The Colonization and Infection Relationship in Hospitalized Patients at Intensive Care Unit

* Fadimana ÇATAL	Özer AKGÜL	Burcu SAPMAZ
T.C. Ministry of Health, Antalya Atatürk State Hospital, Department of Medical Microbiology, Antalya, Turkey. * * Corresponding Author	Üsküdar University, Vocational School of Health Services, Istanbul, Turkey.	Nişantaşı University, Vocational School, Istanbul, Turkey.

Turgut ÇATAL	Ömer Faruk KARASAKAL
T.C. Ministry of Health, Korkuteli State Hospital, Department of Anaesthesiology and Reanimation, Antalya, Turkey.	Üsküdar University, Vocational School of Health Services, Istanbul, Turkey.

Erhan ÖZYURT	Özlem Koyuncu ÖZYURT
T.C. Ministry of Health, Antalya Atatürk State Hospital, Department of Anaesthesiology and Reanimation, Antalya, Turkey.	Akdeniz University, Department of Medical Microbiology, Antalya, Turkey.

ABSTRACT In intensive care units (ICU) identified colonization in hospitalized patients will play an important role in the propagation of the infections and the development factor of infection. In our study, we aimed to find the colonization in patients during the ICU hospitalization, the risk to determine colonization and relationship with infection. For this purpose, colonization samples taken first 48 hours and examined in between 95 adult patients ICU hospitalized. Even, none of the cases with MRSA colonization, concluded in 4 (4.2%) cases VRE, in 16 (16.8%) ESBL-producing E. coli or Klebsiella spp, in 26 (27.3%) Pseudomonas aeruginosa, in 6 (6.3%) Acinetobacter spp, in 20 (28,4%) Candida sp. colonization was determined. In 20 cases polimicrobial colonization (21%). In the light of these findings, comprehensive researches are needed to evaluate the correlation of intensive-care unit (ICU)-infection and colonization.

Introduction

Hospitalized patients in the intensive care unit (ICU) account for less than 5-10% of hospitalized patients. But ICU patients constitutes 40% of nosocomial pneumonia and bacteremia. In addition, 25% of all nosocomial infections developed in the ICU. Comorbidities, severity of disease, ICU type, length of stay in the ICU, the number of invasive procedures, type of patients hospitalized in the many reasons due to the ICU, such as duration, is located within the high-risk population for hospital infection development [1, 2]. These units are often encountered with infections caused by resistant microorganisms and treatment of these infections is an important issue [3].

Nowadays Methicillin-resistant *Staphylococcus aureus* (MRSA), Vancomycin-resistant Enterococci (VRE), Extended-spectrum beta-lactamase (ESBL) producing of *Escherichia coli* and Klebsiella spp., Acinetobacter spp. ,*Pseudomonas aeruginosa* and Candida species are responsible for nosocomial infections caused by the use of antibiotics and antifungal agents in ICU, which creates management problems and outbreaks of these resistant microorganisms.[4].

The relationship between development of infection in the ICU with colonization of the patient during the hospitalization has not been fully determined. Infection in the ICU often earned during hospitalization and how it affects the prognosis of patients with colonization is also a discussion of other issues [5].

In our study, we study the hospitalized patients in ICU for problematic microorganisms colonization at admission in ICU, and aimed to determine whether the patient's colonization is an active infection agent or not in the ICU time and we also aimed to determine which patients and which microorganisms in the direction of that they are risky.

Material and methods

Our study was carried out in 13 surgical and internalbeds serving as an ICU. A total of 893 patients hospitalized in 2009. All patients older than 18 years admitted to the unit during the study period were evaluated. After receiving approval from patients surveillance cultures studied and filled out a form with standard information. All patients, the latest within 48 hours, to search colonization mouth/throat swab, skin swab (with pool method: first the left and right armpit then with the same swab left and right inguinal region) and rectal swab samples were taken. Taken samples from ICU hospitalized patients were evaluated as shown in Table 1. Data were analyzed by Student's t and chi-square tests using SPSS.Statistical significance limit ($p < 0.05$) was determined.

Table 1.Samples, mediums and pathogens.

Samples	Mediums	Pathogens
Mouth/throat Swab	Chromogenic agar, Sabaroud dextrose agar	Gram-negative bacteria and Candida species were performed.
Rectal Swab	Chromogenic agar, Sabaroud dextrose agar, VRE agar, VRE broth	Gram-negative bacteria, Candida species and VRE were performed.

Skin Swab	Chromogenic agar, Sabaroud dextrose agar	Gram-negative bacteria and Candida species were performed.
Nose Swab	Blood agar	MSSA was performed.

Results

A total of95 patients were included in the study. 57/95 were male (%60), 38/95 (%38) were female, mean age was 62.3, average number of days in the intensive care unit was 9.1 and the mean APACHE II score was 22.7. General colonization was observed in 54 (57%) patients. The rate of colonization in patients from community was 9/15 (60%), from other service was 36/62 (58%) and from the other hospital was 9/18 (50%), respectively.

