RESEARCH BRIEFS

Pseudo-outbreak of *Sphingomonas* and *Methylobacterium sp.* Associated with Contamination of Heparin-Saline Solution Syringes Used During Bone Marrow Aspiration

We were alerted by our microbiology laboratory to a cluster of *Sphingomonas* spp. growing in mycobacterial cultures of bone marrow aspirate samples from adult patients with hematological malignancies. From the microbiology database, 4 bone marrow cultures that grew *Sphingomonas* and 1 bone marrow culture that grew *Methylobacterium* were identified between May and August 2010. A total of 27 bone marrow samples were cultured during this period. Table 1 lists clinical details of each case.

An outbreak investigation, including observations of the bone marrow procedure and subsequent sampling of relevant environmental areas, was conducted. This investigation centered in the single hematology/oncology unit where bone marrow aspirations were performed. A "bone marrow procedure cart" was utilized for each case consisting of the necessary equipment, including heparin-saline syringes. Prior to May 2010, the laboratory staff used commercially prepared heparin-saline syringes; however, due to a shortage, they started to use self-prepared heparin-saline syringes. The need for a concentration of 100 USP units/mL heparin meant that they diluted 1,000 USP units/mL with normal saline. However, the normal saline they utilized was a single-dose irrigation solution, not meant for medication preparation and meant to be discarded after first use, and this supply was repeatedly accessed until the container was empty. The providers used the heparin-saline solution to coat the inside of sterile syringes that were then used for bone marrow aspiration procedures. Environmental samples for culture were obtained from the reagents used for skin preparation, heparin-saline solutions in syringes, opened and unopened normal saline bottles used for heparin dilution, 1,000 USP units/mL heparin vials, the surrounding sinks, and faucet water.

During extended incubation for *Mycobacterium* culture, the initial *Sphingomonas* and *Methylobacterium* grew from each of the 5 bone marrow samples. *Sphingomonas* spp. were confirmed in 4 of the bone marrow cultures by gas liquid chromatography (GLC) of cellular fatty acid content utilizing the Sherlock Microbial Identification System (MIDI, Newark, DE) and were clarified by sequencing of the 16S ribosomal RNA gene (Applied BioSystems, Foster City, CA; SmartGene, Raleigh, NC).[1] During the investigation, 28 environmental areas were sampled, including 4 heparin-saline syringes. Cultures of samples from all 4 heparin-saline syringes grew *Sphingomonas* spp.; 3 of 4 of these cultures also grew *Methylobacterium*, as did cultures of 1 bag of in-use normal saline and 5 sink or water samples.

The GLC fatty acid profiles and MIDI software were used to create a dendogram of all 8 of the *Sphingomonas* spp. (4 bone marrow isolates and 4 heparin solution isolates). A comparison of these profiles (as measured by Euclidian distance) determined that 3 of the 4 bone marrow isolates and all 4 of the heparin solution isolates were most likely of the same strain, with 1 bone marrow isolate showing a slightly different strain variation.[1]

Similar methods were used to confirmed that the *Methylobacterium* found in the bone marrow and environmental samples were likely the same strain. An investigation of the mycobacterium blood culture bottles conducted by the manufacturer did not reveal any other cases of growth of *Sphingomonas* or *Methylobacterium*; blood culture bottles cultured from the same lot number did not grow either organism.

The discovery of the contamination of heparin-saline solution syringes in the bone marrow tissue laboratory was communicated to the pathology department and hospital leadership. All laboratory-prepared heparin-saline solutions were removed, and the pharmacy provided a commercial preparation of heparin-saline solution. Bone marrow aspirate cultures since that time have not grown either organism.

This investigation suggests that a pseudo-outbreak of *Sphingomonas* and *Methylobacterium* species was due to contamination during bone marrow extraction procedure. The apparent source was contaminated heparin-saline solution prepared in the bone marrow tissue laboratory. Environmental organisms along with lapses in aseptic technique were likely the cause. As is common in outbreak investigations, the precise source of the outbreak could not be determined with certainty; however, the hospital water system and sinks may have served as a reservoir.

Sphingomonas has been reported as a cause of bacteremia in hematology/oncology units likely related to contamination of hospital water supplies.[2–4] A multistate outbreak of *Sphingomonas* bacteremia has also been described related to contaminated intravenous fentanyl due to lack of adherence to infection control practices at a compounding pharmacy.[5] *Methylobacterium* bacteremia has been described post bone marrow infusion, likely caused by contaminated bone marrow preservative fluid.[6] Virulence factors that allow it to form biofilms and tolerate disinfecting agents, high temperatures, and drying contribute to its resilience in the hospital environment.[7] Outbreaks related to heparin-saline syringes have previously been reported, including a large multistate outbreak of *Serratia marcescens* among patients using prefilled heparin and/or saline syringes.[8]

Pseudo-outbreaks can result in unnecessary antibiotic treatment, as seen in 1 patient in this series. Our findings highlight the importance of reviewing procedures in all patient areas and ensuring regular re-education on the best infection control practices, including proper environmental cleaning, appropriate aseptic and sterile techniques, and use of quality-controlled products.

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TABLE 1. Clinical and Microbiological Details of the 4 Cases of *Sphingomonas* (Cases 1–4) and 1 Case of *Methylobacterium* (Case 5) from Bone Marrow Aspirate Cultures

Case No.	Age, yr	Date of Bone Marrow Procedure	Underlying Diagnosis	Antibiotic Therapy Given
1	42	5/27/10	Low-grade B-cell lymphoma	Yes; meropenem, ciprofloxacin, rifampin
2	53	7/7/10	ALL in remission, cytopenia	No
3	30	7/30/10	HIV/AIDS, Kaposi sarcoma, large B-cell lymphoma	No
4	65	8/12/10	Primary myelofibrosis and secondary leukemia	No
5	42	8/12/10	Low-grade B-cell lymphoma	No

NOTE. ALL, acute lymphocytic leukemia; HIV/AIDS, human immunodeficiency virus/acquired immune deficiency syndrome.

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Indwelling Urinary Catheter Insertion Practices in the Emergency Department: An Observational Study

We know little about the use of aseptic insertion technique for indwelling urinary catheters and catheter insertion practices in real-world clinical settings. Aseptic insertion technique is strongly recommended[1] because bacteria ascending after catheter insertion come from the patient's own flora or the hands of healthcare providers[2] and can lead to significant bacteriuria.[3] The emergency department (ED), as a primary