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Short Communication

Low Percentage of Asylum Seekers Colonized with Multi-Resistant Bacteria Treated at a German Hospital

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Abstract

To assess whether asylum seekers show increased colonization risk for methicillin resistant *Staphylococcus aureus* (MRSA) and multi-resistant Gram negative bacteria, approximately 100 patients treated at the hospital in Ingolstadt between February and August 2015 were examined for colonization frequency. Four patients (4.2%) were MRSA positive. Eight patients (8.1%) were colonized by *E. coli* exhibiting extended spectrum beta-lactamase activity, a percentage similar to that of German ambulatory patients. In summary, the percentage of asylum seekers colonized with multi-resistant bacteria was low eliminating the necessity of general screening measures at hospital admission.

Keywords: Asylum Seekers, *Escherichia coli* with Expanded Spectrum Beta-Lactamase Activity (ESBL), Methicillin-Resistant *Staphylococcus aureus* (MRSA) in Humans

Introduction

The Robert-Koch-Institute (RKI) is a department of the German ministry of health (RKI). The Commission of Hospital Hygiene and Infection Prevention (KRINKO) of the RKI recommends the screening of patients with increased colonization probability for methicillin resistant *Staphylococcus aureus* (MRSA) or multi-resistant Gram negative bacteria (MRGN), e.g. Gram negative bacteria exhibiting extended spectrum beta-lactamase activity (ESBL) during hospital stays at German hospitals. The KRINKO defines Gram negative bacteria as 4-MRGN or 3-MRGN when showing resistance to four or three of the following antibiotic groups, respectively: Acylureidopenicillins (indicator antibiotic: piperacillin), cephalosporines of the 3rd generation (ceftriaxone/cefotaxime), carbapenems (meropenem), and quinolones (ciprofloxacin) [1]. Patients with 3-MRGN must be isolated in haemato-oncologic and intensive care units (ICU), while patients with MRSA and 4-MRGN should be isolated in all sections of a hospital [1,2].

In addition to several unambiguous risk factors, background of a country with increased rates of bacterial resistances should prompt screening of patients for MRSA and MRGN colonization. Many of the asylum seekers coming to countries of the European Union emerge from developing countries where percentage rates of MRSA and MRGN are unknown.

In the present study, asylum seekers treated at the hospital of Ingolstadt were examined for increased colonization risk. These patients were screened for nasal colonization with MRSA and for rectal colonization with MRGN or vancomycin-resistant enterococci (VRE). In addition to MRGN, rectal samples were also examined for the presence of Gram negative enterobacteria exhibiting ESBL.

Patients and Methods

The hospital of Ingolstadt is a tertiary care hospital with about 1,200 beds. The city of Ingolstadt is located in central

Bavaria (South-Eastern Germany). At present there are three local quarters for asylum seekers in our region. However, within the observation period only two of them were working: A quarter for about 500 persons is located in the Southern part of the town in a distance of about 15 km from the city centre. The buildings of the quarter formerly have been barracks for the German army. The second quarter exhibits a capacity for about 300 persons and consists of various portakabins. It is located near the football stadium of the FC Ingolstadt 04 in the eastern part of the town in a distance of about 6 km from the city centre. The occupancy rate of the quarters is fluctuating. Infection prevention program is supervised by the local health authorities.

Asylum seekers were identified by their address and by their health insurance (social welfare department). From each asylum seeker treated at our hospital a nasal swab was taken to detect MRSA colonization. Furthermore, two rectal swabs were examined to identify colonization with ESBL / MRGN or VRE.

Bacterial identification

Initially, bacterial swabs were grown on culture plates containing selective agar. Species identification and antibiotic resistance was determined with the Vitek 2 compact (BioMerieux, Nürtingen, Germany) by using appropriate Vitek 2 identification (ID) and antibiotic susceptibility testing (AST) cards [3].

Nasal swabs were smoothed over MRSA ID-Agar (BioMerieux, Nürtingen, Germany) [4] and the plates were cultured for 48 h. Bacteria from characteristic colonies were initially examined by using the Pastorex Staph Plus kit (BioRad, Munich, Germany) [5] and PBP2a Culture Colony Test (Alere, Cologne, Germany) [6] and subsequently analyzed in the Vitek 2 with the GP ID and the AST-P580 card. Presence of Pantone-Valentine Leucosidine gene (*pvl*) was examined by performing Staphylococcus GenoType PCR (Hain Lifescience, Nehren, Germany) [7].

