Session: 159. Pediatric Bacterial Diseases: Diagnosis and Management Friday, October 4, 2019: 12:15 PM

Background. Daptomycin (DAP) is lipopeptide that frequently is used to treat infections caused by *Staphylococcus aureus* in adult patients. There are limited data using daptomycin in pediatric patients for the treatment of osteomyelitis caused by *S. aureus*. This study's objective is to describe pharmacodynamic (PD) target attainment of daptomycin in pediatric patients with osteomyelitis.

Methods. Medline was queried to obtain PD targets, pediatric pharmacokinetic models, and bone penetration information to build a model for DAP. A 10,000 subject Monte Carlo simulation was performed to estimate steady-state concentrations in the bone. Simulations modeled 30-minute infusions with using 12 mg/kg/dose IV q24h for patients less than 7 years and 10 mg/kg/dose IV q24h for patients 7 years and older. Goal PD targets were: AUC₂₄: MIC of 666 µg hours/mL for log1 killing and AUC₂₄: MIC of 1,061 for log2 killing. The CLSI breakpoint of 1 mg/L was used as a starting point and MIC's were analyzed below that level.

Results. PD target attainment in percentages is listed for DAP below in Tables 1 and 2 and are separated by age groups of patients.Conclusion. The studied DAP doses did not reach any PD target attainment at

Conclusion. The studied DAP doses did not reach any PD target attainment at the CLSI breakpoint of 1 mg/L. Based on these data, DAP should not be empirically used to treat SA osteomyelitis unless the exact MIC is known. Furthermore, modern pediatric pharmacokinetic studies of DAP for pediatric osteomyelitis are warranted.

| Table 1:1 | Percent ta | rget attain pediatr | nment of l | og1 killing yelitis | model of | DAP in | Table 2: I | Percent ta | get attain pediatri | ment of k | og2 killing velitis | model of | DAP in |
|-----------|------------|------------------------|------------|------------------------|----------|--------|------------|------------|------------------------|-----------|------------------------|----------|--------|
| Age group | | | MIC (| mg/L) | | | Age group | | | MIC (| mg/L) | | |
| (years) | 0.03 | 0.06 | 0.12 | 0.25 | 0.5 | 1 | (years) | 0.03 | 0.06 | 0.12 | 0.25 | 0.5 | 1 |
| 0 | 100.00% | 100.00% | 65.96% | 0.24% | 0.00% | 0.00% | 0 | 100.00% | 91.73% | 10.40% | 0.00% | 0.00% | 0.00% |
| 1 | 100.00% | 100.00% | 42.58% | 0.00% | 0.00% | 0.00% | 1 | 100.00% | 94.19% | 0.00% | 0.00% | 0.00% | 0.009 |
| 2 | 100.00% | 100.00% | 61.07% | 1.13% | 0.00% | 0.00% | 2 | 100.00% | 87.08% | 10.66% | 0.00% | 0.00% | 0.009 |
| 3 | 100.00% | 100.00% | 63.39% | 1.19% | 0.00% | 0.00% | 3 | 100.00% | 88.98% | 11.19% | 0.00% | 0.00% | 0.009 |
| 4 | 100.00% | 100.00% | 61.97% | 0.32% | 0.00% | 0.00% | 4 | 100.00% | 89.32% | 10.36% | 0.00% | 0.00% | 0.009 |
| 5 | 100.00% | 100.00% | 66.55% | 0.53% | 0.00% | 0.00% | 5 | 100.00% | 90.32% | 7.92% | 0.00% | 0.00% | 0.009 |
| 6 | 100.00% | 100.00% | 61.06% | 0.16% | 0.00% | 0.00% | 6 | 100.00% | 88.62% | 9.46% | 0.00% | 0.00% | 0.009 |
| 7 | 100.00% | 100.00% | 59.10% | 1.26% | 0.00% | 0.00% | 7 | 100.00% | 83.60% | 11.17% | 0.00% | 0.00% | 0.009 |
| 8 | 100.00% | 100.00% | 61.31% | 1.73% | 0.00% | 0.00% | 8 | 100.00% | 84.80% | 13.47% | 0.00% | 0.00% | 0.009 |
| 9 | 100.00% | 100.00% | 62.30% | 1.15% | 0.00% | 0.00% | 9 | 100.00% | 85.41% | 10.98% | 0.00% | 0.00% | 0.009 |
| 10 | 100.00% | 100.00% | 60.31% | 1.89% | 0.00% | 0.00% | 10 | 100.00% | 83.16% | 12.37% | 0.00% | 0.00% | 0.009 |
| 11 | 100.00% | 100.00% | 60.70% | 1.00% | 0.00% | 0.00% | 11 | 100.00% | 85.74% | 10.95% | 0.00% | 0.00% | 0.009 |
| 12 | 100.00% | 100.00% | 100.00% | 8.77% | 0.00% | 0.00% | 12 | 100.00% | 100.00% | 55.96% | 0.00% | 0.00% | 0.009 |
| 13 | 100.00% | 100.00% | 100.00% | 8.85% | 0.00% | 0.00% | 13 | 100.00% | 100.00% | 52.33% | 0.00% | 0.00% | 0.009 |
| 14 | 100.00% | 100.00% | 100.00% | 9.71% | 0.00% | 0.00% | 14 | 100.00% | 100.00% | 50.94% | 0.00% | 0.00% | 0.009 |
| 15 | 100.00% | 100.00% | 100.00% | 10.68% | 0.00% | 0.00% | 15 | 100.00% | 100.00% | 54.92% | 0.00% | 0.00% | 0.009 |
| 16 | 100.00% | 100.00% | 100.00% | 9.55% | 0.00% | 0.00% | 16 | 100.00% | 100.00% | 57 77% | 0.00% | 0.00% | 0.009 |

