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Prevalence of multidrug-resistant bacteria among international patients

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Objectives

Multidrug-resistant organisms (MDROs) are a worldwide problem. Due to international travel and patient transfers, the risk of spread of MDROs increases permanently. The early identification of colonized and infected patients is of utmost importance for infection control. The goal of our study was to assess the risk of influx of MDROs from international patients to one of Central Europe's largest hospitals.

Methods

The study period was 1 year (6/2012-7/2013). All international inpatients with a history of a length of stay ≥ 48h in a hospital abroad during the last 14 days prior to admission to Heidelberg University Hospital (HUH) were screened (nasal, rectal, wound & stoma swabs). Swabs were inoculated on COS and chromogenic plates. Identification and susceptibility-testing was performed by MALDI-TOF and VITEK2, respectively. Resistance genes were confirmed by PCR. MDR Gram-negatives (GN) were classified as multidrug-resistant (MDR) and extensively drug-resistant (XDR) according to Magiorakos et al. (CMI 2011). HUH is one of Germany's largest hospitals with 2,000 beds and 90,000 in-patients per year. The profile of HUH maybe representative of other large Central European hospitals and was used as a proxy indicator.

Results

Eighty-four of 406 patients (20.7%) were colonized with MDROs (MRSA [3.7%], VRE [2.2%] or MDR-GN [14.8%)) (Table 1). Sixty-seven were colonized with only one bacterial species (79.8%), while 17 were colonized with two or more different MDROs (20.3%). Approximately one third of all patients (n=26/84; 31%)) were not only colonized, but also infected upon admission. The most frequent infections were wound and urinary tract infections accounting for 38.5% each. The most frequent MDROs causing infections were 53.8% MDR-GN (n=14/26), 19.2% XDR-GN (n=5/26), 19.2% MRSA (n=5/26), and 7.7% VRE (n=2/26).

Conclusion

Our data show that a large proportion of international patients are colonized with MDROs, mainly with MDR and XDR-GN (71.4%; n=60/84), which carried a variety of carbapenemases including OXA, VIM, KPC and NDM. In addition, infections with MDROs occurred in approximately one-third of all colonized patients. The introduction of MDR-GN to European hospitals from outside of Europe appears to be a much greater problem than the introduction of MRSA and VRE.

Table 1: MDRO among international patients; data are No. (%)

Species		MDR-GN	XDR-GN	VanA/VanB	Carbapenemase in XDR-GN
Escherichia coli	43 (41.3)	40 (64.5)	3 (23.1)		1none; 1 NDM-1; 1KPC
MRSA	19 (18.3)				
Klebsiella pneumonia	18 (17.3)	14 (22.6)	4 (30.8)		2 none; 1 NDM-1; 1OXA-48
VRE	10 (9.6)			6/4 (60/40)	
Pseudomonas aeruginosa	5 (4.8)	3 (4.8)	2 (15.4)		none
Acinetobacter baumanii	3 (2.9)	0 (0)	3 (23.1)		3 OXA-23
Enterobacter cloacae	3 (2.9)	2 (3.2)	1 (7.7)		1 VIM-4
Proteus mirabilis	2 (1.9)	2 (3.2)	0 (0)		
Klebsiella oxytoca	1 (1.0)	1 (1.6)	0 (0)		
Total	104 (100)	62 (100)	13 (100)		