Microorganisms isolated from ICU patients with hospital-acquired infections: Findings from a six-month study in Zanjan, Iran”

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Abstract

Introduction: Hospital-acquired infections (HAIs) are among the most important health and treatment challenges in healthcare systems. These infections, which appear after 48 hours of hospitalization, are a major cause of increased disease burden, healthcare costs, and mortality in hospitals. Intensive care units (ICUs), due to the specific conditions of admitted patients including underlying diseases, impaired immune function, and extensive use of invasive devices are recognized as the main foci for the occurrence and spread of HAIs. Multiple reports have shown that the incidence of HAIs in ICU patients is several times higher than in other hospital wards, highlighting the necessity of continuous monitoring of microbial patterns in these units. This study aimed to investigate the prevalence and diversity of microorganisms isolated from cultures of patients admitted to the ICU of Vali-Asr Hospital, Zanjan, during the first six months of 2023.
Methods: The study population included all ICU patients diagnosed with hospital-acquired infections at Vali-Asr Hospital, Zanjan, during the first half of 2023. This retrospective study was conducted using patient records. A total of 470 patients were included. Microbiological cultures were performed on blood, urine, wound specimens, and body fluids (including cerebrospinal fluid, pleural fluid, joint fluid, and respiratory secretions such as sputum) to identify causative pathogens. The results of microbial cultures were categorized as Gram-negative bacilli, Gram-positive cocci, yeasts, or normal flora.
Results: A total of 470 patients, with a mean age of 66.98 years, were enrolled. The mean length of ICU stay was 12.47 days. Blood cultures revealed 1.5% Gram-positive cocci. Urine cultures showed 12.2% Gram-negative bacilli and 11.4% yeasts. Wound cultures identified 6% Gram-positive cocci and 1.5% Gram-negative bacilli. Cultures from body fluids predominantly yielded Gram-negative bacilli (58.3%). Infections caused by Gram-negative bacilli tended to occur later compared to Gram-positive cocci in urine and wound cultures. No significant association was observed between length of ICU stay and the type of isolated organism.
Conclusion: The patterns of occurrence and prevalence of Gram-negative bacilli and Gram-positive cocci in HAIs are of considerable importance. In this study, Gram-negative bacilli accounted for a larger proportion of isolates in respiratory secretions and urine samples and were mostly identified as late-onset pathogens. Conversely, Gram-positive cocci were more common in blood cultures and associated with early-onset infections. The temporal difference in the emergence of these two groups underscores the role of antibiotic selection pressure and hospital colonization. Understanding these patterns may provide valuable guidance for empirical therapy, infection control programs, and reducing mortality associated with HAIs.

Keywords: Gram-positive cocci, Gram-negative bacilli, culture, hospital-acquired infections, Zanjan

Reducing the psychological impact of quarantine during the COVID-19 pandemic in the elderly: Cognitive-behavioral therapy and aerobic exercise

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Abstract

Background and Aim :The COVID-19 pandemic was a devastating phenomenon and had a lasting psychosocial impact on the general population. Fear of contracting COVID-19, concern for others, uncertain future, and loneliness were significantly higher in older adults. Therefore, the present study aimed to determine the reduction of the psychological impact of quarantine during the COVID-19 pandemic in the elderly with cognitive-behavioral therapy and aerobic exercise.
Materials and Methods: The research method was a semi-experimental pre-test-post-test and one-month follow-up with a control group. The statistical population of this study consisted of elderly people over 60 years old with depression in Rafsanjan city in 1401. 30 people were randomly assigned to two groups (experimental and control). The experimental group was exposed to 8 sessions of cognitive-behavioral therapy and aerobic exercises. Data were collected using the Depression-Anxiety-Stress Questionnaire (DASS-21) and analyzed using the analysis of covariance method with the Spss-21 software.
Results: The results showed that the mean scores of the two experimental and control groups in the pre-test and post-test were significantly different. Cognitive-behavioral therapy and aerobic exercises had a significant effect on psychological treatment (depression-anxiety-stress) of the elderly.
Conclusion: Due to their physical conditions, elderly people are more susceptible to diseases and mental problems than other groups. Therefore, in critical situations, the situation of these people should be assessed and therapeutic and psychological measures should be taken according to their conditions.
Keywords: Cognitive-behavioral therapy, aerobic exercise, elderly, COVID-19

Characterization of Staphylococcus aureus carriage among asymptomatic individuals in Tehran during 2023

