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Background. In the Republic of Korea (ROK), protein conjugated vaccines (PCV13 and PCV10) in replacement of PCV7 have been used in children since 2010, and attributable mortality in childhood national infant immunization program (NIP) in 2014. This study investigated indirect effect of PCVs on serotypes in PCV-non-adult invasive pneumococcal disease (IPD) and its clinical implications.

Methods. A prospective observational cohort study was conducted, through the serotype surveillance program following the NIP implementation of 23-valent pneumococcal polysaccharide vaccine (PPV23) for elderly population (265 years) from 2013 to 2015. Clinical data and pneumococcal isolates from adult IPD patients (218 years) were collected from 20 hospitals. Clinical characteristics were compared between vaccine-serotype (VT) and nonvaccine-serotype (NVT) groups.

Results. Of a total of 319 IPD patients enrolled, 189 cases (59.2%) were available for serotypes. Among them, the proportion of PCV-naive cases was 95.9% (188/191) and 189 patients consisted of NVT (n = 64, 33.9%) and VT group (n = 125, 66.1%). Compared with the previous study in the ROK (2004–2010), the proportion of PCV13 serotype was decreased (8.3% vs. 37.6%, P = 0.001) and PPV23 serotypes were stationary (71.5% vs. 66.5%), but NVT serotypes were increased (23.4% vs. 33.9%, P = 0.033) in our study. The most common serotype was 3 (20.8%) and 34 (23.4%) in VT and NVT group, respectively. VT group had more bacteremic pneumonia (72.0% vs. 48.4%, P = 0.002). There was no difference in non-hospitalized pneumonia (KPN; 9.1%), coagulase-negative staphylococci (7.3%), and β-hemolytic streptococci (4.7%). Overall, 50.0% of isolates were Gram-negative bacilli (GNB) and 41.4% were Enterobacteriaceae (ENT). All SA were susceptible (S) to dalbavancin (MIC < 0.03 μg/mL), linezolid, and TGC.

Conclusion. Our study indicates that emerging and expanding NVT-IPD among adult patients could affect herd effect of widespread use of pediatric PCV. Further changes of IPD serotypes might occur and IPD serotypes should be monitored for developing better pneumococcal vaccination policy.

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1004. Frequency of Occurrence and Antibacterial Susceptibility of Bacteria Isolated From Patients Hospitalized With Bloodstream Infections in United States Medical Centers (2015–2017)
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Background. Bloodstream infections (BSIs) cause significant morbidity and mortality. A retrospective evaluation of the frequency and antimicrobial susceptibility of bacteria causing BSIs in the United States.

Methods. A total of 9,210 bacterial isolates were consecutively collected (1/5 patients) from 33 US medical centers in 2015–2017 and tested for susceptibility by Enterobacteriaceae (ENT). All SA were susceptible (S) to dalbavancin (MIC < 0.03 μg/mL), linezolid, and TGC. Further changes of IPD serotypes might occur and IPD serotypes should be monitored for developing better pneumococcal vaccination policy.

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1006. Demographic, Clinical, Microbiological Characteristics and Outcome of Patients Admitted to the Emek Medical Center with Blood Stream Infection Acquired in LTCF: A 5-Year Surveillance
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Background. Residents from long-term care facilities (LTCF) hospitalized with an acute infectious disease are challenging in terms of diagnosis and treatment, considering atypical clinical presentation is high rate of resistant bacteria. This study aimed to characterize patients with LTCF-acquired bacteremia (LTCF-B), epidemiology of blood cultures (BC) and potential risk for mortality.

Methods. A retrospective study of LTCF residents hospitalized with LTCF-B. Demographic, clinical and laboratory data were collected and analyzed using SPSS 22 and SAS.

Results. One hundred seventy-seven LTCF residents hospitalized in internal wards (21%) included, mean age 81.6 years, mostly completely dependent. 54.8% were males. Most frequent diagnoses was urinary tract infection (UTI), second by respiratory tract infections. Half were hospitalized during prior 6 months, one-third had a permanent indwelling urinary catheter. On admission, 70% had WBC blood count >10,000 cells/μL. The following path of BC: Gram-negative enterobacteriaceae (70%); E. coli 40% and Gram-positive cocci (21%); S. aureus 5.08% (55% of them MRSA). Extended-spectrum β-lactamase (ESBL) producing enterobacteriaceae were in 47.1% BC, clearly document increase during the years, 26% (2010–2013)–63% (2014). Absolute majority of enterobacteriaceae were sensitive to carbapenems and
amikacin, half were resistant to gentamycin, second- and third-generation cephalosporins and quinolones. Inappropriate empiric antimicrobial therapy was given to 46.8% of patients with ESBL-producing enterobacteriaceae (P < 0.001). Mortality rate was 21.5% in hospital and 46.3% day-90 post discharge. Variables associated with mortality: initial diagnosis of skin and soft tissue infections (SSTI) (OR = 14.44), inappropriate empiric antibiotic (OR = 5.038), high level of urea (OR = 1.017), and nasogastric tube (OR = 4.966). UTI (OR = 0.316) was a protective factor.