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1508. Carbapenem vs. Non-carbapenem as Empiric Regimens for Bacteremia Caused by ESBL Producing *Escherichia coli* and *Klebsiella pneumoniae* in Children: Preliminary Study

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Background. The clinical efficacy of non-carbapenem for the treatment of extended-spectrum β -lactamase (ESBL) bacteremia in children with underlying comorbidities is controversial. We aimed to compare clinical and microbiological outcomes between pediatric patients received carbapenem and non-carbapenem as empiric regimens for bacteremia caused by ESBL producing *E. coli* and *K. pneumoniae*.

Methods. Pediatric patients aged <19 years who hospitalized between January 2014 to Jun. 2018 at Asan medical center with monomicrobial ESBL producing *E. coli* and *K. pneumoniae* bacteremia were included. Patients were excluded if they did not receive a carbapenem after ESBL production was identified. We compared outcomes between patients who had empirical therapy with a carbapenem to those who had empirical therapy.

Results. Among total 161 *E. coli* and *K. pneumoniae* bacteremia, 46 (28.6%) fulfilled the criteria, of which 25 (54.3%) were caused by *E. coli* and 21 (45.7%) by *K. pneumoniae*. The most common underlying diseases were hemato-oncologic diseases (47.8%) and prematurity (23.9%). The main sources of bacteremia were vascular catheter (37.0%) and necrotizing enterocolitis (10.9%). 25 cases were treated with empiric carbapenem, and the remaining 21 cases with non-carbapenem agents. The all-cause 30-day fatality in the carbapenem group was 32% (8/25) and 5% (1/21) in the non-carbapenem group (P = 0.023). Microbiological cure rate at 3 days after the first culture positive day was 75.3% in the carbapenem group and 89.6% in the non-carbapenem group (P = 0.046). However, adjusting initial presentation with septic shock, the choice of initial empiric antibiotic was not a risk factor for the 30-day fatality and microbiological cure rate at 3 days (aHR 4.82, 95% CI 0.592–39.231; aHR 0.648, 95% CI 0.333 - 1.259, respectively).

Conclusion. For the medically fragile pediatric patients with bacteremia caused by ESBL producing *E. coli* and *K. pneumoniae*, the impact of empiric antibiotics on clinical and microbiological outcomes was not significant if early transition to definitive carbapenem regimen is possible when susceptibility is proven. A large-scale multicenter study will be needed to select the most appropriate empiric antibiotics and minimize the spread of antibiotics resistance.

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1509. Outcomes of Empirical Antimicrobial Therapy for Pediatric Community-Onset Febrile Urinary Tract Infection in the Era of Increasing Antimicrobial Resistance

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Background. Urinary tract infection (UTI) is a common cause of fever in children. Since infections caused by extended-spectrum β -lactamase (ESBL)-producing organism in the community have increased, alternative empirical antimicrobials to carbapenems have been studied. We conducted this study to compare clinical outcomes between group receiving empirical antimicrobials to which organisms were susceptible vs. non-susceptible vs. non-susceptible in community-onset UTI.

