basin and filters, a greenhouse sprinkler system, a decorative fish pond and fountain, potable water fountains, urinals, and hot- and cold-water taps in rest rooms. Lp1 isolated from a whirlpool filter was an exact match, by monoclonal antibody subtyping and polymerase chain reaction, to the sputum from two of the cases.

In contrast to other spa- or whirlpool-associated outbreaks of legionnaires' disease, in this outbreak, none of the case patients actually entered the water. Instead, all most likely were exposed by walking by, or spending time in, the area surrounding the spa.

Although most communitywide outbreaks of legionellosis have resulted from transmission from an outdoor source (eg, cooling tower), this report underscores the potential for such outbreaks in association with contaminated indoor sources. The findings of the case-control study indicated that the source of the outbreak was the home-improvement center, and case patients were more likely than controls to have reported exposure to the spas, but this difference was not statistically significant. Thus, the laboratory findings were critical in identifying the exact source of exposure within the store.

Following this outbreak, the Virginia Department of Health recommended that whirlpool spas being used for displays be inspected regularly and maintained with biocides and that filters be changed and decontaminated regularly. In response to recent outbreaks of legionnaires' disease on a cruise ship, the CDC has developed guidelines for the maintenance of whirlpool spas on cruise ships. Based on this investigation, the CDC is assessing these guidelines to determine if modifications are necessary for land-based whirlpool spas, including those that are being operated while on display.

FROM: Centers for Disease Control and Prevention. Legionnaires' disease associated with a whirlpool spa display—Virginia, September-October 1996. *MMWR* 1997; 48:83-85.

The Changing Microbiology of Blood Cultures

The current understanding of the clinical significance of positive blood cultures has been shaped by many studies performed during the past 30 years. Factors such as the increased use of invasive or prosthetic devices, the increase in transplantations, emergence of human immunodeficiency virus (HIV) infection and AIDS, and the use of broader spectrum anti-infective therapies represent major changes in medical practice over the years.

Weinstein and coinvestigators recently reported the results of a major analysis of positive blood cultures among patients in three large medical centers. The authors reviewed 843 episodes of positive blood cultures in 707 patients with septicemia. The five most common pathogens were *Staphylococcus aureus, Escherichia coli,* coagulase-negative staphylococci (CNS), *Klebsiella pneumoniae,* and *Enterococcus* species. Although CNS were isolated most often, only 12.4% were clinically significant. Half of all episodes were nosocomial, and one quarter had no recognized source. Leading identifiable sources included intravenous catheters, the respiratory and genitourinary tracts, and intraabdominal foci. Septicemia-associated mortality was 17.5%. Patients who received appropriate antimicrobial therapy throughout the course of infection had the lowest mortality (13.3%). Multivariate analysis showed that age (relative risk [RR], 1.80), microorganism (RR, 2.86), predisposing factors (RR, 1.98), blood pressure (RR, 2.92), body temperature (RR, 2.04), and therapy (RR, 2.72) independently influenced outcome. Bloodstream infections in the 1990s are notable for the increased importance of CNS as both contaminants and pathogens, the proportionate increase in fungi and decrease in anaerobes as pathogens, the emergence of *Mycobacterium avium* complex as an important cause of bacteremia in patients with advanced HIV infection, and the reduction in mortality associated with infection.

FROM: Weinstein MP, Towns ML, Quartey SM, et al. The clinical significance of positive blood cultures in the 1990s: a prospective comprehensive evaluation of the microbiology, epidemiology, and outcome of bacteremia and fungemia in adults. *Clin Infect Dis* 1997;24:584-602.

Hepatitis B Transmitted by e-Antigen Negative Surgeon

Investigators from the Communicable Disease Surveillance Center in London, England, recently reported four cases of transmission of hepatitis B virus (HBV) infection to patients by four HBV-infected surgeons whose serum did not contain hepatitis B e-antigen (HBeAg).

Transmission of HBV to patients from infected surgeons who carry HBeAg has been documented repeatedly. In the United Kingdom, HBeAg-positive surgeons are not permitted to perform certain procedures that carry a risk that patients might be exposed to the blood of a healthcare worker. Most cardiothoracic, gynecologic, and abdominal surgery is considered to involve such a risk, as are most open orthopedic procedures. There are no practice restrictions for carriers of hepatitis B surface antigen (HBsAg) without detectable HBeAg, unless transmission has been documented.

