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Availability of Automatic Water Tap in Hospitals in Bangkok, Thailand

To the Editor—Pathogens can contaminate the environment and cause infections. In hospitals, contamination of the environment is frequent and expected. Toilets in hospitals are an area of concern. The high contamination rates of toilet tap handles or levers for manual flushing are reported in many publications.[1,2] Toilet seats and handles are commonly found to be contaminated.[1] A good "toilet design" is proposed that could help control the spread of nosocomial infection.[3] To reduce the problem of contamination, toilets with hands-free automatic flushing mechanisms or water taps have been available for a few years. Here, the authors report a field survey of 180 toilets from 25 hospitals in Bangkok, Thailand. According to the survey, automatic hands-free flushing mechanisms were available in 65 toilets (36.1%). Most of the toilets studied lacked automatic water taps and classic toilet tap handles are still in use. The findings are potentially important and not just of local interest. Numerous hospitals in many countries in the world may still use manual flushing mechanisms. Promotion of the automatic water tap in hospitals will help improve hand hygiene in healthcare workers, visitors, and patients and may help reduce the problem of possible pathogen transmission.

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Epidemiology of Antimicrobial Resistance in an Oncology Center in Eastern India

The epidemiology of multidrug-resistant organisms has local, national, and global significance.[1,2] In this study we describe the epidemiology of antimicrobial resistance from a new oncology and bone marrow transplantation center in eastern India. The method of antimicrobial susceptibility testing was per the Clinical Laboratory Standards Institute guidelines. Stool surveillance culture was performed according to the method described by Landman et al.[3] An automated system (Vitek2; bioMérieux) and disc diffusion (Bio-Rad) were employed for antibiotic susceptibility tests. The data refer to the period from April 1, 2012, through March 31, 2013. The data came from 4,723 samples, 1,474 patients (inpatients and outpatients), and 1,965 bacterial and yeast isolates. Gram-positive bacteria were detected in 25% of isolates, gram-negative bacilli in 68%, and yeasts in 7%. Positivity rates for different sample types were blood culture, 15.2%; urine, 33.3%; respiratory samples, 57.9%; pus, 65.8%; and body fluids, 37.0%. Stool samples for surveillance culture of multidrug-resistant organisms were positive in 35.1%. In total 30.6% were positive by culture.

Among patients with various infections antibiotic susceptibility of coliform bacteria (Enterobacteriaceae family) showed a high level of resistance with extended-spectrum beta-lactamase prevalence of 72%, carbapenem resistance in 23%, and resistance to amikacin, gentamicin, piperacillin-tazobactam, and ciprofloxacin to be 26%, 49%, 48%, and 71%, respectively. Nonfermentative gram-negative bacilli (eg, *Pseudomonas*, *Acinetobacter*) showed 36% resistance to carbapenems, 35% to piperacillin-tazobactam, 35% to amikacin, 38% to gentamicin, and 43% to ciprofloxacin. Resistance to meropenem and resistance to third-generation cephalosporins such as ceftazidime (marker of extended-spectrum beta-lactamase production) were detected respectively in cultures of 30.6% and 64.2% of blood isolates, 27% and 66.2% of urine samples, 25.7% and 47.8% of respiratory isolates, and 18.1% and 50.0% of pus isolates. Antibiotic resistance in gram-positive bacteria was noted in only 12% of the isolates (eg, methicillin-resistant *Staphylococcus aureus*), and inducible clindamycin resistance was noted in 23% of isolates. Antifungal susceptibility testing of *Candida* species (n = 123) showed 14% resistance to fluconazole. Among 356 patients with bloodstream infections, 55% were due to

TABLE 1. Surveillance Culture of Stool for Multidrug Resistant Organisms

Antibiotic	No. of isolates tested	No. of isolates resistant	% Resistant (95% CI)
	Coliform bacilli (*Enterobacteriaceae* family)		
Meropenem	136	23	16.9 (11.5 to 25.2)
Amikacin	136	22	16.2 (10.9 to 23.4)
Ciprofloxacin	136	78	57.4 (48.9 to 65.4)
Ceftazidime	123	116	94.3 (88.5 to 97.4)
Piperacillin-tazobactam	136	39	28.7 (21.7 to 36.8)
Cefoxitin	113	101	89.4 (82.2 to 93.9)
	Enterococcus species		
Antibiotic	No. of isolates tested	No. of isolates resistant	% Resistant (95% CI)
Ampicillin	28	27	96.4 (80.8 to 99.9)
High-level gentamicin	28	16	57.1 (39.1 to 73.5)
Linezolid	29	0	0.0 (0.0 to 13.9)
Vancomycin	27	5	18.5 (7.7 to 37.2)

gram-negative bacilli, 39% to gram-positive cocci, and 6% to yeasts. *Candida albicans* was the commonest species of yeast, but *C. glabrata*, *C. haemulonii*, *C. kefyr*, *C. norvegensis*, *C. parapsilosis*, and *C. tropicalis* were also noted.

Surveillance culture for antibiotic-resistant bacteria in stool sample of patients (collected before major therapeutic interventions such as bone marrow transplantation, chemotherapy induction, major gynecologic surgery for cancer) showed meropenem resistance in 17% and extended-spectrum beta-lactamase in 94% among gram-negative bacilli (n = 136). In *Enterococcus* species we found ampicillin resistance in 96.4%, high-level gentamicin resistance in 57.1%, and vancomycin resistance in 18.5% of isolates (Table 1).