Methods. We conducted a retrospective cohort study of pediatric patients with first-episode community-onset febrile UTI caused by *Escherichia coli*, *Klebsiella pneumoniae* and *Proteus* spp. at Ramathibodi Hospital from 2011 to 2017. Patients were classified into group receiving empirical antimicrobials to which organisms were susceptible and non-susceptible. Medical records were reviewed to assess clinical outcomes in both groups.

Results. One hundred and fifty-one eligible patients were enrolled in this study. The most common causative organism was *E. coli* (89.6 and 96.2% in the group receiving susceptible and non-susceptible antimicrobials, respectively). Among causative organisms, 19.8% were ESBL-producing organisms. Ceftriaxone was used in 76.8% of our patients. There was no significant difference in clinical, microbiological, relapse, time to defervescence between two groups of patients. None of patients in both groups developed sepsis after receiving empirical therapy. However, length of stay was significantly longer in group receiving antimicrobials to which organisms were non-susceptible (5.12 \pm 3.187 vs. 8.54 \pm 5.186, *P* = 0.008).

Conclusion. This study found no significant difference in the treatment outcomes between pediatric patients receiving antimicrobials to which organisms were susceptible and non-susceptible for the treatment of UTI.In the era of increasing antimicrobial resistance, third-generation cephalosporins are still a good choice as an empirical antimicrobial for children with community-onset UTI.

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1510. Improving the Management of Pediatric Complicated Pneumonia

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Background. Pneumonia is a leading cause of pediatric hospitalization in the United States. Our Antimicrobial Stewardship Program (ASP) recognized significant variation in the management of pediatric complicated pneumonia. We developed and implemented a quality improvement (QI) intervention to align the management of complicated pneumonia with national guidelines and compared the medical care and clinical outcomes between a pre-intervention period and two post-intervention periods.

Methods. We queried Webi Universe for all ICD-9 and ICD-10-related admissions for pneumonia at our facility from November 15, 2015 to February 28, 2019. Manual chart review was done to extract clinical points of interest and to ensure that all included patients met inclusion criteria. Our first intervention (period 1) consisted of education to providers to increase use of chest tubes instilled with fibrinolytics and to decrease empiric antistaphylococcal therapy. Our second intervention (period 2) consisted of a care process model which codified the standardized management made by the first intervention, followed by several didactic sessions.

Results. 29 patients were identified in the pre-intervention period, 11 in post-intervention period 1, and 27 in post-intervention period 2. Streptococcal species were the most common pathogens recovered in all periods. Following our interventions the number of video-assisted thorascopic procedures to drain complicated parapneumonic effusions decreased three-fold in favor of chest tubes instilled with fibrinolytics (P < 0.01). Our interventions also reduced empiric antistaphylococcal therapy within the first 48 hours of admission (P = 0.02) and decreased the use of empiric vancomycin three-fold (P = 0.01). Our interventions did not affect the median length of stay, frequency of pulmonary complications, number of 30-day readmissions, or duration of antimicrobial therapy.

Conclusion. Our ASP's QI intervention decreased surgical drainage of complicated parapneumonic effusions and decreased the use of empiric antistaphylococcal agents without an increase in complications or readmissions. Opportunities remain to decrease the use of multiple antimicrobial agents within the first 48 hours of admission and to decrease the empiric use of antistaphylococcal therapy.

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1511. Effect of Discharge Antibiotic Route on Clinical Outcomes in Children with Methicillin-Resistant *Staphylococcus aureus* (MRSA) Osteomyelitis with Bacteremia

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Background. Children with osteomyelitis transitioned to oral step-down therapy experience similar outcomes to those treated with outpatient parenteral antibiotic therapy (OPAT). Compared with OPAT, oral therapy has lower costs and avoids catheter complications. However, few studies have specifically compared patient outcomes between those receiving oral therapy vs. OPAT for osteomyelitis with associated bacteremia caused by MRSA.

Methods. We performed a retrospective cohort study comparing early oral therapy (EOT), defined as transition to oral therapy at or prior to discharge vs. use of OPAT at discharge. We identified hospitalized children <19 years of age with MRSA osteomyelitis with bacteremia between 2007 and 2014 from three children's hospitals. The primary outcome was treatment failure within 6 months of discharge, defined as unplanned change in antibiotic after discharge, development of chronic osteomyelitis, need for an operative procedure after discharge, or recrudescence of bacteremia. The secondary outcome was treatment-related events, defined as documented adverse drug events in the medical record and/or central venous catheter complications. Between-group comparisons were made using Fisher exact test for binomial distributions and the Wilcoxon rank-sum test for continuous variables.

