The researchers found that 147 patients (29.9%) received inadequate antimicrobial treatment for their bloodstream infections. The hospital mortality rate of patients with a bloodstream infection receiving inadequate antimicrobial treatment (61.9%) was statistically greater than the hospital mortality rate of patients with a bloodstream infection who received adequate antimicrobial treatment (28.4%). Multiple logistic regression analysis identified the administration of inadequate antimicrobial treatment as an independent determinant of hospital mortality. The most commonly identified bloodstream pathogens and their associated rates of inadequate antimicrobial treatment included vancomycin-resistant enterococci (n=17; 100%), *Candida* species (n=41; 95.1%), oxacillin-resistant *Staphylococcus aureus* (n=46; 32.6%), coagulase-negative staphylococci (n=96; 21.9%), and *Pseudomonas aeruginosa* (n=22; 10.0%). A statistically significant relation was found between the rates of inadequate antimicrobial treatment for individual microorganisms and their associated rates of hospital mortality. Multiple logistic regression analysis also demonstrated that a bloodstream infection attributed to *Candida* species, prior administration of antibiotics during the same hospitalization, decreasing serum albumin concentrations (1-g/dL decrements), and increasing central catheter duration (1-day increments) were independently associated with the administration of inadequate antimicrobial treatment.

The authors suggest that clinical efforts should be aimed at reducing the administration of inadequate antimicrobial treatment to hospitalized patients with bloodstream infections, especially individuals infected with antibiotic-resistant bacteria and *Candida* species.

FROM: Ibrahim EH, Sherman G, Ward S, Fraser VJ, Kollef MH. The influence of inadequate antimicrobial treatment of bloodstream infections on patient outcomes in the ICU setting. *Chest* 2000;118:146-155.

Disinfectant Contaminated With *Klebsiella oxytoca*—Source of Sepsis in Babies

An outbreak of sepsis in an ICU in Giessen, Germany, has been traced to the use of formaldehyde-based disinfectant contaminated with *Klebsiella oxytoca*. Two of the children died, and one of the survivors was severely disabled. Reiss and colleagues from Justus-Liebig University, Glessen, Germany, analyzed blood cultures from the 28 infants affected between October 1996 and March 1999. Enzyme and antibiotic patterns were identical to those of bacterial isolates obtained from the plastic buckets where the disinfectant was stored.

Three months before the outbreak, the disinfectant concentration had been lowered from the recommended concentration of 0.5% to 0.25% because of complaints of skin irritation by hospital staff. The higher concentration of disinfectant consistently killed *K oxytoca* within a few minutes, whereas the 0.25% solution of disinfectant supported the growth of *K oxytoca* at room temperature, with the microbial population doubling every 20 hours The authors report that no further cases of sepsis due to *K oxytoca* have occurred since the following infection control measures were adopted in the ICU: (1) increasing the concentration of disinfectant to 0.5% and (2) replacing plastic pails that held the diluted disinfectant with metal pails, which were autoclavable.

FROM: Reiss I, Borkhardt A, Fussle R, Sziegoleit A, Gortner L. Disinfectant contaminated with *Klebsiella oxytoca* as a source of sepsis in babies. *Lancet* 2000;356:310-311.

Epidemiology of Bacteriuria Caused by VRE

Wong and coinvestigators recently reported on a retrospective study on the epidemiology of vancomycin-resistant enterococcal (VRE) bacteriuria. Their objectives were to describe the frequency of VRE bacteriuria, to use strict definitions to distinguish symptomatic urinary tract infection (UTI) versus urine colonization without pyuria versus asymptomatic bacteriuria with pyuria, and to describe the outcomes of each group.

During the 18-month study period, 98 (92%) of the 107 patients with urine cultures positive for VRE (23/10,000 admissions) had charts available for review. *Enterococcus faecium* was recovered in 94 of 98 patients; in the remaining 4 patients, *Enterococcus faecalis* was recovered. Thirty-seven patients were colonized with VRE; 21 patients had asymptomatic bacteriuria, and the status of 27 patients was not ascertainable. Thirteen patients had VRE UTIs, with two associated bacteremias and one death. Patients with UTI versus patients without UTI were more likely to have an underlying malignancy (39% vs 9%, $P=.014$).

The authors concluded that the majority of urine cultures yielding VRE do not represent true infection, rather colonization or asymptomatic bacteriuria.

FROM: Wong AH, Wenzel RP, Edmond MB. Epidemiology of bacteriuria caused by vancomycin-resistant enterococci—a retrospective study. *Am J Infect Control* 2000;28:277-281.

VRE Risk Factors Among Renal Patients

Beltrami and coinvestigators, from the CDC's Hospital Infections Program and Community Hospital East in Indianapolis, Indiana, conducted a study on risk factors associated with vancomycin-resistant enterococci (VRE) among patients on a renal ward during a community hospital outbreak. During an outbreak of VRE infection and colonization at a community hospital in Indianapolis, they performed a case-control study of patients on the hospital's renal unit to determine risk factors for acquisition of VRE among this potentially high-risk patient population.

