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## 2282. Clinical and Radiologic Manifestations of Cat-Scratch Osteomyelitis in Children

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**Session:** 250. Pediatric Bacterial Infections: From A to Z

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**Background.** Osteomyelitis (OM) is a rare sequela of cat scratch disease (CSD), often with atypical bone involvement. Clinical presentation of CSD OM is not well described. We sought to determine the clinical and radiologic manifestations of CSD OM patients admitted to Nationwide Children's Hospital.

**Methods.** EMR of inpatients was reviewed between January 2010 and March 2017. Clinical, radiological, and histopathological findings were collected.

**Results.** Nine patients with positive cat scratch serology and/or tissue PCR were identified. Mean age was 6 years and 8 months (range 3–12 years). Patients had a prolonged course of illness before the diagnosis was made (mean 9.7 days). All patients had fever and affected bone area pain. Patients had normal WBC (mean 11,800/mm<sup>3</sup>) and modest ESR (mean 53.2 mm/hours) and CRP (mean 5.2 mg/dl) elevations on admission. Six patients had osteomyelitis at ≥ 2 sites (multifocal) with no contiguous lymphadenopathy (LAD). The vertebrae and pelvic girdle were the most common sites. Two patients had contiguous paraspinal abscesses, and 1 patient had a concomitant lymph node (LN) abscess. No osteolytic lesions were identified. Serology in all (9 of 9 IgG, 7 of 9 IgM) and PCR of bone in 2 of 2 patients were positive. All patients received antimicrobial therapy with median duration of 28 days (IQR 15–50).

Patient	Liver, spleen, LAD	Vertebra/spine/pelvis	Long bones	Other bones	Treatment before admission	evaluation
1	Liver, Left axillary LAD	T7, S2, ischium	Femur, tibia	Skull base, 11th rib sternum,	Rifampin (R), doxycycline (D)	
2	Bilateral inguinal LAD	T3–5, T12, L1–2, S1, acetabulum			R, D	R, Azithromycin (A)
3		L2			A	A
4	Paraspinal and epidural abscess, inguinal LAD	T8, T11			R, D	A
5	Contiguous LAD with abscess		Humerus		TMP/SMX (T), R	A
6	Left inguinal LAD, small liver and spleen lesions	T11, S1–4			T, R, ciprofloxacin (C)	C, R, A
7	Psoas muscle, paraspinal abscess	L3, L5, S1, sacroiliitis		4 <sup>th</sup> rib	C	T, R
8	No	T3			A	
9	No	Ischium	Femur		A, R	

**Conclusion.** CSD OM has an indolent course of illness with moderate elevation of inflammatory markers. Unlike previous reports of CSD and other bacterial OM, multifocal osteomyelitis without contiguous LN involvement was common. Despite significant variations in treatment duration and antimicrobial therapy choices, all patients had clinical resolution of their CSD-associated disease.

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## 2283. Epidemiological Profile of Children Infected with *Bordetella pertussis* at Varela Santiago Children's Hospital: a Retrospective Study

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**Background.** Pertussis, also called whooping cough, is an acute infectious disease of high transmissibility transmitted through aerosol particles released during the catarrhal phase and paroxysmal cough. Since the 1990s its incidence has increased and atypical clinical forms have been identified, mainly in newborns and adults. We hypothesized that there is a relationship between the high incidence of pertussis infection in children up to 6 months of age and genetic changes in the circulating strains of *B. pertussis* leading to inefficacy of diphtheria, tetanus, and pertussis vaccine (DTP).

**Methods.** Data were obtained from the medical records of hospitalized patients at the Varela Santiago Children's Hospital in Brazil from January 1, 2013 to December 31, 2013.

**Results.** A total of 33 cases of pertussis hospitalizations were found, where 75.7% (25/33) of the patients were 6 months of age or younger (6 patients were 30 days old or younger while 19 ranged in age from 31 days to 6 months). Of these, 54.5% (14/25) were in exclusive breastfeeding children. Only 18.2% (6/33) of the patients had the appropriate administration of DTP doses according to their age. Signs and symptoms were: cough 100%, cyanosis 63.6%, fever 48.5% and inspiratory winch 33.3%. Azithromycin was used as monotherapy in 90% (30/33) of the cases and the mean time of hospitalization was 9.48 days ranging from 6 to 30 days. No patient died.

**Conclusion.** We identified a high prevalence (75.7%) of *B. pertussis* infection in children up to 6 months of age. This is likely explained by the low vaccination rate (18.2%) and the low percentage of exclusive breastfeeding of the studied population. The low rate of vaccination is unexpected, given that there has been greater access to vaccination in recent decades in Brazil. In addition, the cases evolved with an atypical clinical presentation, since the classic symptoms of the catarrhal stage were absent or had a such short duration that such symptoms were no longer present at the time of hospitalization. Our study does not exclude the possibility that genetic changes are occurring in the circulating strains of *B. pertussis* and that DTP seems to have less efficacy on these new strains, but future studies will be needed to specifically test this hypothesis.