Results. We included 61 patients with MRSA osteomyelitis with bacteremia. Twenty-five patients (41%) received EOT and 36 (59%) received OPAT. Duration of bacteremia and hospital length of stay was similar between groups (Table 1). Clindamycin was the most commonly used antibiotic in both the EOT (24/25; 96%) and OPAT (22/36; 61%) groups. Clinical failure occurred in 1/25 (4%) children receiving EOT and in 5/36 (14%) in the OPAT group (95% CI of difference: -29 to 6%; P = 0.38, Table 1). Treatment-related adverse events occurred in 1/25 (4%) children receiving EOT compared with 9/36 (25%) receiving OPAT (95% CI of difference: -49 to -7%; P = 0.04, Table 1).

Conclusion. Children receiving EOT for MRSA osteomyelitis with bacteremia did not experience higher rates of clinical failure and had fewer treatment-related complications compared with OPAT. Oral step-down therapy can be considered for children with MRSA osteomyelitis with bacteremia.

Table 1 Baseline characteristics and outcomes

| Characteristic | EOT (N=25) | OPAT (N = 36) | P-value |
|---------------------------------------------|------------------|----------------------|---------|
| Age, years (median, IQR) | 7 (4,12) | 6 (4,10) | 0.86 |
| Sex | | | |
| Male, n (%) | 21 (84%) | 19 (53%) | 0.015 |
| Race, n (%) | | | |
| White, n (%) | 7 (28%) | 20 (56%) | 0.08 |
| Black, n (%) | 11 (44%) | 11 (31%) | |
| Comorbidities, n (%) | 7 (28%) | 9 (25%) | 1 |
| ID consultation, n (%) | 24 (96%) | 36 (100%) | 0.41 |
| Duration of bacteremia (median, IQR) | 3 (1,4) | 3 (1,5) | 0.71 |
| Duration of fever (median, IQR) | 6 (3,8) | 6 (3,9) | 0.95 |
| Initial CRP, mg/dl (median, IQR) | 13.2 (4.0, 23.5) | 19.0 (9.3,29.5) | 0.15 |
| Surgical drainage procedure(s), n (%) | 19 (76%) | 31 (86%) | 0.33 |
| Length of stay, median days (range) | 9 (7,12) | 10 (7.75,13) | 0.58 |
| Intensive Care Unit admission, n (%) | 6 (24%) | 7 (19%) | 0.76 |
| Duration of IV abx, days (IQR) | 9 (6,11) | 35 (26,49.25) | <0.001 |
| Total antibiotic duration | 40 (35,50) | 46 (39.25, 56.75) | 0.1 |
| Outcomes | | | |
| Failure, n (%) | 1 (4%) | 5 (14%) | 0.38 |
| All treatment-related adverse events, n (%) | 1 (4%) | 9 (25%) | 0.04 |
| Adverse drug event, n (%) | 0 (0%) | 2 (6%) | 0.51 |
| Central venous catheter event, n (%) | 0 (0%) | 5 (14%) | 0.72 |
| Readmission, n (%) | 0 (0%) | 6 (17%) | 0.03 |
| ED visit, n (%) | 0 (0%) | 2 (6%) | 0.30 |

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1512. Treatment of *Staphylococcus aureus* Bacteremia in a Pediatric Population: A Retrospective Cohort Analysis

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Background. Staphylococcus aureus bacteremia (SAB) is a well-known cause of morbidity in pediatric patients; however, limited data are available regarding optimal antimicrobial therapy. The purpose of this study was to assess treatment outcomes associated with intravenous (IV) vs. oral (PO) stepdown treatment of SAB in a pediatric population.

Methods. This study evaluated patients who were admitted between July 2012 and August 2018, between the ages of 3 months and 18 years, had a blood culture positive for *S. aureus*, and received at least 72 hours of inpatient treatment. Exclusion criteria were as follows: pregnancy, death within 72 hours of initial culture, hospice/palliative care, polymicrobial bacteremia, and previous SAB within the study period. The primary endpoint was 30-day readmission rates. Secondary endpoints included hospital length of stay and all-cause inpatient mortality.

