

**Disclosures.** T. Ferry, HERAEUS: Consultant, Speaker honorarium. S. Lustig, Heraeus: Consultant, Consulting fee

## 222. Clinical Outcomes of Prosthetic Knee Joint Infection in a United States Tertiary Healthcare Center

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**Session:** 45. Clinical: Bone and Joint Infection

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**Background.** The 2013 IDSA prosthetic joint infection (PJI) guidelines identified some research gaps, some of which include what factors may predict PJI outcome. We therefore conducted a retrospective single-center study with the goal of addressing some of these gaps.

**Objectives:** 1. Describe the incidence, pathogens, role of inflammatory markers, and treatment outcomes of knee PJI. 2. Identify correlations between joint aspiration (JA) and intraoperative (IO) cultures.

**Methods.** We retrospectively analyzed all adult knee PJI that were diagnosed and managed at our institution between 1/1/2005 and 12/31/2015. Statistical analysis was done using the paired *t*-test, Fisher exact and McNemar  $\chi^2$  tests as applicable.

**Results.** Forty-six subjects met the inclusion criteria and were analyzed. See table below.

Clinical and Demographic Information of PJI subjects (*n* = 46).

Parameter	Value (%)
Age (years)	
Range	27–84
Median	60
Mean	58.8
Sex	
Female	28 (61)
Symptom onset	
< 3 weeks	15 (33)
> 3 weeks	28 (61)
No Data	3 (6)
Implant duration	
Early (< 3month)	10 (22)
Delayed (3–24 month)	15 (33)
Late (> 24 months)	21 (45)
Positive culture	
JA	17 (37)
IO	29 (63)
Surgical Rx	
Two stage	15 (33)
Debridement and retention	18 (39)
Removal without replacement	13 (28)
Outcome	
Cure	26 (57)
Failure with relapse	5 (11)
Failure with progression	6 (13)
Indeterminate	6 (13)
Death	3 (6)

The incidence rate of PJI for the study period was 5.4%. *Staph. aureus* was the commonest pathogen accounting for 11(65%) JA and 13(40%) of IO cultures. Low virulence organisms [*Staph. epidermidis* *n* = 8 (25%) and *Corynebacterium* spp. *n* = 1 (3%)] were only recovered from IO cultures. Gram-negative bacilli accounted for 5(30%) JA and 7(28%) IO cultures. JA correlates well with IO cultures using paired sample correlations (*t*-test); (correlation 0.61, *P* = 0.027).. 97% of subjects had elevated ESR while 96% had elevated CRP. Concerning outcome, there was no statistically significant difference between groups based on implant duration (*P* = 0.98), symptom onset (*P* = 0.23), pathogen type (*P* = 0.83), and treatment options (*P* = 0.39).

**Conclusion.** 1. JA culture is a good predictor of IO culture in knee PJI. 2. Yield of low virulence organisms from JA culture is poor. 3. Elevated ESR and CRP can support diagnosis of knee PJI. 4. Implant duration, pathogen type, duration of symptoms and treatment type do not appear to affect outcome.

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## 223. Microbiological Epidemiology in Patients Experiencing Microbiological or Clinical Failure Following Reimplantation After a Two-Stage Exchange Strategy for Hip or Knee Prosthetic Joint Infection (PJI)

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**Background.** Patients with late PJI are at risk for superinfection at the time of reimplantation. Different commercially available antibiotic-loaded cements (gentamicin, vancomycin, gentamicin+clindamycin [G+C], gentamicin+vancomycin [G+V]) could be used for the fixation of the new prosthesis and could be effective to treat or prevent superinfection. We aim to determine the microbiological epidemiology in patients experiencing failure following reimplantation to establish, based on the drug susceptibilities, which cement could be the most active.

**Methods.** Prospective cohort study including all patients with a two-stage exchange in 2013–2015. Microbiological failure was defined by positive culture at the time of reimplantation. Clinical failure was defined by patients with clinical signs of infection requiring a new surgery.