Conclusion. Diagnosis of SSTI, high urea levels, nasogastric tube, and inappropriate empiric antibiotic were associated with in-hospital mortality. The notable increased rate of ESBL-producing enterobacteriaceae should alert health care providers to be aware of local microbial resistance profile, especially among LTCFs patients.

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1008. Cluster Analysis to Define Distinct Clinical Phenotypes Among Septic Patients With Bloodstream Infections

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Background. Sepsis is a systemic response to an infection involving one or multiple organ failures frequently caused by bacteremia. Over a million cases of sepsis are reported in the United States annually with an estimated 25% mortality. Early recognition, diagnosis, and treatment of sepsis in the Emergency Department (ED) improves patient outcomes. Increased awareness of sepsis has fostered novel opportunities to improve diagnostics. EDs are increasingly targeting as areas of primary care for suspected septic patients. Understanding the etiology of ED sepsis supports empiric approaches and opportunities for targeted diagnostics. However, a systematic analysis of etiology of ED sepsis, spanning multiple years, is lacking.

Methods. A retrospective analysis conducted over 60 months at Hennepin County Medical Center, an inner-city level one trauma center with over 100,000 ED visits annually, were examined. Positive blood cultures drawn in the ED were included in data analysis. Charts were reviewed for patient demographics and whether the culture was treated; infections that were not treated were considered contaminants, and relevant susceptible patterns.

Results. A total of 8,013 blood cultures were drawn in the ED over an initial 12-month period. Of these, 8.4% (n = 674) were culture positive resulting in 731 (4.8%), group A strep species (>500 cell/mL), Pitt bacteremia score >3, neutropenia (RR 4.1; 95% CI 2.2–7.5), and neutropenia (RR 4.1; 95% CI 1.3–12.9). Pitt bacteremia score >3 (RR 6.8; 95% CI 2.6–18.0), MF (RR 4.7; 95% CI 2.2–10.3) and infection with VRE (RR 4.1; 95% CI 1.1–16.6) remained significantly associated with mortality in multivariate analyses included ICU admission, prolonged hospitalization, hematological malignancy, use of immunosuppressive therapy, hemodialysis, neutropenia (<500 cell/mL), Pitt bacteremia score >3, infection with VRE and MF. ICU admission (RR 3.9; 95% CI 1.7–7.5), neutropenia (RR 4.1; 95% CI 1.3–12.9). Pitt bacteremia score >3 (RR 6.8; 95% CI 2.6–18.0). MF (RR 4.7; 95% CI 2.2–10.3) and infection with VRE (RR 4.1; 95% CI 1.1–16.6) remained significantly associated with mortality in multivariate analyses.

Conclusion. The presence of VRE in ED and MB are associated with increased mortality. MB represent a major burden of disease in hospital settings.

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1010. Effectiveness of Oral Antibiotics for Definitive Therapy of Gram-Positive Bloodstream Infections

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Background. Prior attempts at identifying outcome determinants associated with bloodstream infection have employed a priori determined classification schemes based on readily identifiable microbiology, infection site, and patient characteristics. We hypothesized that even among this heterogeneous population, clinically relevant groupings can be described that transcend old a priori classifications.

Methods. Cluster analysis was applied to variables from three domains: patient characteristics, acuity of illness, infection site, and characteristic antimicrobial. Among 3,715 patients with bloodstream infections from Barnes Jewish Hospital (2008 to 2015), the most stable cluster arrangement occurred with the formation of four clusters. This clustering arrangement resulted in an approximately uniform distribution of the population: Clusters One (21.5%), Two (27.9%), Three (28.7%), and Four (29%). The four clusters were grouped primarily to Clusters Three (40%) and Four (25%), while Enterobacteriaceae were divided predominantly into Clusters Two (34%), Three (30%), and Four (22%). Nonfermenting Gram-negative bacilli grouped mainly in Clusters Four and Two (30% and 31%). More than half of the pneumonia cases occurred in Cluster Four. Clusters One and Two contained 33% and 31%, respectively, of the individuals receiving inappropriate antibiotic administration. Mortality was greatest for Cluster Four (33.8%, 27.4%, 19.2%, 44.6%; P < 0.001), while Cluster One patients were most likely to be discharged to a nursing home.

Conclusion. Our results support the potential for machine learning methods to identify homogeneous groupings in infectious diseases that transcend old a priori classifications. These methods may allow new clinical phenotypes to be identified potentially improving the severity staging and treatment of complex infectious diseases.

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