infection, the duration of pre-hospitalization ≥14 days ($P = 0.034$), the absolute neutrophil count < 100 ($P = 0.048$) and steroid use ($P = 0.025$) were statistically significant risk factors. The mean length of hospital stay was 107 (±103) days. *Klebsiella* spp. attributable mortality due to infection was 14% and crude mortality was 15%. No statistically significant difference was found in patients who developed resistant and susceptible infections.

***Conclusion.*** Carbapenem resistance in *Klebsiella* infections was increased. Prolonged hospital stay, neutropenia and steroid use in the last 3 months were identified as significant risk factors for carbapenem-resistant *Klebsiella* infections.

Table 1: Evaluation of risk factors for carbapenem resistant and carbapenem sensitive cases in *Klebsiella* spp. bloodstream infections

| | Carbapenem Resistant *Klebsiella* [n:26(%30.5)] | Carbapenem Sensitive *Klebsiella* [n:59(%69.4)] | P value |
|---|---|---|---|
| Age (Year)[median (IQR)] | 2.22 (11.73) | 0.45 (2.74) | **0.044** |
| Lenght of stay in hospital before infection [median(IQR)] | 31 (188) | 14 (46.5) | 0.132 |
| Lenght of stay in hospital before infection ≥14 days [median (IQR)] | 20 (76.9) | 31 (52.5) | **0.034** [OR 3.011(%95 CI 1.058-8.567)] |
| Lenght of stay in hospital after infection [median(IQR)] | 55 (57) | 24 (98.5) | 0.331 |
| Lenght of stay in hospital after infection≥14 days [median (IQR)] | 21 (80.8) | 37 (62.7) | 0.099 |
| Laboratory | | | |
| WBC [/mm$^3$(IQR)] | 5960 (9277) | 8960 (8050) | 0.338 |
| ANC [/mm$^3$(IQR)] | 2165 (5154) | 5770 (6705) | 0.331 |
| Hb [/mm$^3$(IQR)] | 10.15 (4.57) | 10 (3.5) | 0.890 |
| Plt[/mm$^3$(IQR)] | 112000 (175000) | 181000 (307500) | 0.088 |
| CRP [mg/dL(IQR)] | 4.6 (7.5) | 3.7 (8.85) | **0.003** |
| ANC <500/mm$^3$[n(%)] | 7 (%26.9) | 8 (%13.6) | 0.136 |
| ANC<100/mm$^3$[n(%)] | 7 (%26.9) | 6 (%10.2) | **0.048** [OR 3.254 (%95 CI 0.971-10.912)] |
| PLT<150000/mm$^3$[n(%)] | 18 (%69.2) | 29 (%49.2) | 0.086 |
| Neutropenia Duration [median (IQR)] | 6 (182) | 3 (7) | 0.097 |
| Treatment Change[n(%)] | 17 (%68) | 23 (%39) | **0.015** [OR 3.326 (%95 CI 1.236-8.950)] |
| Use of steroid [n(%)] | 9 (%34.6) | 8 (%13.6) | **0.025** [OR 3.375 (%95 CI 1.124-10.131)] |
| Central Venous Catheter[n(%)] | 21 (%80.8) | 43 (%72.9) | 0.437 |
| Foley Catheter[n(%)] | 12 (%46.2) | 24 (%40.7) | 0.638 |
| Nazogastric Tube [n(%)] | 21 (%80.8) | 35 (%50.3) | 0.055 |
| Tracheostomy[n(%)] | 3 (%11.5) | 2 (%3.4) | 0.141 |
| Mechanical Ventilation[n(%)] | 8 (%32.0) | 16 (%27.1) | 0.651 |
| Intensive Care Admission [n(%)] | 18 (%69.2) | 38 (%64.4) | 0.666 |
| Attributable Mortality[n(%)] | 5 (%19.2) | 7 (11.9) | 0.369 |
| Mortality (1 month) [n(%)] | 6 (%23.1) | 7 (%11.9) | 0.186 |
| Mortality (3 months) [n(%)] | 8 (%30.8) | 13 (%22) | 0.390 |

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### 2273. Outcomes of Trimethoprim/Sulfamethoxazole as Definitive Therapy for Urinary Tract Infections with Multi-Drug-Resistant Enterobacteriaceae

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**Session:** 246. Clincal Outcomes of Infections with Resistant Organisms
*Saturday, October 5, 2019: 12:15 PM*

***Background.*** Trimethoprim/Sulfamethoxazole (TMP/SMX) is not routinely employed for urinary tract infections (UTI) with multi-drug-resistant organisms (MDRO) due to paucity of effectiveness data, concerns regarding inadequate urinary penetration, and risk of adverse effects. We describe our experience with TMP/SMX as definitive therapy for MDRO Enterobacteriaceae (MDRO-E).

***Methods.*** We carried out a retrospective review of patients hospitalized at a tertiary care center and treated with TMP/SMX as definitive therapy for UTI with MDRO-E (as defined by resistance to third-generation cephalosporins in culture). We evaluated rates of overall cure rate (CR), adverse events (AE), recurrence (RC) and reinfection (RI). Repeat growth of same or different pathogen in urine culture (UC) within 30 days of completion of treatment was defined as RC or RI, respectively.