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## 2285. The Impact of Routine *Chlamydia trachomatis* (CT) Screening during Pregnancy on the Seroepidemiology of Chlamydial Infection in Children, 1991–2015

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**Background.** CT remains the most prevalent STI in developed and developing countries. Prenatal screening and treatment of pregnant women has resulted in a dramatic decrease of perinatal CT infection. There have been limited seroepidemiologic studies in unselected children and adolescents following the implementation of routine CT screening as first recommended by the CDC in 1993.

**Methods.** Anonymized banked sera (–80°C) and prospectively collected sera from children and adolescents in Brooklyn, NY, were tested for anti-CT IgG via a validated enzyme immunoassay. Serum samples were divided by collection years: Group 1 (1991–1995, prescreening) and Group 2 (2012–2015, post-screening). Infants <1 year of age were excluded due to interference of maternal antibody. Maternal screening and CT infection rates during pregnancy were determined via a retrospective review of 200 random charts (2016–2017). Statistical analysis by Fisher's exact test.

**Results.** 297 serum samples were identified (age range 1–20 years). 18.5% (10/54) of subjects ≤10 years of age in Group 1 tested positive for anti-CT IgG, while none tested positive in Group 2 (0/55),  $P = .0006$ . Children >10 years had a prevalence of 10.3% (3/29) in Group 1 and 7.5% (12/159) in Group 2,  $P = .7$ . Maternal screening rate was estimated at 95.5%, with 100% screened if <25 years of age. The rate of maternal CT infection during pregnancy was 4.5% (9/200) overall, 8% (4/49) in <25 year olds and 3.3% (5/151) in ≥25 year olds.

**Conclusion.** Children ≤10 years of age in the prescreening group (1991–1995) had relatively high rates of seropositivity, likely due to persistence of antibody from perinatal infection. The absence of CT antibody in children ≤10 years of age in the post-screening group (2012–2015) and the high rate of prenatal screening (>95%) in this high-risk population suggest prenatal screening and treatment of pregnant women has been effective at preventing perinatal CT infection.

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## 2286. Risk Factors for Community-Associated *Clostridium difficile* Infection in Children

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**Background.** Incidence of *Clostridium difficile* infection (CDI) in children has been shown to be highest among those aged 1 to 3 years, with similar clinical presentation, disease severity, and outcomes as older children. In addition, a large proportion of CDI in children are community-associated (CA), but few data exist regarding associated risk factors. We sought to identify CA-CDI risk factors in younger children.

**Methods.** We enrolled children from 8 geographically-diverse U.S. sites during October 2014–February 2016. Case-patients were defined as children aged 12–60 months with a positive *C. difficile* stool specimen collected as an outpatient or within 3 days of hospitalization, who had no healthcare facility admission in the prior 12 weeks and no history of CDI. Each case-patient was matched to one randomly selected control (child with no prior history of CDI) by site and age group. Caretakers were interviewed about participants' relevant exposures in the 12 weeks prior to case-patient's illness onset date; univariate analysis was performed using exact conditional logistic regression.

**Results.** Of 138 children, 43.5% were female; 69.6% were 12–23 months old. A significantly higher proportion of cases than controls had: an underlying chronic medical condition (33.3% vs 11.9%;  $P = 0.02$ ); a neonatal intensive care unit (NICU) stay at time of birth (26.9% vs 13.2%;  $P = 0.04$ ); or recent antibiotic exposure (53.6% vs 20.6%;  $P = 0.0001$ ). More cases than controls had recent higher-risk outpatient healthcare exposures (emergency department, outpatient procedure and surgical centers, hospital-based outpatient settings, or urgent care) (34.9% vs 19.1%;  $P = 0.06$ ) or a household member with diarrhea (36.2% vs 20.6%;  $P = 0.05$ ). No difference was found in the proportion of cases and controls who had a feeding tube (2.9% vs 0%;  $P = 0.50$ ) or a recent exposure to gastric acid suppressants (6.1% vs 2.9%;  $P = 0.63$ ).

**Conclusion.** Young children with underlying disease, NICU stay, or recent antibiotic use might be at higher risk for CA-CDI. Improving outpatient antibiotic use, particularly among children with comorbidities, might reduce CA-CDI in this population. Further investigation of other risk factors, including outpatient healthcare and household exposures, is needed.

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## 2287. Risk Factors for Recurrent Pediatric Community Associated *Clostridium difficile* Infection

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**Background.** As rates of pediatric community-associated (CA) *Clostridium difficile* infection (CDI) increase, additional research is needed to address the paucity of data in this cohort. Studies in pediatrics suggest concurrent antibiotics, CA CDI, malignancy, recent surgery, the number of antibiotic exposures by class and tracheostomy as independent risk factors for recurrent CDI (rCDI).

