The use of central venous catheters (CVC) carries a risk from local and systemic infectious complications, with prevalence of 6% in patients in Intensive care unit. Microorganisms colonizing the CVC usually originate from patient's or staff member's skin, but the source can also be a contaminated infusion solution or hematogenous dissemination from a distant focus. The infective agents often show increased resistance to antibiotics, which is an additional therapeutic problem. There is no knowledge of the frequency of the colonization of CVC by microorganisms in hospitals in Bosnia and Herzegovina, neither of the types of microorganisms which usually colonize CVC, nor their sensitivity to antimicrobial agents. Methods During the period 2004-2008, the analysis of 188 CVC samples was performed in patients in ICU at which the doubt for CVC connected infection was present. The microorganism identification was performed by standard microbiological antibiotics sensitivity methods. Results Out of 188 checked samples, 101 (54%) had positive cultures and 87 (46%) were sterile. Out of 101 positive microbiological cultures, in 33 (32.67%) the gram-positive bacteria had been found, gram-negative in 62 (61.37%) and Candida albicans in 6 (5.94%) cultures. Gram-negative bacteria were 93.55% sensitive to imipenem, and Gram-positive bacteria were sensitive to vancomycin. Conclusion Gram-negative bacilli and Coagulase-negative staphylococci are the most frequent micro-organisms which colonize the CVC. The increase of bacteria antibiotics resistance represents a big problem. All those facts leads to the need for bigger control and supervision over the CVC implantation, its proper maintenance and rational use. Key words: central venous catheter, the frequency of microorganism colonization, antibiotics sensitivity.

1. INTRODUCTION
Central venous catheters (CVC) are essential in everyday medical practice, especially in intensive care units (ICU). Although such catheters are necessary to provide vascular access, their use carries a risk of infectious complications such as local infection on the insertion site, sepsis, septic thrombophlebitis and other metastatic infections. CVC related infections cause about 10-15% of nosocomial infections, which as a consequence has a considerable increase of morbidity and mortality, including the prolongation of days spent in hospital and the increase of costs (1).

Microorganisms colonizing the CVC mostly originate from patients or staffs skin flora, but the source can also be a contaminated infusion solution or hematogenous dissemination from distant foci such as lungs and urinary tract (2, 3). Colonization of the CVC can be extraluminal-al or intraluminal. If the CVC’s is left in place for less than 10 days, the extraluminal colonization occurs by bacteria from a patient’s skin at insertion site. If the CVC’s are left in place for a longer period (more than 10 days) the intraluminal colonization of catheter caused by microorganisms from staff’s skin, often occurs. It is well known that some microorganisms such as Staphylococcus aureus, coagulase-negative Staphylococci (CNS), Pseudomonas aeruginosa have the ability of adherence to catheters and creating biofilm which protects them from the host defense and antibiotics (4). As these infections occur in hospitals, the causative agents often show the increased resistance to antibiotics, which is an additional therapeutic problem. CVC-related infections are mostly manifested as bacteremia or fungemia, because the microorganisms can migrate from the biofilm surface to the bloodstream. In case of sepsis, there is a great possibility for central venous thrombosis (5). To all knowledge there is limited data about the frequency of the colonization of CVC as well as types of microorganisms and patterns of their resistance in hospitals in Bosnia and Herzegovina.

2. MATERIALS AND METHODS
A retrospective study of microbiological analyses of CVC was done in patients treated in ICU at the Department of Anesthesiology and Reanimation of UCC Tuzla, within the period from 1 January 2004 to 31 December 2008. The data about the type of identified organisms and the resistance for the most frequent isolates were collected.

The multiluminal CVC’s (Certo fix duo/trio. Braun, Germany) were inserted in all patients, through well-es-
tablished surgical procedure i.e. in subclavian vein. Removal or replacement of CVC was performed in accordance with indications (averagely after 15-20 days or earlier in case of infection or CVC damage), in patients with clinically positive signs of sepsis or local signs of inflammation at catheter insertion site.

After removal of the catheter, the tips of CVC, about 5cm in length, were sent to micro-biology laboratory. The tip of CVC was examined with standard microbiological method by the qualitative culture of catheter. The tip of the CVC catheter was cultured in 10 ml of heart infusion bouillon up to 48 hours on 35 C. In the case of positive growth, the tip of CVC was examined with standard microbiological method by the qualitative culture of catheter. The tip of CVC was sent to micro-biology laboratory. The tips of CVC, about 5cm in length, were cultured on blood agar on 35 C. In the case of positive growth, the culture of catheter was found to be positive.

3. RESULTS

A total of 188 CVC were microbiologically examined during the period of 2004-2008. Out of 188 CVC, 101 (53.72%) samples were culture positive; in 87 (46.28%) samples cultures were sterile.

Out of positive cultures, Gram-negative bacteria were isolated in 62 (61.37%) samples and Gram-positive bacteria were isolated in 33 (32.69%). Candida albicans was isolated in 6 (5.94%) samples. The most frequently isolated microorganism was CNS, found in 22 (21.8%) samples, followed by: Pseudomonas aeruginosa in 19 samples (18.81%), Acinetobacter spp. in 13 samples (12.87%), Proteus mirabilis in 12 samples (11.88%), Klebsiela pneumoniae in 10 samples (9.90%), Serratia marcessens in 8 samples (7.92%), Staphylococcus aureus in 7 samples (6.93%) and Enterococcus fecalis in 4 samples (3.96%) (Table 1).

