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1436. Overview of ESBL Enzyme Producing Infections and UTIs

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Session: P-81. UTIs

Background. Extended-spectrum beta lactamase (ESBL) enzymes are plasmid-mediated, rapidly emerging and complex thereby posing a major therapeutic challenge in the management of urinary tract infections (UTIs) in community and hospital settings. In 2017, there were an estimated 197,400 cases of ESBL-producing Enterobacteriales among hospitalized patients and 9,100 estimated deaths in the United States.

Methods. We conducted a retrospective cohort study using a publicly accessible National Inpatient Sample (NIS) database from October 2015 to December 2017. Adult patients (age >= 18 years old) with UTI as a principal diagnosis were included. SAS 9.4 was used for univariate and multivariate linear. Logistic regression statistical analyses were used to compare mean age at the time of admission, length of stay, in-hospital mortality, hospitalization costs, and Elixhauser comorbidity indices.

Results. Of the total 5,776,156 patients included in the study, 52,765 patients had ESBL-enzyme induced UTIs. 66% were females and 34% were males. 63.3% were Caucasian, 11.6% were African-American, 18.8% were Hispanic, and 4.4% were Asian or Pacific Islander. The most common comorbidities were renal failure (22.8%), diabetes mellitus with complications (20.8%), congestive heart failure (20.5%), chronic lung disease (20.0%), neurological diseases (17.8%), obesity (12.6%), paralysis (12.5%), and depression (11.5%). In-hospital mortality was 2.5% (p < 0.0001), which was most likely due to the underlying co-morbidities. In patients without ESBL-enzyme induced UTIs, average length of stay was 7.8±8.5 days, and economic burden was \$16,166.8 ± \$21,183.5 USD. In comparison, patients with ESBL-enzyme induced UTIs had in-hospital mortality of 3.9%, average length of stay of 7.0 ± 9.7 days, and economic burden of \$15,793.3 ± \$29,268.6 USD.

ESBL and UTI data analysis image 1

Variable	ESBL	No ESBL	ASD %
Total: 5776156	n = 52765	n = 5723391	
Age			
Mean years (SE)	70.9±16.7	69.2±18.4	
Gender			
Male	17875(33.9%)	1808469(31.6%)	<.0001
Female	34890(66.1%)	3914922(68.4%)	
Race			
Caucasians	32055(63.28%)	3930102(70.8%)	<.0001
African-Americans	5875(11.6%)	769460(13.9%)	
Hispanic	9545(18.8%)	537469(9.7%)	
Asian or Pacific Islander	2220(4.4%)	120760(2.2%)	
Income quartile by zip code			
0 – 25 th	16240(31.3%)	1823363(32.4%)	<.0001
26 – 50 th	12950(25.0%)	1482034(26.3%)	
51 – 75 th	11925(23.0%)	1287709(22.9%)	
76 – 100 th	10760(20.7%)	1036214(18.4%)	
Insurance type			
Medicare	39215(74.3%)	4079677(71.2%)	<.0001
Medicaid	6445(12.2%)	652614(11.4%)	
Private	5300(10.0%)	739335(12.9%)	
Other	690(1.3%)	99024(1.7%)	
Elixhauser Comorbidities			
Congestive heart failure	10825(20.5%)	980759(17.1%)	<.0001
Valvular disease	1865(3.5%)	222930(3.9%)	<.0001
Pulmonary circulation disease	395(0.7%)	56745(1.0%)	<.0001
Peripheral vascular disease	2175(4.1%)	304185(5.3%)	<.0001
Paralysis	6585(12.5%)	483865(8.4%)	<.0001
Other neurological disorders	9395(17.8%)	869184(15.2%)	<.0001
Chronic pulmonary disease	10535(20.0%)	1112264(19.4%)	<.0001
Hypertension	28380(53.8%)	3167013(55.3%)	<.0001

ESBL and UTI data analysis image 2

Diabetes w/o chronic complications	7440(14.1%)	823119(14.3%)	<.0001
Diabetes w/ chronic complications	10985(20.8%)	896424(15.7%)	<.0001
Hypothyroidism	8185(15.5%)	839524(14.7%)	<.0001
Renal failure	12055(22.8%)	1078994(18.8%)	<.0001
Liver disease	2125(4.0%)	228590(4.0%)	<.0001
Coagulopathy	4455(8.4%)	432155(7.5%)	<.0001
Deficiency Anemias	12615(23.9%)	1176974(20.6%)	0.0001
Obesity	6670(12.6%)	695040(12.1%)	<.0001
Depression	6070(11.5%)	698960(12.2%)	<.0001
Geographic region			
Northeast	8630(16.3%)	979450(17.1%)	<.0001
Midwest	8025(15.2%)	1212275(21.2%)	
South	22770(43.1%)	2469063(43.1%)	
West	13345(25.3%)	1064524(18.6%)	
Hospital ownership/control			
Rural	5340(10.1%)	658669(11.5%)	<.0001
Urban nonteaching	16910(32.0%)	1593098(27.8%)	
Urban teaching	30520(57.8%)	3473544(60.7%)	
Hospital bedsize			
Small	10850(20.6%)	1162559(20.3%)	<.0001
Medium	1630(31.1%)	1745492(30.5%)	
Large	25490(48.3%)	2817260(49.2%)	
Outcomes			P-Value
In-hospital mortality	1340(2.5%)	225770(3.9%)	<.0001
Length of stay, days	7.8±8.5	7.0±9.7	<.0001
Total hospitalization cost, \$	16166.8±21183.5	15793.3±29268.6	<.0001
Disposition			
Discharge to home	13990(26.5%)	2171893(38.0%)	<.0001
Transfer other: includes Skilled Nursing Facility (SNF), Intermediate Care Facility (ICF), and another type of facility	24055(45.6%)	53565(0.9%)	
Home health care	11955(22.7%)	2073034(36.2%)	
Against medical advice (AMA)	430(0.8%)	1056369(18.5%)	