Twenty-four renal patients with VRE colonization or infection (ie, case-patients) were compared by univariate and multivariate analyses with 29 renal patients with nosocomially acquired vancomycin-susceptible enterococcal infection and colonization (ie, controls). The results showed that age and length of hospitalization were similar between

the VRE case-patients and the vancomycin-susceptible enterococcal control-patients, but case-patients had higher Acute Physiology and Chronic Health Evaluation II scores and received significantly greater numbers of antimicrobials and significantly more days of antimicrobials during the 60 days preceding the first positive enterococcal culture. In an assessment of the appropriateness of vancomycin use, one third of vancomycin orders were found to be inappropriate in both patient groups.

The authors concluded that that among renal patients, those who are severely ill and receive multiple and prolonged courses of antimicrobials are at greatest risk for acquiring VRE infection or colonization.

FROM: Beltrami EM, Singer DA, Fish L, Manning K, Young S, Banerjee SN, et al. Risk factors for acquisition of vancomycin-resistant enterococci among patients on a renal ward during a community hospital outbreak. *Am J Infect Control* 2000;28:282-285.

Bacterial Colonization of Toys in Neonatal Intensive Care Cots

Davies and coinvestigators from the Royal Women's Hospital, Melbourne, Australia, conducted a study to investigate which bacteria and fungi contaminated toys in neonatal ICU (NICU) cots. A cross-sectional, longitudinal, bacteriologic survey was conducted of all toys in the cots of infants in an NICU. Cultures of toys were obtained weekly for 4 weeks. Data were collected on the infant's postnatal age, the type of cot, whether humidity was added, characteristics of the toy, and any infant infections.

Over the 4-week period, there were 86 cultures from 34 toys of 19 infants. Bacteria were grown from 84 (98%) of 86 cultures: 84 grew coagulase-negative staphylococci; 50, *Micrococcus* species; 21, *Bacillus* species; 13, methicillin-resistant *Staphylococcus aureus;* 12, diphtheroids; 4, group B streptococcus; 3, *S aureus;* 3, nonhemolytic streptococci; 3, group D streptococci; 4, alpha-hemolytic streptococci; and 2, coliforms. None grew fungi. The colonization rate did not differ with cot type, presence of humidity, size of the toy, toy fiber length, or the fluffiness score. Eight (42%) of the infants had positive blood culture results, and 5 (63%) of the 8 isolates were of the same type as that colonizing their corresponding toy.

The authors point out that, with time, all the toys in NICU cots became colonized with bacteria. Many were potentially pathogenic. Toys may be reservoirs for potential infantile nosocomial sepsis.

FROM: Davies MW, Mehr S, Garland ST, Morley CJ. Bacterial colonization of toys in neonatal intensive care cots. *Pediatrics* 2000;106:E18.

Prolonged Viremia With Hepatitis A Virus Infection

Researchers from the CDC recently reported on the results of a study to determine the duration of viremia in hepatitis A virus (HAV) infection and the onset of IgM antibodies to HAV. The duration of viremia and time course for development of IgM antibodies were determined prospectively in natural and experimental HAV infection. Serial serum samples from 13 HAV-infected men and 5 experimentally infected chimpanzees were examined by nested reverse-transcriptase polymerase chain reaction analysis to detect HAV RNA and by enzyme-linked immunosorbent assay to detect IgM antibodies to HAV. Among infected humans, HAV RNA was detected an average of 17 days before the alanine aminotransferase peak, and viremia persisted for an average of 79 days after the liver enzyme peak. The average duration of viremia was 95 (range, 36-391) days. Results were similar in chimpanzees. In addition, HAV RNA was detected in serum of humans and chimpanzees several days before IgM antibodies to HAV were detected. These results indicate that adults with HAV infection are viremic for as long as 30 days before the onset of symptoms and that the duration of viremia may be longer than previously described.

The authors note that these findings have important implications for the transmission of HAV infection through blood products. Blood collected before the onset of symptoms appears to be at highest potential risk of transmitting HAV infection because of the high concentration of virus and essentially no antibody.

FROM: Bower WA, Nainan OV, Han X, Margolis HS. Duration of viremia in hepatitis A virus infection. *J Infect Dis* 2000;182:12-17.

Hepatitis B Outbreak Linked to Autohemotherapy

Webster and colleagues recently reported on a look-back investigation conducted among patients who received treatment at an autohemotherapy clinic in London following diagnosis of acute hepatitis B virus (HBV) infection in a patient who had recently been treated at the clinic. The HBV outbreak investigation was led by the local public health authority and the Public Health Laboratory Service Communicable Disease Surveillance Centre, who identified 399 patients attending the clinic between January 1997 and September 1998. Autohemotherapy is available in alternative medicine clinics worldwide; patients seek treatment for a variety of ailments, including allergies, malignancy, viral hepatitis, and herpes zoster. The autohemotherapy procedure involved drawing approximately 1 mL of the patient's blood with a needle and syringe, mixing the blood with an equal volume of saline, and injecting the mixture into the buttocks or acupuncture points.

Transmission of HBV was linked to a multiuse vial of saline that was drawn from after each venipuncture with the syringe containing the patient's blood. The authors state that the point source of infection in this outbreak could not be unequivocally identified, but one of five patients who were classified as having chronic HBV infection was regarded as the likely source of the infec-