including antibiotic use and offending organisms. We compared the cumulative incidence of reinfection between those with or without suppression using a competing risk model, with death and revision for mechanical failure as competing risks.

Results. The median age was 77 years (range, 48–94). Gender distribution was equal. The median Charlton Comorbidity Index (CCI) was 3 (1–11), while median BMI was 30.1 (17.8–59.5). Eleven of 51 patients received antibiotic suppression after spacer retention. A history of prior antibiotic suppressive therapy was the only variable associated with being placed back on antibiotic suppression after spacer retention [OR 18 (95% CI 3.2–100)]. During the median follow-up period of 31.3 months, there were five re-infections. The cumulative incidence of re-infection was not significantly different between suppressed and unsuppressed groups ($P = 0.89$). The re-infecting pathogens were different from the index offending organisms. Only the presence of preoperative draining sinus was significantly associated with re-infection [OR 10 (95% CI 1–99.6)].

Conclusion. In selected patients where a second-stage prosthesis re-implantation is not an option, and retention of "temporary" antibiotic loaded spacer is surgically preferred, the risk of re-infection was not prevented by prolonged antibiotic suppression. The presence of a draining sinus was significantly associated with re-infection, often with new pathogens.

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323. Childhood Outcomes Following Parechovirus Central Nervous System Infection in Young Infants at a US Children's Hospital

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Background. Parechovirus (PeV), specifically *Parechovirus A* type 3 (PeV-A3), is a picornavirus associated with severe infection in young infants, with disease manifestations ranging from undifferentiated fever, to sepsis like illness, and meningoencephalitis. There are limited data regarding long-term outcomes of infected infants. The objective of this study was to describe early childhood outcomes following infantile PeV-CNS infection

Methods. Families of Infants hospitalized during 2014 with laboratory confirmed PeV-CNS infection were contacted for neurodevelopmental follow-up. Testing included medical history, standard neurologic examination, parental completion of Ages and Stages questionnaire (ASQ) and determination of Bayley III cognitive, motor, and language quotients. Neurodevelopmental impairment (NDI) was considered present if cognitive, motor, or language quotients were >1 standard deviation (mild) or >2 SD (severe) below the testing norms, the presence of cerebral palsy (CP), or sensory (vision/hearing) impairment. Relationship of childrens' outcomes to severity of PeV disease (uncomplicated febrile illness [mild], disseminated disease [moderate] or advanced disease requiring intensive care [severe]) was assessed by chi-square analysis.

Results. Nineteen children were available for testing at approximately 3 years of age (31–38 months), 12 (63%) with mild, five (26%) moderate, and two (11%) with severe disease. Mean Bayley quotients were within normal limits (see table), one infant had mild CP (5%) and two (11%) had mild NDI. There was no apparent relationship of NDI with infant PeV clinical presentation. ASQ results included 11% at referral level and 32% suspect, and were unrelated to severity of the viral illness. However, all parents of children with moderate or severe presentations of infantile PeV disease had medical or behavior concerns at 3 years of age compared with 25% of those with mild presentation ($P = 0.007$).

Bayley Quotients

	Mean	Range
IQ	98	85–125
Motor	108	91–130
Language	103	89–118

Conclusion. Neurodevelopmental impairments may be seen following infant PeV disease, but may not correlate with severity of clinical disease. Longitudinal monitoring of developmental status through early childhood following PeV infantile disease is warranted.

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324. Lack of Accuracy of the International Classification of Disease, Ninth (ICD-9) Codes in Identifying Patients With Encephalitis

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Background. ICD-9 codes have been widely used in studies utilizing large national databases that evaluate the clinical epidemiology of encephalitis in the United States. Many studies have showed that ICD-9 codes have poor accuracy in stroke, multiple sclerosis and pulmonary fibrosis but their utility in encephalitis is unknown.

Methods. Retrospective study of all adults with a discharge diagnosis of encephalitis by an ICD-9 code. The study was performed in 17 hospitals from the Memorial Hermann Hospital and Harris Health Hospital system in the Greater Houston area from March 2010 until July 2015. Medical records were reviewed and a case was considered accurately classified as encephalitis if they met the definition established by the international encephalitis consortium.

Results. A total of 1,241 cases were identified by a discharge diagnosis of ICD-9 code as having encephalitis. The most common cause identified was not having a central nervous system infection in 580 (46.7%) patients. A total of 244 (19.6%) patients were correctly identified as having encephalitis. Other causes identified were nosocomial meningitis (11.9%), community-acquired bacterial meningitis (8.1%), aseptic meningitis (5.8%), fungal meningitis (5.4%), tuberculosis (2.0%), and parasitic meningitis (0.2%).

Conclusion. ICD-9 codes have poor reliability in identifying patients with encephalitis questioning the accuracy of large nationwide studies that utilize them to identify patients.

Table 1: Correct Clinical Diagnosis in 1,241 Patients with a Discharge Diagnosis of Encephalitis by ICD-9 Codes.