Results. In total, 101 patients were included (43 IV therapy alone; 58 PO stepdown). The median age was 7.9 years (IQR, 3.0, 12.2; range 4 months to 16.7 years), and 52.5% were male. The most common primary foci of infection were osteomyelitis (n = 32), device-associated infections (n = 23), and skin/soft-tissue infections (n = 8). Most patients (56.4%) had no comorbidities. There were no significant differences in comorbidities between groups except the IV group had significantly more immuno-suppressed patients (30.2% vs. 1.7%; P < 0.001). Methicillin resistance was noted in 56.4% of patients (62.8% IV group vs. 51.7% PO stepdown; P = 0.313). The most common IV agents were vancomycin (n = 51) and anti-Staphylococcal penicillins (n = 20). Thirty-day readmission occurred in 25.6% (n = 10) of patients receiving full-course IV therapy and 5.3% (n = 3) in the PO stepdown group among survivors (P = 0.006; n = 96). Median length of stay was 11.0 days (IQR, 8.0, 21.0) in the IV group and 7.0 days (IQR, 5.0, 11.0) in the PO stepdown group (P = 0.001). All-cause inpatient mortality occurred in four patients (9.3%) in the IV group compared with one (1.7%) in the PO stepdown group (P = 0.10).

Conclusion. Patients in the PO stepdown group had a low rate of 30-day readmissions and had a significantly shorter hospital length of stay than patients who received a full IV course.

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1513. Management of Children with Blood Cultures (BC) Positive for Nonpathogenic Organisms After the Introduction of Polymerase Chain Reaction (PCR) Technology

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Background. Traditionally, clinicians would wait for the absence of growth in BC for 48 hours to consider a BC negative. A BC with a positive gram stain necessitated a repeat BC and antibiotics prior to final identification. Blood culture identification (BCID) PCR has the potential to shorten this time course, particularly with pathogens that are considered "contaminants." There is no published data which addresses the clinical significance of more rapidly identifying contaminants.

Methods. This is a retrospective chart review of data collected from children (ages 2 months- 18 years) treated at Cohen Children's Medical Center, who had a positive BC deemed a contaminant. A 2.5-year period prior to and after implementation of PCR technology was observed (September 2015–November 2018). A contaminant was defined as bacteria that is not considered virulent in an immunocompetent patient. Patients with indwelling catheters, those who have undergone corrective cardiac surgery or are immunocompromised were excluded from analysis. Data collected included length of stay, antibiotic duration and whether a patient received a repeat BC.

Results. 136 patients during this time (49% (n = 67) pre-PCR and 51% (n = 69) post-PCR) had positive BC for nonvirulent bacteria. Patients in the pre-PCR period received BC only, while those in the post-PCR period received both BC and PCR, with all BC and PCR results being concordant. The proportion of patients who did not receive antibiotics was greater in the post-PCR group (70%, 48 of 69) compared with the pre-PCR group (45%, 30 of 67), P < 0.01. Of those who received antibiotics, the proportion of patients who received more than 1 dose was significantly lower in the post-PCR group (43%, 9 of 21) compared with the pre-PCR group (73%, 27 of 37), P < 0.025. The proportion of patients who had a repeat BC was significantly lower in the post-PCR group (58%, 40 of 69), compared with the pre-PCR group (82%, 55 of 67), P = 0.0022. The proportion of patients who were asked to return to the emergency department was significantly lower in the post-PCR group (88%, 23 of 26), P = 0.016.

Conclusion. With the addition of PCR technology, patients with BC positive for nonpathogenic bacteria have received less antibiotics, less repeat BCs and were less frequently asked to return for evaluation.#8232;

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1514. Factors Associated with an Infectious Diseases Consultation for Pediatric Staphylococcus aureus Bacteremia

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Background. Staphylococcal aureus bacteremia is associated with substantial morbidity in children. An infectious diseases consultation is associated with decreased mortality in adults with *S. aureus* bacteremia, but this has not yet been shown in a pediatric population.

Methods. This was a retrospective cohort study of children <18 years old hospitalized at Children's National Medical Center with *S. aureus* bacteremia between January 1, 2012 and December 31, 2016. We excluded children with polymicrobial infections, those with a concurrent culture-proven infection, and those transferred with incomplete records. Structured manual chart review was used to collect demographic information, underlying comorbidities, type of admission (ICU or non-ICU), epidemiologic classification (hospital- or community-onset), primary source of infection, and methicillin resistance (MRSA or MSSA). A multivariable logistic regression analysis was performed to identify factors associated with having an infectious diseases consultation.