**Results.** We included 117 patients (median age 70 years). Fourteen patients (12%) experienced a failure: seven patients with microbiological failure (four CoNS, one *P. acnes*, one *corynebacterium*, and three *Candida albicans*); seven patients with a clinical relapse requiring a new surgery (three *Enterobacteriaceae*, two *P. aeruginosa*, one *streptococcus* spp., one CoNS, one *P. acnes*, one *E. faecalis*). Considering the use of a vancomycin-loaded cement, this antibiotic was inactive on *Candida* (*n* = 3) and Gram-negative isolates (*n* = 5). Considering the use of gentamicin, this antibiotic was inactive on *Candida* (*n* = 3) and five bacterial isolates. These five letter isolates were also not susceptible to Clindamycin. Considering the use of G+V, this combination was inactive on *Candida* (*n* = 3) and only one bacterial isolate (a gentamicin-resistant *K. pneumoniae*). Consequently, the vancomycin-, gentamicin- and G+C-loaded cements may effectively treat or prevent 42.9% of superinfections, only. Conversely, the G+V-loaded cement may effectively treat or prevent 71.4% of them.

**Conclusion.** Considering the commercially available antibiotic loaded: none of the *Candida albicans* superinfection could be locally treated, and the G+V-loaded cement could treat or prevent most bacterial superinfections.

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## 224. Pressure Ulcer-Related Pelvic Osteomyelitis: Evaluation of a Two-Stage Surgical Strategy (Debridement, Negative Pressure Therapy and Flap Coverage) with Prolonged Antimicrobial Therapy

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**Background.** A two-stage surgical strategy (debridement-negative pressure therapy (NPT) and flap coverage) with prolonged antimicrobial therapy is usually proposed in pressure ulcer-related pelvic osteomyelitis but has not been widely evaluated.

**Methods.** Adult patients with pressure ulcer-related pelvic osteomyelitis treated by a two-stage surgical strategy were included in a retrospective cohort study. Determinants of superinfection (i.e., additional microbiological findings at reconstruction) and treatment failure were assessed using binary logistic regression and Kaplan–Meier curve analysis.

**Results.** Sixty-four pressure ulcer-related pelvic osteomyelitis in 61 patients (age, 47 [IQR 36–63]) were included. Osteomyelitis was mostly plurimicrobial (73%), with a predominance of *S. aureus* (47%), *Enterobacteriaceae* (44%), and anaerobes (44%). Flap coverage was performed after 7 (IQR 5–10) weeks of NPT, with 43 (68%) positive bone samples among which 39 (91%) were superinfections, associated with a high ASA score (OR, 5.8; *P* = 0.022). An increased prevalence of coagulase negative Staphylococci (*P* = 0.017) and *Candida* (*P* = 0.003) was observed at time of flap coverage. An ESBL *Enterobacteriaceae* was found in one (12%) patients, associated with fluoroquinolone consumption (OR, 32.4; *P* = 0.005). Treatment duration was as 20 (IQR 14–27) weeks, including 11 (IQR 8–15) after reconstruction. After a follow-up of 54 (IQR 27–102) weeks, 15 (23%) failures were observed, associated with previous pressure ulcer (OR, 5.7; *P* = 0.025) and Actinomyces infection (OR, 9.5; *P* = 0.027).

**Conclusion.** Pressure ulcer-related pelvic osteomyelitis is a difficult-to-treat clinical condition, generating an important consumption of broad-spectrum antibiotics. Carbapenem should be reserved for ESBL at-risk patients only, including those with previous fluoroquinolone use. The uncorrelation between outcome and the debridement-to-reconstruction interval argue for a short sequence to limit the total duration of treatment.

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## 225. Microbiologic Predictors of Pelvic Osteomyelitis Related to Decubitus Ulcers

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**Background.** Management of pelvic osteomyelitis related to decubitus ulcers (PODU) remains challenging, whereas definitive therapy is based on blood, bone,

or deep tissue cultures, empirical therapy prior to culture results may be indicated in patients with sepsis or cellulitis surrounding PODU. The objective of this retrospective case series is to develop an institutional protocol for empirical therapy of PODU when indicated based on local microbiology results.