Conclusion. We found that ESBL-enzyme-producing UTIs have statistically significant prolonged length of stay and economic burden, though in hospital mortality rate is low. This could be due to judicious use of antimicrobial therapy. There is a need for further research, as well as increased antimicrobial stewardship for UTIs, a globally recognized major cause of nosocomial acquired infections.

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1437. Short Versus Long-Course Intravenous Antibiotics for Young Infants with Urinary Tract Infection

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Session: P-81. UTIs

Background. Shorter courses of intravenous (IV) antibiotics for young infants with urinary tract infection (UTI) have myriad advantages. As practice shifts toward shorter IV treatment course, this study aimed to determine the safety of early IV-to-oral antibiotic switch, and identify risk factors for bacteraemia with UTI.

Methods. Retrospective audit of infants aged ≤90 days with a positive urine culture at a quaternary paediatric hospital over four years (2016-2020). Data were collected from the hospital electronic medical record and laboratory information system. Short-course IV antibiotic duration was defined as < 48 hours for nonbacteraemic UTI and < 7 days for bacteraemic UTI. Multivariate analysis was used to determine patient factors predicting bacteraemia.

Results. Among 427 infants with nonbacteraemic UTI, 257 (60.2%) were treated for < 48 hours. Clinicians prescribed shorter IV courses to infants who were female, aged >30 days, afebrile, and those without bacteraemia or cerebrospinal fluid pleocytosis. Treatment failure (30-day UTI recurrence) occurred in 6/451 (1.3%) infants. All had nonbacteraemic UTI and only one received < 48 hours of IV antibiotics. None had serious complications (bacteraemia, meningitis, death). Follow-up audiology was performed in 21/31 (68%) infants with cerebrospinal fluid pleocytosis, and one had sensorineural hearing loss. Bacteraemia occurred in 24/451 (5.3%) infants, with 10 receiving < 7 days IV antibiotics with no treatment failure, meningitis or death. Fever and pyelonephritis were independent predictors of bacteraemia.

Conclusion. Short course IV antibiotics for < 48 hours for young infants with nonbacteraemic UTI are safe provided bacterial meningitis has been excluded. Treatment failure and serious complications were rare in young infants with UTI.

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1438. Prevalence and Risk Factors for Extended Spectrum Betalactamases Among Hospitalized Patients with Community Acquired Pyelonephritis in Colombia
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Session: P-81. UTIs

Background. Urinary tract infections (UTI) are the most frequent bacterial infection in hospitalized patients. Extended spectrum betalactamases (ESBL) producing bacteria causing UTI have become more prevalent. *Escherichia coli* (*E. coli*) is the most frequent ESBL producing bacteria isolated in UTI. This drug resistant organisms are associated with poorer outcomes for patients. In low income countries, approaching to and treating ESBL *E. coli*, represent a major challenge for health care centers.

Methods. A retrospective cohort of adult patients with community acquired pyelonephritis caused by *Escherichia coli* was identified in a tertiary hospital in Colombia. Susceptibility was performed with Vitek (BioMerieux, France); extended spectrum beta lactamase (ESBL) production was defined phenotypically. Inclusion criteria were adult patients hospitalized with a positive urine culture for *E. coli*. Demographic and clinical characteristics were searched in electronic records. Risk factors associated with ESBL production were identified by using a multivariate logistic regression analysis.

Results. During 7 years 817 patients with pyelonephritis caused by *E. coli* were identified. 79 (9.7%) of them were caused by ESBL producers. Women were 66% and 408 (74.8% of them) had menopause. Mean age was 64.2 years (standard deviation of 19.1). Of the cohort, 481 (561.1%) had at least some comorbidity and was frequent to find diabetes (18.5%), immunosuppression due to oncologic disease or medications (18.4%), urolithiasis or previous surgical procedures (17%). After logistic regression, risk factors identified to predict ESBL production, were: being a man (aOR 5.4, 2.1-18.2), a woman with menopause (aOR 2.9, 1.3 -9.9), and the Charlson score (aOR 0.83, 0.73 - 0.96). Previous antibiotic use was not related to ESBL infection.

