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Nosocomial Infections in Tbilisi, Georgia: A Retrospective Study of Microbiological Data from 4 Major Tertiary Care Hospitals

To the Editor—Healthcare-associated infections (HAIs) are important and ever-increasing public health problems worldwide. These infections are associated with increased morbidity, length of stay, mortality, and costs.[1-3] The problem is somewhat underrecognized in the country of Georgia.[4] There are relatively scarce statistical data available regarding the epidemiology of nosocomial infections and the prevalence of infection due to multidrug-resistant (MDR) organisms in the region. During the past decade, several small-scale studies have tried to address the problem and clearly showed a significant burden of HAIs and high prevalence of MDR infections in Georgia.[5-8]

The goal of our study was to evaluate the epidemiology of nosocomial pathogens and their resistance patterns at 4 major tertiary care centers in Tbilisi, Georgia. A 3-year retrospective descriptive analysis of microbiological data collected during the period 2007–2010 from 4 major tertiary health care centers in Tbilisi, Georgia, was performed. All microbiology specimens were Gram stained and cultured at the same referral microbiology laboratory. Identification of the bacterial pathogens was performed with an automated system for identification and susceptibility tests (VITEK; bioMérieux). Antibiotic susceptibility testing was performed with the disk diffusion method or by using an automated method (VITEK; bioMérieux). Stool samples were assessed for *Clostridium difficile* with enzyme-linked immunosorbent assay for A and B toxin.

A total of 3,452 available clinical samples were included in the study, and positive findings were documented for 1,607 cultures (46.6%). The most commonly isolated microorganisms included *Klebsiella pneumonia* (in 26.5% of samples), *Pseudomonas aeruginosa* (15.2%), *Candida albicans* (12.3%), *Staphylococcus aureus* (9%), *Escherichia coli* (7.6%), and *Acinetobacter baumannii* (5.1%). The susceptibility patterns of gram-negative rods (GNRs) to the most commonly used antibiotics are shown in Table 1. Among 95 GNR isolates tested for the presence of extended-spectrum β-lactamase (ESBL), 33.7% were found to be ESBL carriers. Extensive resistance to different groups of antibiotics was found among GNRs, including resistance to carbapenems. Only 29% and 11.9% of *Pseudomonas* and *Acinetobacter* isolates, respectively, were susceptible to imipenem. The vast majority of GNRs showed susceptibility to colistin, but we identified 8 colistin-resistant isolates, which included *P. aeruginosa*, *K. pneumoniae*, *Proteus* species, and *E. coli*. The most common gram-positive cocci (GPC) recovered were *S. aureus*, *Staphylococcus epidermidis*,

TABLE 1. Antibiotic Susceptibility of Selected Bacterial Pathogens

	Susceptibility to antibiotics, %							
Bacterial pathogen	AMK	CEPH-3	CFT	CFP	CIP	PIP/TAZ	IMP	FOSPH
Klebsiella pneumoniae	45.1	60.7	57.2	59.1	69.1	60.7	76.8	57.0
Pseudomonas aeruginosa	20.4	0	13.1	12.5	22.6	20.0	29.0	31.5
Escherichia coli	59.0	50.0	53.4	52.5	40.4	44.9	89.4	63.4
Acinetobacter baumannii	10.1	0	1.8	7.0	4.8	13.7	11.9	23.3
Enterobacter aerogenes	39.1	4.2	19.4	20.6	21.0	20.3	39.1	49.1
Proteus mirabilis	46.4	42.9	48.3	42.9	48.3	53.8	51.7	61.1
Klebsiella oxytoca	39.3	55.6	69.6	60.7	64.3	57.1	100.0	64.0
Enterobacter cloacae	54.5	42.9	36.4	42.9	59.1	55.0	71.4	66.7

NOTE. AMK, amikacin; CEPH-3, third-generation cephalosporins other then ceftazidime; CFT, ceftazidime; CFP, cefepime; CIP, ciprofloxacin; FOSPH, fosphomycin; IMP, imipenem; PIP/TAZ, piperacillin-tazobactam.

and *Enterococcus faecalis*; 33.3% of *S. aureus* isolates and 36.1% of *S. epidermidis* isolates were methicillin resistant. All of the GPC isolates were vancomycin susceptible. Overall, 66 stool samples from 53 patients with diarrhea that developed during their hospitalization were evaluated for the presence of *C. difficile* A and B toxins; 20 patients (37.7%) had culture results positive for *C. difficile*.

To the best of our knowledge, this is the first attempt at a comprehensive review of the epidemiology of microbial organisms causing healthcare-associated infections in Georgia. The study results clearly show that there is a considerable burden of antibiotic-resistant nosocomial infections among 4 tertiary care hospitals in Tbilisi, the capital city. Some gram-negative organisms are resistant to nearly all available antibiotics. Susceptibility to colistin is retained among most GNRs (perhaps because of limited use in recent years), and this agent remains the antibiotic of last resort in many cases of GNR infection, but the appearance of colistin-resistant isolates is alarming. One-third of *S. aureus* isolates were methicillin resistant, which should be considered during the choice of initial empirical antibiotic selection among patients with possible nosocomial gram-positive infection.

There is an urgent need to establish a comprehensive surveillance system for nosocomial infections in Georgia to better define the epidemiology of HAI in the country and to facilitate robust public health interventions to improve infection control and prevention efforts at healthcare facilities in Georgia.

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Seasonal and Novel H1N1 Influenza Vaccination at a Children's Hospital

To the Editor—In their survey of 4,046 healthcare workers (HCWs), Kaboli et al[1] demonstrated that receipt of seasonal vaccine during the 2008–2009 influenza season was the most important predictor of intention to be vaccinated against H1N1 virus during the 2009–2010 influenza season. Maurer et al[2] reached a similar conclusion after surveying a nationally representative sample of 2,067 US adults. In that population, prior seasonal vaccine receipt was highly associated with the intention to receive H1N1 vaccine (73% vs 34.2%; $P < .001$). However, intention to receive influenza vaccine may not correlate with actual patterns of vaccination.[2,3] Few published data have confirmed the association between receipt of seasonal vaccine and receipt of H1N1 vaccine.[4]

We sought to measure the association between H1N1 vaccination of HCWs and prior receipt of seasonal vaccine at our institution, a free-standing, tertiary care children's hospital. Because 2009 H1N1 vaccine became available after seasonal vaccine, we included seasonal vaccine receipt during the 2008–2009 and 2009–2010 influenza seasons in our analyses. HCWs were not required to receive either vaccine, but