VRE were cultured on Brilliance VRE agar (Oxoid, Wesel, Germany) [8] and identified in Vitek 2 with the GP ID and the AST-P586 card. Vancomycin resistance was confirmed by determining minimal inhibitory concentration (MIC) with vancomycin Etest (BioMerieux, Nürtingen, Germany). MIC \leq 2 mg/l was considered as susceptible.

Multi-resistant Gram negative bacteria (MRE) were grown on Gram agar plates divided into halves (Oxoid, Wesel, Germany). A half of these plates contained Brilliance ESBL agar (Oxoid, Wesel, Germany) [9] and the other half Brilliance CRE agar for identification of carbapenem resistant Gram negative bacteria [10]. Bacteria from suspicious colonies were cultured on MacConkey agar and subsequently examined in Vitek 2 using GN ID card and Enterobacteriaceae AST-N233 or *Pseudomonas*

aeruginosa AST-N248 card. Presence of ESBL was identified by performing double synergy test using cephalosporine containing discs (MAST Diagnostica, Rheinfeld, Germany) and Etest stripes (BioMerieux, Nürtingen, Germany) with and without clavulanic acid.

Results

Table 1 shows the characteristics of 108 asylum seekers treated at the hospital of Ingolstadt between February 4th and August 13th in 2015. The majority of patients (N=94) was male (87.0%), median age of male patients was 25 years. Median age of 14 female patients (13.0%) was 32 years. The majority of 63 patients came from Africa (58%). Forty patients (37%) had an Asian background while four patients came from Europe (4%). The national background of a patient (1%) remained unknown.

Ninety-nine of the 108 patients had been examined for colonization with MRGN / ESBL, 98 for colonization with VRE and 96 patients for MRSA colonization. Neither 4-MRGN nor VRE was discovered. MRSA was isolated from four patients (4.2%) and ESBL from eight patients (8.1%). Six ESBL were *E. coli* 3-MRGN (6.1%). Two further *E. coli* ESBL were susceptible to ciprofloxacin and therefore did not meet the criteria of 3-MRGN. Neither ESBL colonized patient was infected. As shown by Table 2 all patients colonized or infected with MRSA, 3-MRGN or ESBL were male. Median age of ESBL colonized patients was higher than that of MRSA colonized / infected patients (34 vs. 23 years).

While MRSA screening analyses of three patients were positive, screening result of patient 4 was negative (Table 2), although the patient suffered from crusted scabies superinfected by *pvl* positive MRSA indicating infection of community acquired MRSA (c-MRSA). Moreover, patient 1, suffering from a MRSA caused scrotal abscess, was also affected by c-MRSA. By contrast, two patients were MRSA colonized but not infected.

Table 1. Characteristics of asylum seekers treated at the hospital of Ingolstadt between February 4th and August 13th 2015

Country	Number of Patients (N)			Median Age (Years)		
	All Patients (%)	Male (%)	Female (%)	All Patients	Male	Female
Eritrea	21 (100)	18 (86)	3 (14)	23	23	30
Syria	20 (100)	17 (85)	3 (15)	36	36	36
Nigeria	16 (100)	13 (81)	3 (19)	32	29	35
Pakistan	14 (100)	14 (100)	-	29	29	-
Senegal	11 (100)	11 (100)	-	23	23	-
Somalia	12 (100)	10 (83)	2 (17)	21	21	22
Afghanistan	5 (100)	4 (80)	1 (20)	32	26	55
Congo	3 (100)	3 (100)	-	31	31	-
Bosnia	1 (100)	-	1 (100)	48	-	48
Jordan	1 (100)	1 (100)	-	25	25	-
Kosovo	2 (100)	1 (50)	1 (50)	37	44	30
Romania	1 (100)	1 (100)	-	21	21	-
Unknown	1 (100)	1 (100)	-	19	19	-
Sum	108 (100)	94 (87)	14 (13)	27	25	32

Table 2. Characteristics of asylum seekers colonized with multi-resistant bacteria. Neither of 105 examined patients was colonized by 4-MRGN or VRE. *Patients suffered from infection with pvl-gene positive MRSA.

