the 8 isolates from case patients and the isolates recovered from the sedimentation tubes to be indistinguishable.

The written guidelines describing the correct procedure for obtaining blood culture samples have been available for many years at our hospital. After the breakdown in the sample collection process was detected, an in-service presentation on correct procedure was provided at all sites in the health network. The erythrocyte sedimentation tubes were labeled as nonsterile, and a notice was sent to the outpatient clinics to remind them that these tubes could produce cross-contamination of blood cultures. Surveillance and follow-up from April 2000 to December 2005 showed only 1 new case of O. anthropi bacteremia.

A few previous studies have identified nonsterile blood collection tubes, including erythrocyte sedimentation tubes, as the source of pseudo-outbreaks of bacteremia.[7-9] These pseudo-outbreaks have been responsible for an excess of hospitalization, as well as unnecessary antibiotic therapy and laboratory testing.[9] Reflux from the blood collection tube to the syringe can occur while vacuum tubes are being filled.[10] The risk of cross-contamination persists even if the needle is changed or removed before inoculation of the blood culture bottles.[11] In the pseudo-outbreak we describe here, blood culture bottles most likely were contaminated with a syringe previously used to fill an erythrocyte sedimentation tube contaminated with O. anthropi. Although the written hospital policy stated that blood drawn for culture should be immediately inoculated into the blood culture bottle before inoculating any other collection tubes, we observed that this procedure was not followed in some areas of the hospital and outpatient clinics. Because the isolation of O. anthropi was so unusual, we were able to rapidly identify the pseudo-outbreak of bacteremia, and no patients received unnecessary antimicrobial therapy or additional medical procedures.

However, if the contaminating microorganism had been one more commonly associated with bacteremia, it is likely that the outbreak would have been more difficult to detect, as has been reported previously.[9] This investigation emphasizes the importance of using aseptic technique and following written guidelines when obtaining blood specimens for culture.

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A Controlled Study of *Legionella* Concentrations in Water from Faucets with Aerators or Laminar Water Flow Devices

TO THE EDITOR—Water aerators and laminar water flow devices are used to decrease water flow by forcing air through faucets. Washing with the air and water combination feels the same as it does with constant water flow, but the combination dramatically reduces water consumption by as much as 60%.[1,2] The use of these items is recommended by the US Environmental Protection Agency for water conservation in various locations, including office buildings, hotels, and hospitals.

However, faucet aerators have been colonized by waterborne pathogens, and these pathogens have been epidemiologically linked to hospital-acquired infections.[3-7] Removal of aerators from faucets in the healthcare setting has been an accepted infection control practice for decades, and guidelines from the Centers for Disease Control and Prevention, the Healthcare Infection Control Practices Advisory Committee,[8] the American Society of Heating, Refrigerating, and Air Conditioning Engineers,[9] and others[10] recommend removal of aerators or laminar water flow devices to prevent colonization by *Legionella* species and other waterborne pathogens. Specific recommendations have been made, especially for areas housing high-risk patients, according to which aerators either should not be used,[10] or if used, they should be designed with radially and vertically arranged lamellae (which do not lead to the collection of sediment or water stagnation) and cleaned regularly.[7]

Because hospitals in Taiwan have been experiencing water shortages during the drought season, during which patient care may be compromised, we conducted a study to test the hypothesis that installation of aerators and laminar water flow devices would actually promote the growth of *Legionella* species in a healthcare facility.

A model plumbing system (Figure) was built in a hospital with history of colonization by *Legionella* species and gram-negative bacteria. The system consisted of 3 sets of duplicate faucets arranged in parallel: 2 faucets with aerators (A1205; Tien Kuang), 2 faucets with laminar water flow devices (LF2043; Tien Kuang), and 2 faucets without any aerating attachment (control faucets). The entire model system was steam autoclaved before use. The model was then attached to a water pipe with an existing water outlet on top of a laboratory basin. When the water outlet was used at random times, water also flowed uniformly through all 6 faucets. Water samples of 500 mL were collected from each faucet and concentrated to 5 mL by use of a 0.22 μm–pore filter. After removal of the aerators or laminar water flow devices, a sterile swab (BBL CultureSwab; Becton Dickinson) with transportation media was inserted into each faucet outlet and rotated against the interior surface 2 times clockwise and 2 times up and down to dislodge sediment in the faucet. Each swab was vortexed vigorously in 2 mL of sterile deionized water to resuspend the sediment from the swab into the aliquot of water. One hundred μL from each acid-treated sample was directly inoculated onto buffered charcoal yeast extract culture media and buffered charcoal yeast extract selective media containing dyes, glycine, vancomycin, and polymyxin B. Culture media were incubated at 37°C in a humidified atmosphere for 3-7 days. Paired *t*-tests were performed with Excel software (Microsoft).

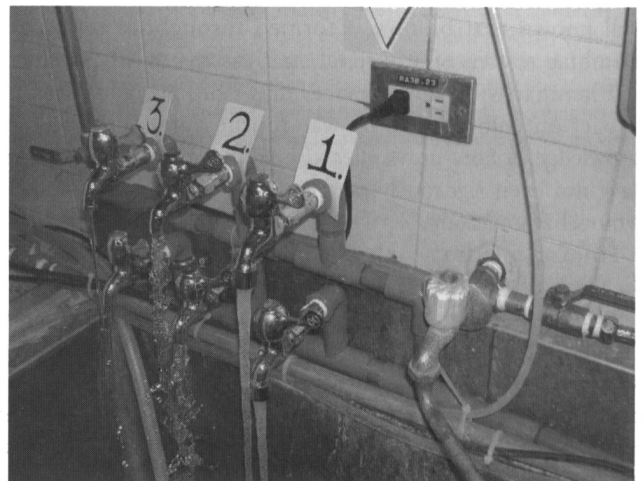During the 27-week study period, a total of 102 biofilm

FIGURE. Experimental set up of the model plumbing system (1, faucets with aerators; 2, control faucets; 3, faucets with laminar water flow devices).