***Results.*** 92 patients had 101 episodes of MDRO-E UTIs treated with TMP/SMX as initial ($n = 26$, 25.7%) or as step-down therapy ($n = 23$, 77%) after broad-spectrum empiric antimicrobials (ceftriaxone $n = 22$, cefepime $n = 21$, piperacillin/tazobactam $n = 12$, carbapenems $n = 6$, ciprofloxacin $n = 3$). 63 (68.5%) patients were 65 years or older. MDRO-E in 10 (9.9%) episodes were also resistant to carbapenems. Empiric therapy was appropriate in 56 (55.5%) episodes. Median duration of treatment was 8.5 (range 3–24) days for all antimicrobials and 7 (range 2–15) days for TMP-/SMX. Overall CR was 100%. RC/RI was seen in 23/101 (22.8%) episodes (RC $n = 9$; RI $n = 14$); UC data were available for 20 of which 8/20 (40%) had a TMP/SMX-resistant organism. 4 (3.9%) patients required readmission for a RC/RI UTI. In terms of AEs: 10 (9.9%) episodes of hyperkalemia (median maximum potassium level 4.5 mmol/L, range 2.7–6.4), 3 (2.9%) episodes of acute kidney injury, 5 episodes of Clostridium difficile infection, and 4 (3.9%) readmissions for a RC/RI UTI within 90 days.

***Conclusion.*** Our findings suggest that TMP/SMX can be safe and effective as definitive therapy for ESBL-E UTI. The major AE are hyperkalemia and AKI, the incidence of which is high when TMP/SMX is used in combination with ACEI/ARBs. No clinical factors were found to be predictive of recurrence of reinfection.

| **Presenting features of 101 episodes of MDRO UTIs treated with TMP/SMX** | |
|---|---|
| Fever >100.4°F, n (%) | 26 (25.7) |
| Maximum white blood cells per mm$^3$, median (range) | 11.1 (4.0-34.2) |
| Baseline serum creatinine in mg/dL, median (range) | 0.9 (0.3-4.7) |
| Pyelonephritis on imaging | 3 (3) |
| Bacteremia | 2 (1.9) |
| Microbiological isolates (total 104 organisms), n (%) | |
| *Escherichia coli* | 58 (57.4) |
| *Klebsiella spp* | 16 (15.8) |
| *Enterobacter spp* | 13 (12.9) |
| *Citrobacter spp* | 7 (6.9) |
| *Proteus spp* | 6 (5.9) |
| *Other Enterobacteriaceae spp* | 4 (4) |

| **Clinical characteristics of 92 patients treated with TMP/SMX for MDRO UTI** | |
|---|---|
| Age in years, median (range) | 73 (21-102) |
| Charlson comorbidity score, median (range) | 3 (0-12) |
| Male gender, n (%) | 35 (38) |
| BMI, median (range) | 25.9 (13.6-66.7) |
| Diabetes mellitus, n (%) | 31 (33.7) |
| Chronic Kidney Disease, n (%) | 15 (16.3) |
| Hemodialysis, n (%) | 3 (3.3) |
| Kidney transplantation, n (%) | 2 (2.2) |
| Genitourinary abnormality, n (%) | 92 (65.9) |
| Immunocompromise (immunosuppressive medications, active malignancy, HIV/AIDS), n (%) | 18 (17.8) |
| Concomitant Angiotensin converting enzyme inhibitor (ACEI) or Angiotensin receptor blocker (ARB) use, n (%) | 16 (15.8) |

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### 2274. Comparison of Clinical Outcomes in Patients with Extensively Drug-Resistant *Pseudomonas aeruginosa* Pneumonia Treated with Aminoglycosides vs. Ceftolozane/Tazobactam

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**Session:** 246. Clincal Outcomes of Infections with Resistant Organisms
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***Background.*** Extensively drug-resistant (XDR) P. aeruginosa (PA), defined as resistant to ≥ 1 agents in all classes of antibiotics except two classes, limits therapeutic options to more toxic agents such as aminoglycosides (AMG) and polymyxins. Majority of the XDR PA isolated in two of our teaching hospitals were found to be susceptible to ceftolozane–tazobactam (CT) in addition to AMG and polymyxins. Our study aims to compare treatment outcomes with traditional antibiotics vs. CT in patients with XDR PA pneumonia.

***Methods.*** This is a retrospective case–control study of patients admitted to two local hospitals from 2013 to 2018. Patients were screened by discharge diagnosis for pneumonia. We included patients over 18 years with XDR PA in sputum cultures susceptible to ≤ 2 classes of antibiotics. Statistical analyses included ANOVA, T-test, Fisher exact and Chi-square tests.

***Results.*** Among the 48 patients with XDR PA pneumonia, 33 patients met inclusion criteria. Their mean age was 62 years (SD ±16), 30% were female, and 18% were immunocompromised. Similarly, 85% of patients had underlying lung disease and 55% had a tracheostomy tube. Majority of these patients were either nursing home residents (55%) or hospitalized (46%) within past 3 months. Septic shock associated with XDR PA pneumonia was found in 30% of patients, and 73% required mechanical ventilation during treatment. Nineteen patients received an aminoglycoside (AMG group), 1 colistin, 9 CT (CT group), and 4 received CT plus an AMG. The average time to clinical improvement was 3.5 (±2.2) days for AMG group and 2.2 (±1.7) days for CT group ($P = 0.3$). Compared with CT group, AMG group had significantly longer mean duration of hospital stay (19 ± 13 vs. 32.4 ± 17 days, $P < 0.05$). All patients who had clinical failure to improve requiring change in antibiotics (2 patients) or who died after withdrawal of care (3 patients) were in AMG group. Clinical relapse within 30 days occurred equally in both groups (4 AMG, 2 CT, $P > 0.05$). Six patients who developed acute kidney injury received either an AMG (5) or colistin (1).

***Conclusion.*** Based on our observation, CT is a safe and effective treatment for XDR PA pneumonia. Compared with CT, patients who received AMG had longer hospital stays and sustained more nephrotoxicity.

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