No.	Admission	Age	National	Screening result for...		Diagnosis
	Date			Background	MRGN/ESBL	
1*	2015-04-14	22	Eritrea	Negative	MRSA	MRSA caused scrotal abscess
2	2015-04-10	50	Syria	Negative	MRSA	Cephalgia, infection
3	2015-05-29	21	Somalia	Negative	MRSA	Rheumatic fever
4*	2015-03-15	23	Eritrea	Negative	Negative	Crusted scabies, MRSA superinfection
5	2015-05-12	25	Jordan	ESBL / 3-MRGN	Negative	Cephalgia, nausea
6	2015-07-22	31	Congo	ESBL / 3-MRGN	Negative	Acute abdomen
7	2015-07-16	29	Nigeria	ESBL / 3-MRGN	Negative	Fever, infection, suspected meningitis
8	2015-05-22	19	Syria	ESBL / 3-MRGN	Negative	Infectious tuberculosis
9	2015-03-24	36	Nigeria	ESBL / 3-MRGN	Negative	Hydrocele testitis
10	2015-07-21	37	Pakistan	ESBL / 3-MRGN	Negative	Acute urinary retention
11	2015-07-22	41	Syria	ESBL	Negative	Suspected infectious tuberculosis
12	2015-08-03	37	Syria	ESBL	Negative	Acute abdomen

Discussion

To study whether asylum seekers exhibit a high risk of colonization with multi-resistant bacteria, asylum seekers treated at our hospital were examined for colonization with MRSA, ESBL and VRE. In total, the percentage of asylum seekers infected / colonized with these bacteria (MRSA, MRGN / ESBL) was relatively low, eliminating a general screening necessity. In total 8.1% of the asylum seekers carried ESBL. The percentage is very similar to that reported for German ambulatory patients. In 2010 8% of *E. coli* had been ESBL [11]. A similar ESBL value was obtained (7.1%) in a more recent study examining *E. coli* causing urinary tract infections in ambulatory patients from Germany, Spain, and Belgium [12]. Among ESBL neither isolate was a so-called 4-MRGN requiring contact isolation outside ICUs and haemato-oncological wards confirming the conclusion that general screening of asylum seekers for MRGN is not indicated in our setting. Neither patient was colonized with VRE, also excluding eliminating the necessity of VRE screening.

MRSA was identified in 4 of 96 patients (4.2%). One of the patients suffering from MRSA infection showed a negative screening result. Therefore, only three MRSA patients (3.1%) exhibited MRSA in nasal screening swabs. Due to this low percentage there is also no indication for general MRSA screening of asylum seekers.

In a previous study, MRSA was isolated from Albanian inhabitants of a Danish refugee centre although screening cultures from the same patients performed 14 months earlier had been negative [13]. That finding indicates acquisition of MRSA when staying at the refugee center. Therefore, repetition of MRSA screening after an appropriate time, e.g. 12 months, might be rational to assess whether MRSA frequency has increased in asylum seekers in our region.

Two *pvl* positive MRSA were observed. Previously, an asylum seeker centre with 232 inhabitants in Northern Germany was examined for colonization with *pvl* positive MRSA after a resident suffered from furunculosis caused by *pvl* positive MRSA [14]. In that analysis two further asymptomatic patients were identified. Therefore, the actual number of asylum seekers colonized with *pvl* positive MRSA might be higher. However, we did not receive any further information from the local health authorities whether *pvl* positive MRSA has spread among asylum seekers in our region.

A further limitation of the present study is that it is not clear whether patients treated at the hospital of Ingolstadt are representative of the total population of asylum seekers sheltered in our region. This information might be helpful in recognizing patients with an increased probability of becoming ill and to develop appropriate prevention strategies. However, there was also no reply from the local health authori-

ties to our request for the national background of asylum seekers allocated to the city of Ingolstadt.

Finally, infection rates may vary among certain subgroups of asylum seekers. In a recent study from the Netherlands the prevalence of HIV infection was significantly higher in female asylum seekers originating from sub-Saharan Africa than in female asylum seekers from other regions of origin [15]. On the other hand, polio wild type virus were not found in stool samples from Syrian asylum seekers although a recent outbreak had occurred this region, highlighting the necessity to monitor infectious diseases in various populations of asylum seekers [16,17].

Conclusion

The present analysis shows that the rate of asylum seekers colonized with multi-resistant bacteria in our region is relatively low at present and there is no reason to assume threat to the local population.

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