**Methods.** This study was a retrospective review of the electronic health records of all children 1–17 years with stool specimens sent for *C. difficile* from January 1<sup>st</sup> 2012 – December 31<sup>st</sup> 2016 at Kaiser Permanente Northern California. Children with clinical symptoms consistent with CDI, confirmatory laboratory testing, no other identified causes of diarrhea, and community associated disease were defined as cases.

**Results.** Of the 961 positive *C. difficile* cases from 2012 to 2016, 744 were community-associated. There were 558 total cases of CA CDI fitting case definition. Of these 507 were primary, 43 recurrence and 8 recurrence following recurrence. The incident rate of CDI was 17 per 100,000 children.

The overall rate of recurrence in our cohort was 8.5%. Race and having a diagnosis of inflammatory bowel disease (IBD) were statistically significant risk factors for rCDI. Compared with other races, we observed increased rates of rCDI in multi-racial and "other/unknown" children. Though not statistically significant, there appeared to be a correlation between the age subset of 2–5 years of age and developing rCDI. (Table)

Table: Demographics and comorbidities in rCDI

	Total Primary		Recurrence <8wk		p-value
	N = 507	(%)	N = 43	(%)	
Age (years)					0.09
1	131	(25.8)	6	(4.6)	
2–5	131	(25.8)	22	(16.8)	
6–11	87	(17.2)	6	(6.9)	
12–17	158	(31.2)	20	(12.7)	
Sex					0.99
Female	247	(48.7)	21	(8.5)	
Male	260	(51.3)	22	(8.5)	
Race					0.02
Caucasian	244	(48.1)	21	(8.6)	
Hispanic	133	(26.2)	8	(6.0)	
Asian	67	(13.2)	4	(6.0)	
African American	31	(6.1)	2	(6.5)	
Multi-Racial	23	(4.5)	6	(26.1)	
Other/Unknown	9	(1.8)	2	(22.2)	
IBD					0.02
No	340	(67.1)	22	(6.5)	
Yes	167	(32.9)	21	(12.6)	
Malignancy					0.33
No	477	(94.1)	39	(8.2)	
Yes	30	(5.9)	4	(13.3)	

**Conclusion.** High suspicion for recurrence must be maintained in multi-racial or non-Caucasian, Hispanic, Asian, or African American children and those with underlying IBD for rCDI in children.

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## 2288. *Clostridium difficile* Molecular Epidemiology in a Prospective Cohort of Canadian Children Compared with Cases of *C. difficile* Infection

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**Background.** *Clostridium difficile* is a notorious nosocomial pathogen, but little is known regarding the colonization commonly observed in children. It is suspected that *C. difficile* carriage in infants is a reservoir for toxigenic strains. To test this hypothesis, we sought to determine the genetic relatedness between a prospective cohort of *C. difficile* toxin gene positive healthy children and those with acute gastroenteritis (AGE) and strains identified in adult and pediatric *C. difficile* infection (CDI) cases from Alberta, Canada. Additionally, we compared *C. difficile* toxin production in healthy and AGE children.

**Methods.** *C. difficile* was cultured from 97 hospitalized CDI cases ( $n = 79$  adult;  $n = 18$  pediatric) from stool samples tested positive for toxigenic *C. difficile* by C.DIFF QUIK CHEK COMPLETE® enzyme immunoassay (EIA) in 2015 and samples tested positive for toxin genes by the Luminex xTAG® Gastrointestinal Pathogen Panel from a prospective cohort of 59 children with AGE seeking care at the emergency department and 17 healthy children attending public health clinics. Isolates were then characterized by PCR-ribotyping, pulsed-field gel electrophoresis (PFGE), PCR of the *tcdA*, *tcdB*, *tcdC*, and *cdtB* genes and *C. difficile* toxigenicity by EIA for a subset of 14 healthy and 45 AGE children.

**Results.** Ribotype 106 was predominant among all pediatric isolates ( $n = 21$ , 27.6% AGE and healthy children;  $n = 5$ , 27.8% pediatric CDI) and ribotype 027 in adult CDIs ( $n = 35$ , 44.3%). Eighteen ribotypes were shared between children and CDI cases ( $n = 134$ , 77.5%). Sixteen unique ribotype and PFGE patterns ( $n = 84$ , 48.6%) were identified in two or more cohorts. Similar toxin gene profiles were observed across the three cohorts, but adult CDI isolates had a higher proportion of binary toxin positive isolates ( $n = 42$ , 53.2%) compared with children ( $n = 3$ , 3.95%) and pediatric CDI ( $n = 0$ ). *C. difficile* toxigenicity was similar ( $P = 0.23$ ) amongst the subset of healthy ( $n = 6$ , 42.9%) and AGE ( $n = 28$ , 62.2%) children.

**Conclusion.** Production of *C. difficile* toxins in children was not significantly associated with symptoms of AGE. *C. difficile* strains found in children were similar to those from CDI cases; especially pediatric cases. This suggests that strains might be shared, but the development of CDI may be related to factors other than *C. difficile* strain type.

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