Resistance to antimicrobial agents is not a new phenomenon.[1,4,5] However, the degree of antimicrobial resistance in certain settings and the subsequent dwindling of therapeutic options have raised this issue to the level of a national security threat in some countries. What is unusual about the current data from our center is the extent of the problem, especially the severe diminution of therapeutic options posed by the emergence of carbapenem resistance in gram-negative bacterial infections and azole resistance in *Candida* infections. The current study was done in a new cancer care center (<2 years old) but antimicrobial resistance was noticed from the early days of this hospital, suggesting the possibility of high level of antibiotic resistance already present in the community and the environment. To emphasize this point and also to optimize empirical therapy of infections in neutropenic and other immunocompromised patients, surveillance culture for antibiotic-resistant bacteria was initiated. The results of surveillance culture for antibiotic-resistant bacteria performed predominantly on stool samples before interventions demonstrate the high prevalence of background resistance in the patient population. This could be due to several factors, such as inadequate hygiene and sanitation, improper and inadequate disposal of wastes and sewage, use of antibiotics in food animals (poultry, cattle, fish), unrestricted availability of antibiotics in the chemist shops in developing countries, lack of safe drinking water in large sections of the population, and the entry of antibiotic-resistant bacteria in the food chain. Although it is possible that to some extent resistance could have been acquired during medical interventions, it cannot be ruled out that in a significant proportion of patients it could have been acquired by community exposures of various types. The question about the extent of antibiotic-resistant bacteria colonizing healthy general population needs investigation so that possible sources can be identified and remedial measures taken. Surveillance for multidrug-resistant organisms in stool or rectal swab samples is not routinely performed in most hospitals because of cost and technical difficulties.[4] It may be argued that rapid sensitive and cost-effective tests such as those offered by real-time polymerase chain reaction assays targeting carbapenem-resistant coliforms and vancomycin-resistant enterococci would be useful tools for infection control and rational selection of empirical antimicrobial therapy.

Early diagnosis of drug-resistant pathogens would require new diagnostic and surveillance strategies, including perhaps the wider use of molecular technologies. It is possible that intricate host-pathogen interaction is at play and genetic studies of both bacteria and their victims may reveal new insights into pathogenesis and identify future therapeutic strategies. It is hoped that the creation of a national antibiotic resistance database in India and the close interaction of national, regional, and collaborating centers internationally would lead to more evidence-based prescribing and create greater understanding about the serious threat posed to the population from antimicrobial resistance.

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Infection Control Challenges of Infrequent and Rare Fungal Pathogens: Lessons from Disseminated *Fusarium* and *Kodamaea ohmeri* Infections

To the Editor—Infrequent and rare fungal infections represent special challenges with respect to infection prevention and control. The epidemiology of many of these infections is not well understood with regard to environmental reservoirs, modes of transmission, and ways to detect them. Because of their relative rarity, laboratory diagnosis of these potential pathogens is challenging. Specific identification requires expertise because most diagnoses of fungi, especially those that are filamentous, are morphology based and nonautomated. Antifungal susceptibility testing of these rare pathogens is challenging because reliable methodology and antifungal breakpoints are often not readily available. Quality-assured diagnosis requires confirmation of rare species in reference laboratories, posing problems with regard to transportation of microbiologically hazardous culture isolates. In addition, reference laboratory facilities are not available in all regions and countries, and sometimes international collaboration and shipment of materials are required for confirmation of diagnosis. Here, we relate 3 cases of unusual fungal infections to illustrate these points.

A 4-year-old male child with acute lymphoblastic leukemia and receiving chemotherapy developed blackish necrotic lesions on the back and forehead in September 2011. Histopathology from a lesion showed acutely angled branching fungal hyphae in the dermis, and *Fusarium solani* was isolated on culture. Antifungal susceptibility showed the following minimum inhibitory concentrations (MICs): amphotericin B 2 μg/mL, voriconazole 8 μg/mL, itraconazole 16 μg/m, posaconazole 16 μg/mL. The patient initially responded to antifungal therapy but had a relapse of similar skin lesions. He eventually responded to a combination of liposomal amphotericin B, which was given for 31 days (1 to 2.7 mg/kg/day, intravenously [IV]), and voriconazole for 71 days at 10 mg/kg/day, orally. The child survived and is well on follow-up (3 years).

A 22-year-old male with aplastic anemia underwent a haploidentical stem cell transplantion from a brother in August 2013. He developed multiple erythematous papular skin lesions 18 days post transplantation and cellulitis of right big toe. A blood culture from the central line grew filamentous fungus after 4 days of incubation, identified as *Fusarium* spp. Antifungal susceptibility showed the following MICs: amphotericin B-1 μg/mL, voriconazole 4 μg/mL, itraconazole >16 μg/mL. The patient had acute graft rejection, hemorrhagic cystitis. He was treated with liposomal amphotericin B for 26 days (3 mg/kg/day, IV), voriconazole for 29 days (200 mg, orally, twice daily), and caspofungin for10 days (50 mg/day, IV). The patient died in September 2013.

A 75-year man with total colectomy developed *Klebsiella* bactermia on postoperative day 5, which initially responded to a course of meropenem and colistin. Antibiotics were changed to piperacillin-tazobactam, ciprofloxacin, and doxycyline when *Ralstonia pickettii* and *Elizabethkingia meningoseptica* were isolated from central-line tip on different occasions. Because the patient remained febrile, repeat blood cultures were taken, which grew *Kodamaea ohmeri* on several occasions while the patient was on fluconazole and then on caspofungin. Fungaemia persisted despite changing the central line. Treatment with conventional amphotericin B (IV) for 2 weeks cleared the fungus. The patient was discharged in stable condition.

Fusarium is a hyaline hyphomycetes fungus that may cause localized infections, such as keratitis and onychomycosis, and disseminated infections in immunocompromised hosts.[1,2] The natural habitat of *Fusarium* is said to be plants and soil.[1]