Colonization in case it usually colonizes the determining factors wasn't involved in clinical samples and wasn't found to be the agent of infection. Reproduction of *P. aeruginosa* was detected in clinical samples as merely three of pneumonia. Significant growth is detected in seven of eight patients with *P. aeruginosa* colonization of the mouth and working on endotrakeal aspirat been interpreted as an example of possible contamination or colonization. Number of colonized patients and the locations of colonization are shown in Table 2.

Table 2.Anatomic distribution of the pathogens in colonized patients.

Microorganism	Number of Colonized Patients	Locations of Colonization
MRSA	0	-
VRE	4	4 (Rectal)
ESBL (+) *Escherichia coli* & Klebsiella spp.	16	11 (Rectal)
Pseudomonas aeruginosa	26	16 (Oral)
Acinetobacter spp.	6	4 (Skin)
Candida spp.	27	20 (Oral), 19 (Skin), 16 (Rectal)
Polimicrobial	20	-

Discussion

More than 70% of hospital infections are estimated to occur with multiresistant microorganisms. These infections increase the morbidity and mortality and patients with infections caused by resistant microorganisms causes restrictions on antibiotic treatment [6]. More invasive procedures performed in intensive care units and long-term hospital admissions for infectious pathogens, creating a high risk of bacterial colonization, causing favorable conditions for infection and propagation. Around developing common nosocomial infections is the most cause of morbidity and mortality. MRSA, VRE, and Gram-negative bacilli and, Candida are common pathogens and outbreaks occurring with this organism have been reported. Multiresistant microorganisms for the prevalence and prevention of dissemination activities, management consultation, personnel training, appropriate antibiotic use, targeted multiresistant microorganisms surveillance, the implementation of infection control measures, the patient care environment, environmental measures, such as supplies of cleaning and disinfection, a range that includes the decolonization treatment when appropriate requires approach [7].

ICU in the study in 2000, 18 from communities and 28 from other hospitals and others (54 individuals) from other services in a total of 100 patients was investigated for colonization. For this purpose, taking nose and throat cultures were studied. In this study there was a significant

57% in colonization. In this study colonization identified from 22.2% in the community, 59.2% in hospitals 75% in other hospital and the use of antibiotics and pre-hospital length of stay before in intensive care was defined as significant risk factors. The factors that were determined include 4 MRSA, 2 imipenem-resistant *A. baumannii*, ESBL-producing Klebsiella spp. [8]. After the lapse of ten years in this study conducted a more thorough they have been total colonization rate was 57% , colonization rate of patients from community 9/15 (60%), from other service 36/62 (58%) and from other hospitals 9.18 (50%), respectively.

MRSA carriage often a problem that has been raised. The highest rate was detected in nasal colonization, armpit and inguinale collonization follows this. In our country, Sancak et al. [9] studied nose, throat, axilla and perineum culture for MRSA colonization patients in ICU, MRSA colonization rates was found to be 33.3%, and in colonized patients the nasal carriage 67.4% of patients. Given that the nose of the detected anatomical regions where the most intensive colonization of different studies, it was reported that 85% of carriers can be identified by cultures of this region [10].

Marshall et al, in which the work done by 11.4% of patients admitted to ICUs become colonized with MRSA, that colonized 18 from 63 patients (29%) developed infection [11]. Theker et al. in another study conducted by the ICU; 305 patients, including 19 of the 97 colonized with MRSA on admission and 56 episodes of the MRSA infection was observed in 53 patients which are colonized with MRSA [12]. In our study, only nose culture studied for MRSA colonization and in the hospitalization any patient detected colonized with MRSA. Nevertheless detection of MRSA in the unit nasal carriage outside the house may or may suggest the spread of infected patients or carrier personnel from the unit.

What it did not reveal which patients should be investigated as colonization. Among the determining factors to point to a risk unit (multi-drug resistant organisms, a high proportion of available ICU), the antibiotic history, underlying diseases, other multi-drug exposure in contact with organisms resistant patients, lately hospitalization history or patients at home have received nursing care services countable. However, when it is appropriate and what is not certain that the occurrence of the need for this study [13]. In our study, immediately on admission (first 48 hours) at the time of taking the samples and we aimed to determine the status of admission policies that can be implemented rapidly isolation likely. However, antibiotic use, and hospitalization risk factors as may seem particularly useful in polimicrobial colonization estimate could not be identified statistically significant risk in our study. The possible causes of this situation; serve as a center forward, especially hospitals, may actually come from those who monitored the patients are chronically ill from society. High average age (62.5), last year hospitalization history (79%) is much of which the number of patients and the presence of diagnosis about 30% cases of malignancy emerges as evidence to explain this situation.

In conclusion, this study ICU emerged as a factor in admission colonization at ICU that infections detected and identified did not affect mortality. In the light of these findings, comprehensive researches are needed to evaluate the correlation of intensive-care unit (ICU)-infection and colonization.

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