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Abstract

Background: *Staphylococcus aureus* makes an asymptomatic constituent of the human natural bacterial microbiota, yet under favorable conditions can cause a number of local and invasive infections, such as skin and soft tissues, pneumonia, osteomyelitis or endocarditis. The recent increase in the incidence of staphylococcal infections has been associated not only with increasing resistance to many common antibiotics, but prevalent colonization as well. In this study we determined the prevalence of methicillin sensitive *S. aureus* (MSSA) and methicillin resistant *S. aureus* (MRSA) strains among nasal and oropharyngeal asymptomatic adult carries in Tehran, during 2023.
Materials and Methods: Sampling was carried out from nose and oropharynx of 283 asymptomatic healthy people in Tehran and samples were cultured on HiCrome Aureus agar plates. Suspected colonies to *S. aureus* were collected and identified at the species level using polymerase chain reaction (PCR) by specific primers for *nuc*A gene. The antibiotic susceptibility of confirmed strains to 16 antibiotics were assessed by the guidelines of clinical and laboratory standards institute (CLSI) and presence of *mec*A gene and different SCC*mec* types among MRSA strains was determined by separate PCR and multiplex-PCR assays, respectively. Moreover, another multiplex-PCR was employed for prophage typing of strains and all isolates were tested for presence of the *pvl* gene.
Results: A total of 79 suspected isolates (28%) were confirmed as *S. aureus*, in which 28 strains (35%) were resistant to methicillin and harbored *mec*A gene. the high rate of resistance to penicillin, erythromycin, ciprofloxacin, clindamycin, tetracycline and azithromycin was observed among MRSA strains and resistance to penicillin, tetracycline, ciprofloxacin, erythromycin and azithromycin was higher in MSSA strains. Totally, 4 different SCC*mec* types was detected among MRSA strains, in which 93 and 7% of strains were classified as hospital acquired- (HA-) and community acquired- (CA-) MRSA, respectively and SCC*mec* type III was the most prevalent type. Moreover, *S. aureus* strains carried 5 different prophage types (SGA, SGB, SGF, SGFa and SGFb) and prophage types SGF and SGFa were present in 100% of strains; and 3 & 6 prophage patterns were also identified among MRSA and MSSA strains, respectively, in which prophage pattern 3, consisted of SGF, SGFa and SGFb prophage types, was the most frequent one. Also, the frequency of *pvl* gene was 15% and restricted to strains with SGA prophage type.
Conclusion: The high prevalence of multidrug (MDR) resistant MRSA and MSSA strains with high potential to produce a variety of virulence factors among healthy people in Tehran, emphasized on the importance of investing in intensive surveillance of *S. aureus* in the community.
Key words: *S. aureus*, nasal and oropharyngeal careers, methicillin, SCC*mec* typing, prophage typing, Panton-Valentine leucocidin

The impact of the COVID-19 pandemic on the prevalence of circulating pneumococcal serotypes

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Abstract

The COVID-19 pandemic brought about major shifts in the epidemiological patterns of many respiratory infectious diseases. One such disease is caused by *Streptococcus pneumoniae* (*S. pneumoniae*), which plays an important role—especially in children and the elderly—in serious conditions such as pneumonia, meningitis, and sepsis. Following the global spread of COVID-19 and the widespread implementation of community health interventions (including social distancing, mask use, and school closures), the transmission patterns of respiratory pathogens like pneumococcus and invasive pneumococcal disease (IPD) changed significantly.

This article provides a comprehensive review of the impact of the COVID-19 pandemic on the overall incidence and serotype distribution of pneumococcus, analyzing the effects of public health measures, disruptions in vaccination, and changes in exposure to respiratory viruses. Although COVID-19 does not directly cause genetic changes in pneumococcal serotypes, it indirectly influences colonization and persistence of certain serotypes through alterations in mucosal immunity, disturbances in the natural microbiome, and shifts in transmission and social contact patterns.

Tuberculosis: The Major Challenge of the 21st Century in Investigating the Factors Influencing Prevalence and Drug Resistance

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Abstract

The discovery of streptomycin, the first effective drug for tuberculosis (TB), marked a milestone in the fight against infectious diseases. Over time, the integration of newer antibiotics into anti-TB regimens has saved millions of lives. However, despite therapeutic advancements, TB remains one of the leading causes of death from infectious diseases worldwide, with over 10 million new cases and 1.6 million deaths reported in 2021. Moreover, the COVID-19 pandemic has significantly impacted TB diagnostic and treatment programs, leading to increased disease incidence and reduced access to healthcare.

The rise of drug resistance, particularly multidrug-resistant TB (MDR-TB) and extensively drug-resistant TB (XDR-TB), poses a serious challenge to disease management. Nevertheless, the introduction of novel treatment regimens—including drugs such as bedaquiline, pretomanid, and linezolid—offers new hope for reducing adverse effects and improving treatment success. Innovative 6- and 9-month regimens, such as BPaL and BPaLM, with higher efficacy and fewer side effects, are currently under investigation and implementation.

This article provides a comprehensive overview of TB epidemiology, disease spectrum, the impact of COVID-19, the rise of drug resistance, and the introduction of novel therapeutic regimens, with a focus on resistance mechanisms and modern treatment approaches.

Keywords: Tuberculosis; Multidrug-resistant TB; Drug resistance; Epidemiology