Medical News

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Outbreak of Highly Contagious Tuberculosis

Researchers from the Centers for Disease Control recently reported a large community outbreak of tuberculosis (TB) in a rural area at the foothills of the Smoky Mountains along the Tennessee-Kentucky border. Dr. Sarah Valway, the lead investigator and chief of the epidemiology section in the TB section at the CDC, commented that this strain had increased virulence and had not been identified before this outbreak, and its extreme contagiousness is unexplained. Twenty-one TB cases (15 culture-positive) were identified from 1994 to 1996, compared with less than one TB case per year for the prior 10 years. Thirteen of the available isolates were DNA fingerprinted, and all were found to be identical.

To determine the extent of transmission, an investigation was conducted among close and casual contacts of the cases. The source case, diagnosed in 1994, case B, diagnosed in 1995, and case C, diagnosed in 1996, were the sources of infection for the other 18 cases. Five secondary cases became infected and developed active disease with only very limited, casual exposure to the source case, case B, or case C. Extensive transmission from these three cases to close and casual contacts also was found; 337 (73%) of 461 contacts had positive TB skin tests, and 86 had documented skin-test conversions.

Virulence studies using mouse models also were conducted on the outbreak strain of *Mycobacterium tuberculosis*. Mouse studies found that, after 10 days, a virulent Erdmann strain of *M tuberculosis* grew to 10^6 bacilli/lung and after 20 days grew to approximately 10^4 bacilli/lung. In contrast, the outbreak strain grew $2x10^6$ bacilli/lung after 10 days and approximately 10^8 bacilli/lung after 20 days. The extraordinary rate and extent of growth of the outbreak strain of *M tuberculosis* greatly exceeds that seen with other clinical isolates of *M tuberculosis. These* data suggest increased transmission was a feature of the strain of *M tuberculosis,* eg, increased virulence, rather than an environmental factor or patient characteristics.

Standard anti-TB medications are effective against this strain, and this outbreak appears to be under control through use of directly observed therapy and other prevention initiatives.

FROM: Valway S, Sanchez S, Shinnick T, Orme I, Agerton T, Onorato I. Extensive transmission of *Mycobacterium tuberculosis* due to increase virulence. Presented at the 35th Annual Meeting of the Infectious Disease Society of America; September 14-16, 1997; San Francisco, California. Abstract 35; and, Grady D. New strain of highly contagious tuberculosis identified in the Smokies. *New York Times* September 23, 1997; B1009.

Disease Transmitted Through Food Supply

The CDC recently published its annual update of infectious and communicable diseases that are transmitted through handling the food supply. Since the last publication of the list, on August 15, 1996, in the *Federal Register,* the CDC has received no further information to indicate that additional unlisted diseases are transmitted through handling the food supply. The contamination of raw ingredients from infected food-producing animals and cross-contamination during processing are more prevalent causes of foodborne disease than is contamination of foods by persons with infectious or contagious diseases. However, some pathogens frequently are transmitted by food contaminated by infected persons. Pathogens that can cause diseases after an infected person handles food include hepatitis A virus, Norwalk and Norwalk-like viruses, *Salmonella typhi, Shigella* species, *Staphylococcus aureus,* and Streptococcus *pyogenes.* Other pathogens occasionally are transmitted by infected persons who handle food, but usually cause disease when food is intrinsically contaminated or cross-contaminated during processing or preparation. Pathogens in this category include *Campylobacter jejuni, Entamoeba histolytica,* enterohemorrhagic *Escherichia coli,* enterotoxigenic *E coli, Giardia lamblia,* non-typhoidal *Salmonella,* rotavirus, *Taenia solium, Vibrio cholerae* 01 and *Yersinia enterocolitica.*

FROM: Centers for Disease Control and Prevention. Infectious and communicable diseases transmitted through handling the food supply. *Federal Register* September 22, 1997:62:49519.

Antiseptic- and Antimicrobial-Coated Catheters Reduce Bloodstream Infection Risk

Two recent studies published in the *Annals of Internal Medicine* provide additional evidence to support the clinical application of antiseptic or antimicrobial coating of central venous catheters (CVCs). The studies evaluated the predictors of catheter-related infections (catheter colonization and microbial colonization of the skin at the catheter insertion site) and assessed the impact of impregnated catheters in reducing the risk of catheter-related bloodstream infection.

Dr. Dennis Maki and colleagues recently conducted a randomized, controlled clinical trial in a medical-surgical intensive-care unit of a 450-bed university hospital to determine the efficacy of a noncuffed, multilumen CVC impregnated with chlorhexidine and silver sulfadiazine compared to a triple-lumen polyurethane catheter in preventing CVC-

related infection.[1] The antiseptic-impregnated catheter was associated with a 44% reduction in catheter colonization (13.5 compared with 24.1 colonized catheters per 100 catheters; *P*<.*005)* and a 79% reduction in the rate of catheter-associated bloodstream infections (1.0 compared with 4.7 infections per 100 catheters).