**Methods.** Hospitalized adults with PODU from 1 August 2005 to 1 August 2015 at Palmetto Health hospitals in Columbia, SC were identified. PODU was defined based on clinical, radiographic, and microbiology criteria. Descriptive statistical methods (Fisher's exact) were used for preliminary analysis.

**Results.** Seventy-five cases with PODU were included with a mean age of 53 years and male predominance (48; 64%). The most common comorbidities were paraplegia (45, 60%), diabetes (23, 31%) and previous strokes (17, 23%). Forty-nine cases (65%) received antibiotics within a year of PODU. Prior infections or colonization with *P. aeruginosa* within the past year was present in 24/75 (32%) cases. Most cases had multiple sources of cultures: blood (61; 81%), bone/deep tissue (37; 49%), and/or superficial (73; 97%). Among a total of 99 clinical isolates, 56 (57%) were Gram-positive cocci (GPC) and 43 (43%) were Gram-negative bacilli (GNB). The most common organisms were *Enterobacteriaceae* (26; 26%), coagulase negative staphylococci (CONS) (20, 20%), *Staphylococcus aureus* (19, 19%), [12 (12%) methicillin-resistant *S. aureus*], and *P. aeruginosa* (9, 9%). Of the *Enterobacteriaceae*, 69% (18/26) were susceptible to ciprofloxacin and 88% (23/26) to ceftriaxone. All cases (9/9) of PODU due to *P. aeruginosa* had a prior infection/colonization with *P. aeruginosa* within 1 year as compared with 15/66 (23%) in those with PODU due to other organisms ( $P = 0.001$ ).

**Conclusion.** The microbiology of PODU is diverse (including GPC and GNB). Prior positive *P. aeruginosa* culture was a predictor of *P. aeruginosa* PODU. When empirical antimicrobial therapy is indicated, data support the use of intravenous vancomycin plus ceftriaxone in the absence of prior infection/colonization with *P. aeruginosa*, or intravenous vancomycin plus an anti-pseudomonal agent in the presence of prior *P. aeruginosa* within the past year.

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## 226. Clinical and Epidemiological Aspects Related to Infection of Orthopedic Prostheses in Argentinean Children. A 10-Year Period Study

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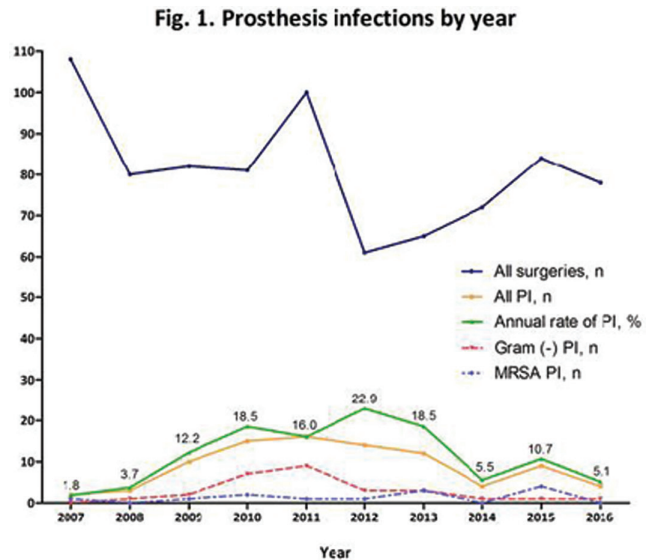
**Background.** Management of orthopedic prostheses infections (PI) in children is a main challenge, not only for the complexity of the disease but also for the scarce of evidence in this field.