Diagnosis	Number of Patients (%)
Non-CNS infection	580 (46.7)
Encephalitis	244 (19.6)
Nosocomial meningitis	148 (11.9)
Bacterial meningitis	101 (8.1)
Aseptic meningitis	72 (5.8)
Fungal meningitis	68 (5.4)
Tuberculous meningitis	25 (2.0)
Parasitic meningitis	3 (0.2)

Abbreviation: ICD-9, an International Classification of Disease, Ninth; CNS, Central Nervous System.

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325. Neurosyphilis Management in the Post-Procaine Penicillin Era

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Background. Neurosyphilis (NS) is an infection of the central nervous system caused by *Treponema pallidum*. Intramuscular (IM) penicillin (PCN) G procaine is a treatment option for those who cannot receive or decline intravenous (IV) therapy. Since August 24, 2016, it has been unavailable from the manufacturer, necessitating the use of IV PCN for NS. Our institutions organized a multidisciplinary, coordinated care system to expedite outpatient treatment of NS upon diagnosis. We report successful management of NS at an urban safety-net hospital in the post-procaine PCN era.

Methods. We identified patients with suspected NS from the King County Public Health STD and Harborview Infectious Disease clinics from October 2016 to February 2018. Demographics, clinical symptoms, diagnostics, treatment, and outcomes were collected by chart review. Successful NS treatment was defined as resolution of cerebrospinal fluid (CSF) pleocytosis or elevated protein, improvement in neurologic symptoms or appropriate decrease in serum rapid plasma reagin (RPR) or CSF Venereal Disease Research Laboratory (VDRL) titers.

Table 1: Demographic and Socioeconomic Characteristics

	Total = 43
	n (%)
Gender	
Male	39 (91)
Race	
White	29 (67)
Black	3 (7)
Asian	3 (7)
Homeless	5 (12)
Insurance status[a]	
Private	15
Medicaid	20
Medicare	8
Charity care	11
Substance use disorder	15 (35)
HIV Positive	22 (51)
Viral load suppressed (< 200 copies/mL)	13 (59)

[a]Represents more than one payer per patient.

Results. We identified 43 cases of suspected NS. The most common symptoms were blurred vision, headache, and tinnitus. All had a lumbar puncture (LP). Median days from LP to treatment initiation was 6—many starting on day of diagnosis. Fourteen patients (33%) required admission for treatment. Two patients declined therapy. IV PCN G was used in 93% of cases; one received IM ceftriaxone. Treatment was successful in 32 of 41 (78%) cases, with 23 of these (72%) managed as outpatients. Three cases were treatment failures for incomplete therapy adherence or equivocal response and uncertain diagnosis.

Conclusion. Without available IM procaine PCN, neurosyphilis is challenging to manage in vulnerable populations or those wishing to avoid inpatient admission. Employing a multidisciplinary, coordinated care approach can lead to successful treatment of NS using IV PCN in the outpatient setting.

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326. Malaria vs. Bacterial Meningitis in Children With Spinal Tap in the Luanda Children's Hospital, Angola

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Background. In Sub-Saharan Africa, both malaria (M), and bacterial meningitis (BM) cause fever and central nervous system (CNS) disturbance. We studied their prevalence, characteristics, outcome, and risk factors for poor outcome to better understand the clinical impact of suspected CNS infection in children.

Methods. We conducted a prospective study in the Children's Hospital (HPDB) in the capital of Angola which attends 300 new patients daily. Spinal tap (ST) was performed for children presenting with altered consciousness, convulsions, prostration, or meningism. The analysis included children aged 3 month to 15 years with confirmed discharge diagnosis in 2016–2017.

Results. Of 941 children, the diagnosis was M in 56% (525), BM in 12% (116), epilepsy/convulsions in 9% (88), and other infections in 6% (60). Of all children, 16% (150/941) died, 6% (45/733) had severe, 14% (93/655) any neurological sequelae, and 27% (243/897) either died or had neurological sequelae. In children with M, the corresponding figures were 7% (35/525), 1.5% (7/476), 4% (19/443), and 11% (54/514). In children with BM, the figures were 41% (47/116), 15% (8/54), 33% (11/33), and 55% (58/105), respectively. Comparing with M, children with BM were younger (median age (IQR) 28 (61) vs. 60 (68) months, $P < 0.0001$), had an underlying illness (23/97 vs. 19/374, $P < 0.0001$), like sickle-cell disease (18/96 vs. 9/372, $P < 0.0001$), longer duration of illness (4 (4) vs. 3 (3) days, $P < 0.0001$, dyspnea (70/119 vs. 210/463, $P = 0.009$), were dehydrated (36/113 vs. 67/441, $P < 0.0001$), or malnourished (38/115 vs. 75/447, $P = 0.0001$). Multivariate analysis revealed as independent risk factors for death or neurological sequelae age <12 months (OR 1.71, 95% CI 1.02–2.88, $P < 0.0001$), duration of illness >3 days (2.48, 1.68–3.64, $P < 0.0001$), malnutrition (1.92, 1.20–3.05, $P = 0.006$), and dehydration (1.92, 1.16–3.14, $P = 0.01$). When BM vs. M was included in the analysis, BM appeared as the most important risk factor (OR 8.06, 4.44–14.65, $P < 0.0001$) and age lost its significance.

