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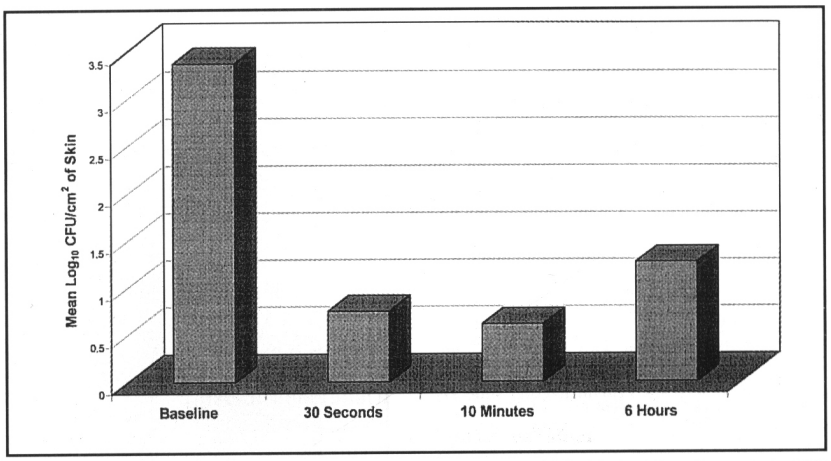

FIGURE. Decrease in colony-forming units (CFU) after application of 2% chlorhexidine gluconate in 70% isopropyl alcohol on the abdomen.

Administration of 2% Chlorhexidine Gluconate in 70% Isopropyl Alcohol Is Effective in 30 Seconds

To the Editor:

A randomized, blinded clinical trial was conducted to determine the immediate and persistent antimicrobial activity of 2% chlorhexidine gluconate in 70% isopropyl alcohol (CHG+IPA; ChloraPrep, Medi-Flex Hospital Products, Inc., Overland Park, KS). Healthy subjects meeting the inclusion and exclusion criteria who were between 18 and 70 years of age with no evidence of dermatoses, dermatitis, inflammation, or injuries to the drug-application sites on the abdomen were eligible for the study. They were included if they had 2.2 $\log_{10}$ or more colony-forming units (CFU) of bacteria per square centimeter of skin on the abdomen when they were screened and at baseline (zero time).

The trial was divided into pretest, screening, and test periods. In the 14-day pretest period of the study, subjects were required to avoid the use of medicated soaps, lotions, shampoos, and deodorants, as well as skin contact with solvents, acids, and bases. Subjects also avoided using ultraviolet tanning beds or bathing in antimicrobial-treated pools or hot tubs. They were given personal hygiene kits that contained no antimicrobial ingredients. Subjects were not allowed to shave the treatment areas for 5 days before sampling or to bathe for 24 hours before microbial samples were taken. The screening period consisted of the week following the 14-day pretest period. The week following the screening period was the test period of the study. On test day 1, the subjects were scored for irritation and sampled for baseline microbial counts randomly on the right or left abdomen and groin using a cylinder sampling technique.[1]

If the treatment area passed the screening test, a single dose of CHG+IPA was applied for 30 seconds to a 42-cm^2 area on the right or left abdomen and allowed to dry for 30 seconds. All of the sampling sites were scored for irritation before any microbial samples were taken. All sampling sites were randomized within treatment areas on the abdomen using a computer-generated randomization schedule. Treatment areas were sampled for bacteria on the abdomen 30 seconds and 10 minutes after CHG+IPA application. After the 10-minute sample was taken, all treatment areas were covered with a gauze and fenestration bandage (Tegaderm, 6 × 7 cm, 3M Co., Minneapolis, MN) to prevent microbial contamination of the treatment areas.

Six hours after CHG+IPA application, sites on the abdomen were sampled for bacteria using the cylinder sampling technique. The numbers of CFU on duplicate pour plates were averaged to determine the number of CFU per dilution and a formula was used to convert the number of CFU in the sample into the number of CFU per square centimeter of skin.[2] Antimicrobial efficacy was measured by determining the mean number of CFU per square centimeter of skin on the abdominal treatment site 30 seconds, 10 minutes, and 6 hours after CHG+IPA application. Effective antimicrobial activity was defined as a 2.0-$\log_{10}$ or greater decrease in the mean density of bacteria in 10 minutes. In addition, the mean number of CFU per square centimeter of skin must remain below baseline 6 hours after CHG+IPA application. Effective antimicrobial activity was also defined as a 1.0-$\log_{10}$ or greater decrease in the mean number of CFU per square centimeter of skin on the abdomen 30 seconds after CHG+IPA application.

The safety of CHG+IPA was evaluated by monitoring adverse events and skin irritation of the treatment sites at baseline and at 30 seconds, 10 minutes, and 6 hours after CHG+IPA application. There were no adverse events or skin irritation reported during the study.

Sixty-three subjects were recruited into the study and 45 were screened. Thirty-three of the 45 subjects passed the screen and were treated with CHG+IPA. Twenty-six of these met the baseline inclusion criteria and completed the study. The mean $\log_{10}$ CFU/cm^2 of skin on the abdomen at baseline, 30 seconds, 10 minutes, and 6 hours after application of CHG+IPA are presented in the figure. The mean $\log_{10}$ CFU/cm^2 of skin on the abdomen at baseline was 3.38, or approximately 2,400 CFU/cm^2 of skin. Thirty seconds after the application of CHG+IPA, the mean number of CFU/cm^2 on the

skin was approximately 5; most of the samples tested at 30 seconds contained no detectable CFU.