Following the recognition of four unconnected cases of acute HBV in which surgery was identified as the possible source of infection, all the surgical teams were tested for serologic HBV markers. Three of the surgeons were found to be carriers (positive for HBsAg and negative for anti-HBc IgM), and the fourth surgeon was known to be an HBeAg-negative carrier of HBV. All four surgeons were negative for HBeAg. HBV DNA was detectable by liquid hybridization in the sample from one surgeon, but was not detectable from any samples from the other three surgeons. However, HBV DNA was detectable by enzyme-linked oligo-nucleotide assay in samples from all four surgeons. The nucleotide sequences of HBV DNA from the surgeons were indistinguishable from those of the corresponding patients. Screening of other exposed patients

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identified at least two other patients who probably had acquired HBV infection from one of these surgeons. None of the surgeons had a history of reported needlestick injuries, none practiced double gloving routinely, and all were assessed as technically competent by their colleagues. Two of the surgeons had received HBV vaccination; however, they most likely acquired their infections prior to vaccination.

In a 1993 revision of the United Kingdom guideline on HBV, all healthcare workers at risk for HBV infection must be vaccinated, and their immune response must be documented. Healthcare workers who perform procedures involving a risk of exposure, defined according to guidelines, and who do not have an antibody titer HBsAg of at least 10 mIU/mL after vaccination, are investigated further. Those in whom HBeAg is detected are not allowed to perform procedures involving a risk of exposure. Carriers in whom serum HBeAg is not detectable may perform such procedures, unless their participation is shown to be associated with the transmission of HBV.

They receive advice about preventing transmission and career counseling, but are in the unenviable position of having to weigh the prospect of future restrictions of practice against the desire to continue in their chosen career. All of the four surgeons in this investigation were given career counseling—all remain in medicine, three in work that includes contact with patients and the performance of invasive procedures, but not in procedures involving a risk of exposure to the virus. One surgeon continues to work in the same department but in a different capacity. One surgeon had considerable difficulty before the offer of alternative employment was made, as required by the current guideline.

The introduction of the guidelines in the United Kingdom may have contributed to the detection of these four cases by raising professional awareness about the possibility of transmission of HBV from surgeons to patients and by instituting the prospective restriction of practice of HBeAg-positive surgeons.

Three of the four cases were identified after the introduction of the guidelines. The investigators note that a better understanding of the markers that predict transmission would benefit infected surgeons, as well as those responsible for public policy development.

FROM: Heptonstall J, the Incident Investigation Team. Transmission of hepatitis B to patients from four infection surgeons without hepatitis B e antigen. *N Engl J Med* 1997;336:178-184.

Meningococcal Infection Transmitted From Saliva

Investigators from the Lambeth, Southwark, and Lewishan Health Authorities in London, England, recently reported a case of occupationally acquired conjunctival infection with *Neisseria meningitidis* following an incident involving continual exposure to saliva. The case involved a hospital security guard who developed hemorrhagic conjunctivitis 2 days after a man spit in his eye, with *N meningitidis* being isolated from a conjunctival swab culture. *N meningitidis* also was isolated from nasopharyngeal swabs from the man who spit in the security guard's eye and the man's household partner.

All three strains were found to be serogroup B, serotype 4, and also were found to be sulfonamide resistant, yielding the phenotype B 4 nt R. Macrorestriction profiles showed that all three isolates were genotypically closely related.

N meningitidis is an uncommon causative organism of acute conjunctivitis. Until the introduction of antimicrobial therapy, endogenous meningococcal conjunctivitis was a known complication of systemic meningococcal disease. Systemic meningococcal disease from primary meningococcal conjunctivitis develops in approximately 18% of patients. This report illustrates how a meningococcus bearing the phenotype of a well-recognized invasive strain can cause serious infection within 48 hours.

FROM: Holdsworth G, Jackson H, Kaczmarski E. Meningococcal infection from saliva. *Lancet* 1996;348:1443. Letter.

Additional news items in this issue: Candida *Endocarditis From Contaminated Aortic Valve, page 411; VRE Skin Colonization and Risk of Bacteremia, page 416.*

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