Conclusion. In this relatively large cohort of patients with pyelonephritis caused by *E. coli*, ESBL production risk factors were not clearly identified other than sex and menopause. Curiously, Charlson score predicted a lower risk of resistance. Other factors (food consumptions and others) might be driving the resistance in the community in *E. coli*.

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1439. Epidemiology and 12- Month Antibiotic Use in the Outpatient Setting among Adult Patients with Complicated Urinary Tract Infections: A Retrospective Database Analysis

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Session: P-81. UTIs

Background. Complicated urinary tract infections (cUTI) are one of the most common bacterial infections and represent substantial burden to the health care system. Here, we examine the epidemiology and treatment patterns associated with cUTI in a large US database containing longitudinal inpatient (IP) and outpatient (OP) patient-level data.

Methods. We conducted a retrospective cohort study of adult patients in the IBM MarketScan® Commercial or Medicare Supplemental Databases with at least 1 IP or non-diagnostic OP claim with a diagnosis for cUTI between January 1, 2017 and June 30, 2019. Patients meeting the following criteria were included for analysis: (1) ≥18 years of age on the index date, (2) ≥6 months of continuous enrollment (CE) with medical and pharmacy benefits prior to the index date, (3) ≥12 months of CE following the index date or evidence of death, and (4) no evidence of a prior cUTI during the 6-month baseline period. Demographics and clinical characteristics were quantified. Patients were classified as IP if they were hospitalized during 30-day post index date; remaining patients were classified as OP. Antibiotics received in the OP setting in the 12-months post index date were examined.

Results. 95,423 patients met study criteria. Most (86.4%) patients were Commercially insured, mean (SD) age was 53.6 (18.1) and 70.4% were female. Mean baseline Charlson Comorbidity Index was 0.77. During the 30-day post index date, 22.2% were treated as IP and 77.8% were strictly treated as OP. In the 12-month OP follow-up period among index IP, 78.2% required ≥ 2 antibiotics, 38.2% required ≥4 antibiotics, and 41.6% received an IV antibiotic. In the 12-month OP follow-up period among index OP, 81.8% required ≥2 antibiotics, 38.2% required ≥4 antibiotics, and 46.8% received an IV antibiotic. For both IP and OP, fluoroquinolones were the most common oral antibiotic class (57.7%), followed by cephalosporins (39.2%), penicillins (30.3%), trimethoprim-sulfamethoxazole (29.8%), and nitrofurantoin (25.2%). Cephalosporins were the most common IV antibiotic class (38.5%).

Conclusion. Regardless of index treatment setting, approximately 40% of all cUTI patients required ≥4 antibiotic therapy and almost half with receive an IV antibiotic in the outpatient setting in the 12-months post index date.

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1440. Meta-regression Analysis of Worldwide Herpes Zoster Incidence

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Session: P-82. Virology: Studies of the Epidemiology of Viral Infections

Background. Many studies have been conducted worldwide to estimate Herpes Zoster (HZ) incidence rates and temporal trends. We systematically reviewed and synthesized studies of HZ incidence rates in the general population using meta-analysis models.

Methods. A random-effects meta-analysis was conducted to estimate HZ incidence from a published worldwide systematic literature review (SLR) including only individuals aged 50 years and older. Meta-regression was used to explore if variability in incidence rates could be explained by a combination of study-specific characteristics in the base model: age, gender, continent and year of data collection. The impact of adding additional covariates: case detection, case definition, study design, incidence type, patient type and latitude to the base model was also assessed.

Results. 65 out of 69 studies from the SLR, were included in the analysis: 27 from Europe, 20 from North America, 11 from Asia and 7 from Oceania. There was much variability in study methodology and outcomes. Heterogeneity of incidence rates was greatest across studies conducted in Asia. Meta-analysis results showed that: incidence increased with age; was lower in males compared to females; was lower in Europe and North America compared to Asia and Oceania; and increased from the period prior to 2003 to the period after 2003. The final meta-regression model included continent, year of data collection, gender, age, cubic and quadratic terms for age, as well as an age x gender interaction term. The age x gender interaction suggests that the difference in incidence between males and females is greater in younger ages (e.g. 50-59), whereas in older age groups (e.g. 80+) incidence rates are similar between males and females. None of the additional covariates contributed significantly to the model. It was estimated that 15.5 million HZ cases occurred in 2020 worldwide in individuals aged 50 years and older, which in the absence of vaccination, is projected to increase to 19.8 million by 2030.

Conclusion. The model allows for trends in incidence data to be explored based on influential covariates. Incidence rates were shown to vary by age, gender, continent, and over time.

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1441. Significant Decrease in the Incidence Rate of Common Outpatient Upper Respiratory Tract Infection Diagnoses per Clinic Visit in the First Respiratory Season of October 2020 to March 2021 During the Covid-19 Pandemic. A Report From an Outpatient Antimicrobial Stewardship Program at a community hospital in Brooklyn

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