CHG+IPA was safe and effective in reducing the number of CFU on the skin of the abdomen at 30 seconds and 10 minutes after application. In addition, the antimicrobial activity of CHG+IPA persisted for at least 6 hours.

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Nosocomial Central Venous Catheter Infections Among Patients With Different Types of Cancer

To the Editor:

More than 200,000 nosocomial bloodstream infections occur each year in the United States. Most of these are related to central venous catheters.[1] Among patients with cancer, malignancy-specific rates of nosocomial catheter-related bloodstream infection (CR-BSI) have not been well defined. We systematically determined rates of nosocomial CR-BSI according to underlying malignancy at our center.

Memorial Sloan-Kettering Cancer Center is a 434-bed, tertiary-care cancer hospital in New York City divided into adult disease-specific units, an adult bone marrow transplant unit, an adult intensive care unit, and a pediatrics unit. We conducted intermittent surveillance between February 1997 and February 2001 for nosocomial CR-BSI on the pediatrics, leukemia, lymphoma, breast, bone marrow transplant, and intensive care units. Patients with implanted subcutaneous ports, tunneled (Hickman–Broviac) catheters, leukopheresis catheters, temporary triple-lumen central catheters, and peripherally inserted central catheters were included.

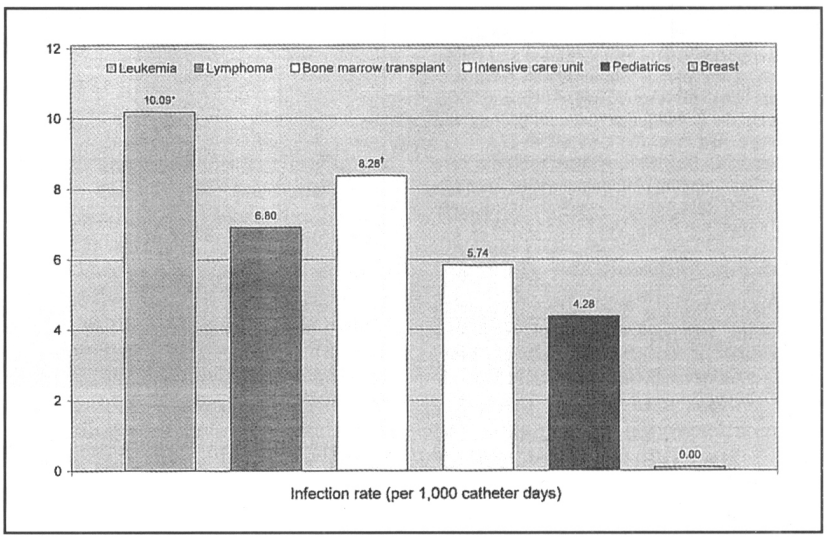

FIGURE. Hospital unit-specific rates of nosocomial catheter-related bloodstream infection during periods of surveillance from 1997 to 2001 at Memorial Sloan-Kettering Cancer Center. *$P < .05$ compared with breast; †$P = .09$ compared with breast.

Registered nurses or nurse practitioners assigned to each unit recorded the number of catheter-days and evaluated each central venous catheter daily. An infection control practitioner confirmed each CR-BSI according to definitions from the Hospital Infection Control Practices Advisory Committee.[1] Only nosocomial cases were included, defined as no evidence of infection present at admission and first positive blood cultures drawn more than 48 hours later. Cancer-specific rates were compared using the two-sided, chi-square statistic.

A total of 6,295 catheter-days of surveillance was performed on the leukemia (1,982 days), lymphoma (441 days), bone marrow transplant (1,811 days), intensive care (697 days), pediatrics (935 days), and breast cancer (429 days) units. Forty-six nosocomial CR-BSIs (20 leukemia, 3 lymphoma, 15 bone marrow transplant, 4 intensive care, 4 pediatrics, and 0 breast cancer) were identified during the periods of surveillance for an overall rate of 7.31 per 1,000 catheter-days (95% confidence interval, 5.16 to 9.45). Disease-specific rates of nosocomial CR-BSI are included in the figure. A statistically significant difference ($P < .05$) was found between patients with leukemia (20 per 1,982 catheter-days) and patients with breast cancer (0 per 429 catheter-days).

Central venous catheters play an important role in the treatment of patients with a variety of diseases. However, catheter-related infections commonly occur and cause significant morbidity and mortality. Mean rates of CR-BSI in medical–surgical intensive care units in the United States between 1995 and 2000 ranged from 3.9 to 6.0 per 1,000 catheter-days depending on the type of medical center.[2] In a previous study of patients with cancer at our institution,[3] at least one device-related infection occurred in 43% of all Hickman-type catheters and 8% of all totally implanted subcutaneous ports placed between 1987 and 1989.

Cancer-specific rates of nosocomial CR-BSI have not previously been well described. Studies[3-7] of central venous catheters in patients with cancer either did not divide patients by type of malignancy or failed to distinguish between hospitalized and ambulatory patients. Also, all catheter-related infections (eg, insertion site, tunnel, pocket, and bloodstream infection) were commonly considered together, limiting any conclusions on specific risk factors for CR-BSI. We found significant differences in rates of CR-BSI between hospitalized patients with hematologic malignancies and those with solid tumors (as represented by patients with breast cancer).

Several possible explanations exist for the wide range of cancer-specific rates. Patients with

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