Conclusion. In suspected CNS infection, M was the final diagnosis of most children. However, BM caused more deaths and neurological sequelae. Amendable factors, such as delay in treatment, dehydration, and malnutrition, appeared as risk factors for poor outcome.

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327. Comparison of Clinical Outcome, Causative Serotypes, and Antimicrobial Susceptibilities Between Pneumococcal Meningitis and Pneumococcal Bacteremic Pneumonia in Adult Patients in the Republic of Korea

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Background. Pneumococcal meningitis (PM) is one of invasive pneumococcal disease (IPD) and is considered as a medical emergency with notable morbidity and mortality. This study was designed to characterize differences in clinical characteristics and outcomes, pneumococcal serotypes, and antimicrobial susceptibilities between PM and pneumococcal bacteremic pneumonia (PBP) in adult patients in the Republic of Korea (ROK) from a prospective observational cohort.

Methods. Adult IPD cases (≥18 years) were prospectively collected from 20 hospitals participated in the pneumococcal surveillance program in the ROK from 2013 through 2015. Serotyping and antimicrobial susceptibility testing were performed by a multiplexed serotyping assay and Microscan system, respectively.

Results. During the study period, 30 cases of PM and 205 cases of PBP were compared. Serotypes 19A, 15B/15C, and 35B were the most prevalent among PM cases, whereas serotypes 3, 11A/D/F, and 19A were the most common serotypes in PBP. There were significant female predominance (46.7% vs. 2.3%, $P = 0.022$), younger age (56.7% vs. 36.1%, $P = 0.031$), less immunocompromised states (3.3% vs. 28.8%, $P = 0.005$), less underlying chronic lung diseases (3.3% vs. 16.6%, $P = 0.04$), and lower mortality rate (16.7% vs. 44.4%, $P = 0.004$) in PM, compared with PBP. However, PM cases showed higher penicillin resistance (76.7% vs. 19.2%, $P < 0.001$), and ceftriaxone resistance (53.3% vs. 13.4%, $P < 0.001$), consistent with higher MDR prevalence in PM cases (76.7% vs. 53.2 $P = 0.016$). All PM cases except for three cases received empiric or definite vancomycin treatment. Multiple logistic regression analysis showed that penicillin resistance (odds ratio [OR] 15.75, 95% confidence interval (CI) 3.82–64.72, $P < 0.001$) and survival (OR 20.73, 95% CI 3.1–136.74, $P = 0.002$) were significantly associated with PM.

Conclusion. This study indicates that adult PM showed favorable clinical outcomes, compared with PBP, despite of differences in clinical characteristics.

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328. National Expertise Group to Improve Management of Complex Encephalitis Cases

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Background. Incidence of infectious encephalitis in France is evaluated to be 0.5 to 1/100,000 inhabitants. That means encephalitis are rare infections, and not all physicians do not have expertise about this disease. In case of complex presentations, they may benefit from advices and guidance from a multidisciplinary group. The French infectious diseases society implemented a group of expertise in 2016 to address clinicians' difficulties with complex cases in a timely manner.

Methods. Experts were delegated by scientific societies (Infectious Disease, Microbiology, Neurology, Intensive care and Public Health) with regards to their expertise in brain infections. Any physician facing difficulties to manage a patient presenting as a complex case can ask for advice, using a specific e-mail address (*encephalite.spilf@infectiologie.com*). They have to provide a detailed summary of the clinical case, together with all available biological and etiological results and, when possible, an access to brain images. The case file is then or circulated by mail or discussed in a conference call, within 48 hours. At the end of the discussion, a written answer is produced (detailed recommendations and justification). The traceability of the advice is kept by the French infectious diseases society for both teaching purposes and legal matters.

Results. So far we had to examine 32 cases, providing from various hospital in mainland France, French West Indies, and Polynesia: 15 from university hospital and 17 from nonuniversity hospitals. Questions (overlapping in some cases) were related to diagnosis procedure (12), to treatment (4), to interpretation of imaging (5), to management of failure (6), and interpretation of test results (10). Our answers were: investigation for autoimmune or inflammatory disease (15); investigation for tuberculosis and/or treatment (14); investigation for tumour (3); complementary tests for an unusual pathogen (10). Pertinence of the advices was adapted in 20 cases (30 evaluated).

Conclusion. Such a group seems to be useful, and the organization at a national-level works. It is also the opportunity to extend our network in the field of neurological infections, and to use the submitted cases as education material for young ID fellows.

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