The data about antimicrobial sensitivity of isolated bacteria were collected. For Gram-positive bacteria the following group of antibiotics: oxacillin, aminopenicillins, quinolones, aminoglycoside, the third generation cephalosporins, carbapenem and trimetoprim/sulphametoxasol. (Table 2)

Out of total number of Pseudomonas aeruginosa strains, four of them were resistant to car-bapenem (imipenem), while all strains of Acinetobacter and Gram-negative enterobacteria were sensitive to carabapenem (Table 2).

All Gram-positive cocci were sensitive to vankomycin. Among strains of CNS, 77.3% were resistant to methicillin. All Staphylococcus aureus aureus strains were methicillin resistant (Table 3).

4. DISCUSSION

Intravascular catheters have a significant role in ICUs for medicine application and fast liquid and electrolyte compensation and for measuring the central venous pressure. Considering their frequent use and the possibility of their colonization with different types of organisms, they represent a significant cause of morbidity and mortality in these patients (6). Colonization of CVC with microorganisms is one of the main risk factors for the occurrence of CVC-related infection. Isolation of microorganisms from CVC segments indicates the colonization of a catheter itself. To diagnose the infection, besides quantitatively positive culture, the presence of clinical infection signs is needed. In the case of sepsis related to CVC, the same type of organism must be cultured from blood and from catheter.

The time length of catheterization influences to the catheter colonization risk and the occurrence of numerous complications (7). In our study, the colonization of CVC was found in 101 catheter samples (53.72%). There are different data on the incidence of microbial colonization of CVC in different studies and they range from 5%-70% (8). Multiluminal catheters are related to the lower infection risk. They have a subcutaneous part 5-10 centimeters long, increasing the length between the skin and the bloodstream and lowering the possibility of infection (9). Skin colonization at the insertion site has an important role in catheter colonization and CVC related bloodstream infection (10).

The most frequent microorganisms colonizing CVC were CNS, in 21.8% cases. In addition, different Gram-negative bacilli (61.37%), Staphylococcus aureus (6.93%), Enterococcus fecalis (3.96%), Candida spp (5.94%) were isolated. The most frequent organisms that colonize CVC and cause infection, reported in the literature, are CNS, Staphylococcus aureus, Candida spp and Gram-negative bacilli (11). Our study also confirmed these findings. These
isolates were present in over 96% samples in our study. The sensitivity testing to antimicrobial showed that Gram-negative bacteria were mostly sensitive to imipenem (93.55%), while all Gram-positive isolates were sensitive to vancomycin.

Although overall resistance of Gram-negative bacilli to imipenem was not high (6.45%), the finding of resistant strains of Pseudomonas aeruginosa must warn Infection control team to take more effective actions in prevention transmission of intrahospital bacterial resistance.

Knowing local microbial flora that colonize catheter can be useful for empirical treatment prior we get final microbiology results. On the other side, monitoring of catheter colonization can be used as the indicator of implementation of guidelines for insertion and care main-tenance of catheter as well as prevention measures.

Recommendations for the therapy of Catheter-related infections are different, depending on the catheter type, patient’s clinical picture, preceding illness and potential infectious agent. If there is suspicion on CVC-related infection, the patient’s clinical picture is taken into consi-deration, and catheter is removed only when infection is diagnosed. According to some research only 15%-20% of removed CVC due to suspicion to the infection, were significantly colonized (12). Antibiotic therapy for CVC related infection is prescribed according to the antibiotic susceptibility testing, lasting usually 10-14 days. In the case of complications anti-biotics should be given for 4 weeks. It is important to emphasize that Gram-negative orga-nisms can be very often transmitted through contami-nated infusion solutions, so the prepara-tion and application of such solutions is very important (13).

The recommended empiric treatment in hospitals with higher incidence MRSA and me-thycilin resistant CNS would be vancomycin. The third and fourth generations of cephalo-sporin

are recommended for Gram-negative bacteria and Pseudomonas strains, but increasing resistance can cause fail in treatment. If there is suspicion to fungemia, amphotericin B or fluconazole is recommended.

In our study, the resistance of Gram-negative bacteria to third generation cephalosporin was almost 50%, indicating to probably existence of expanded spectrum beta lactamase in these strains. The data about the most common infectious agents and their antimicrobial resistance pattern in the hospital environment are very important to monitor mechanisms of developing antimicrobial resistance and spreading of resistant strains in the hospital.

The results of this study point to the need for the intensified control of intravenous catheters colonization prevention measures in surgical intensive care units. Prevention of CVC related infection includes general measures for prevention infection, measures for the stopping of development anti-microbial resistance and monitoring of incidence of infection. In order to decrease CVC colonization and CVC related infection it is very important that specialized staff is educated for proper catheter placement and the adequate catheter maintenance. Staff must be also skilled to recognize as soon as possible CVC related sepsis, which requires removal of such catheter and administra-tion the antibiotic therapy.

According to the obtained results it can be concluded that there is high level of Gram-negative bacteria and CNS colonization of CVC’s in surgical intensive care units. High prevalence of antibiotic resistant bacteria is a big concern for ICU. All those things refer to the need for stronger control and monitoring of CVC insertion, its proper maintenance and rational use of antibiotics.

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REFERENCES