**Objectives.** To describe the burden of PI and to analyze clinical and epidemiological aspects in pediatric patients.

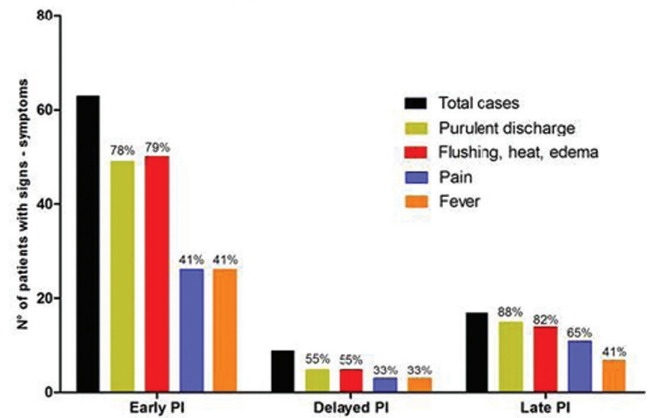
**Methods.** Retrospective study in a tertiary pediatric hospital. Clinical charts of patients <18 years who underwent surgery for bone and/or joint implantation at "R. Gutiérrez" Children's Hospital in Buenos Aires from January 2007 to December 2016 were reviewed, and all PI cases were analyzed. PI was defined as early (E) when presentation was within 3 months of prosthesis implantation, delayed (D) when presenting between 3–24 months and late (L) if presenting beyond 2 years.

**Results.** 811 surgeries performed; 89 PI detected: E(n = 63); D(n = 9), L(n = 17); 58% male; median(m) age: 13 years (range[r] 4–20); m hospital stay 30 days (r 6–180). Annual incidence: 11% (CI95%: 8.9–13.1) (Figure 1). Underlying conditions: scoliosis (58.4%), malignancy (16.8%). Clinical features are detailed in Figure 2. Bacterial isolation in 63 (70.8%) cases, 51 (57.3%) with a single microorganism (Figure 3). Gram(+) bacteria were isolated in 58% of E PI, 86% of D PI and 49% of L PI. Gram(-) pathogens in 49% of E PI and in 38% of L PI. Three febrile PI (3,4%) had Gram(+) bacteremia, two of them L PI. No differences were seen in white blood cell count (WBC) and C-reactive protein(CRP) levels on admission in children with and without bacteremia, nor among the different types of PI; m WBC 9000/mm<sup>3</sup> (r 3200–25550), m CRP 37 mg/l (r 1–270). WBC on admission in MRSA PI was significantly higher,  $P < 0.01$ . Duration of EV treatment was different according to type of microorganism ( $P 0.03$ ), higher in PI by Gram(-). Forty-eight (53.9%) cases continued with trimethoprim-sulfamoxazole orally, without side effects requiring its discontinuation. Total treatment duration (m): 189 days (r 28–756). Eighty-two children (92.1%) underwent surgical toilette, 37 (45.1%) required more than one. Six (6.7%) presented relapse and eight (9%) reinfection.

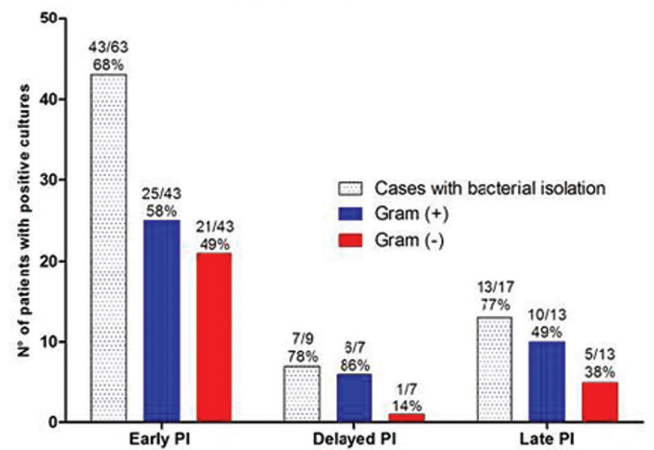
**Conclusion.** PI in children is a considerable burden, with high morbidity. Incidence of bacteremia was low. Results of the study could help to delineate preventive strategies and improve decision making in PI in children.



**Fig. 2. Clinical manifestations**



**Fig. 3. Bacterial isolation**



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**227. Epidemiology and Clinical Features of Septic Arthritis in Children**  
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