Use of these antiseptic catheters also was associated with a significant reduction in the number of organisms colonizing the skin around the catheter insertion site. No adverse effects from the antiseptic catheter were seen, and none of the 122 isolates obtained from infected catheters in either group showed in vitro resistance to chlorhexidine-silver sulfadiazine. Antiseptic catheters also showed comparable benefit with catheters placed into a new site and catheters placed into an old site over a guidewire.

Cost-benefit analysis indicated that the antiseptic catheter should prove cost-beneficial if an institution's rate of catheter-related bacteremia with noncuffed CVCs is at least three infections per 1,000 catheter days.

In a second study, Dr. Issam Raad and colleagues from the Texas Medical Center Catheter Study Group conducted a multicenter, randomized clinical trial comparing triple-lumen polyurethane CVCs pretreated with tridodecylmethyl-ammonium chloride and coated with minocycline and rifampin to untreated, uncoated catheters.[2] The use of treated or coated catheters also was associated with significant reductions in the rates of catheter colonization and catheter-related bloodstream infections (0 bloodstream infections per 1,000 catheter days compared with 7.34 bloodstream infections per 1,000 catheter days). The authors did not report the effect of the coated catheters in reducing colonization of the catheter insertion site.

An important finding in both of these studies was that none of the impregnated catheters was associated with adverse events (hypersensitivity or toxicity) or infections caused by resistant pathogens; however, additional evaluation still is needed. Both studies conclude that the use of impregnated catheters, although more expensive than traditional catheters, result in a net cost savings.

In an accompanying editorial, Dr. Michele Pearson of the CDC and Dr. Elias Abrutyn of the Allegheny University of Health Science, Philadelphia, point out that, because these two studies addressed only a subset of CVCs—triple-lumen catheters-it remains to be determined whether the economic benefit would persist if the use of impregnated catheters was expanded to include CVCs that are used more commonly and have a lower risk for infection (for example, peripherally inserted CVCs, single-lumen CVCs, or tunneled CVCs for long-term use).[3] They also note the importance of other measures to reduce risk of catheter-related infections, including the use of maximal barrier precautions (sterile gloves, large sterile drape; sterile gown, cap, and mask) for insertion of CVCs and use of skilled personnel for insertion and maintenance. They conclude that technological advances are an important advance in reducing the rate of CVC-related infections; however, their use should be viewed as an adjunct to, rather than a substitute for, good aseptic practices.

FROM: 1. Maki DG, Stolz SM, Wheeler S, Mermel LA. Prevention of central venous catheter-related bloodstream infection by the use of an antiseptic-impregnated catheter: a randomized, controlled trial. *Ann Intern Med* 1997;127:257-266.

2. Raad I, Darouiche R, Dupuis J, et al. Central venous catheters coated with minocycline and rifampin for the prevention of catheter-related colonization and bloodstream infections: a randomized, double-blind trial. *Ann Intern Med* 1997;127:267-274.

3. Pearson ML, Abrutyn E. Reducing the risk for catheter-related infections: a new strategy *Ann Intern Med* 1997;127:304-306.

Sepsis Varies With Patient Population

Sepsis syndrome is a leading cause of mortality in hospitalized patients. However, few studies have described the epidemiology of sepsis syndrome in a hospitalwide population. Researchers at the Channing Laboratory, Department of Medicine, Brigham and Women's Hospital, and Harvard Medical School in Boston conducted a prospective, multi-institutional observational study including 5-month follow-up to describe the epidemiology of sepsis syndrome in the tertiary-care hospital setting. Eight academic tertiary-care centers were used, and each center monitored a weighted random sample of intensive-care unit (ICU) patients, non-ICU patients who had blood cultures drawn, and all patients who received a novel therapeutic agent or who died in an emergency department or ICU. Sepsis syndrome was defined as the presence of either a positive blood culture or the combination of fever, tachypnea, tachycardia, clinically suspected infection, and any one of seven confirmatory criteria. Estimates of total cases expected annually were extrapolated from the number of cases, the period of observation, and the sampling fraction. From January 4, 1993, to April 2, 1994, 12,759 patients were monitored, and 1,342 episodes of sepsis syndrome were documented. The weighted estimate of hospitalwide incidence of sepsis syndrome was 2.0 cases per 100 admissions, or 2.8 per 1,000 patient days. The unadjusted attack rate for sepsis syndrome between individual centers differed by as much as threefold, but, after adjustment for institutional differences in organ transplant populations, variation from the expected number of cases was reduced to twofold and was not statistically significant overall. Patients in ICUs accounted for 59% of total extrapolated cases, non-ICU patients with positive blood cultures for 11%, and non-ICU patients with negative blood cultures for 30%. Septic shock was present at onset of sepsis syndrome in 25% of patients. Bloodstream infection was documented in 28%, with gram-positive organisms being the most frequent isolates. Mortality was 34% at 28 days and 45% at 5 months. It was concluded that sepsis syndrome is common in academic hospitals, although the overall rates vary considerably with the patient population. A substantial fraction of cases occur outside ICUs. The authors note that an understanding of the hospitalwide epidemiology of sepsis syndrome is vital for rational planning and treatment of hospitalized patients with sepsis syndrome, especially as new and expensive therapeutic agents become available.