***Disclosures.*** **All authors:** No reported disclosures.

**1006. Diagnostic accuracy of CSF cell index and corrected CSF white blood cell count in healthcare-associated ventriculitis and meningitis after intracranial hemorrhage**

Helena Jenkinson, MD[1]; Onaizah Habib, MD[2]; Lucrecia Salazar, MD[2] and Rodrigo Hasbun, MD, MPH[3]; [1]University of Texas McGovern Medical School at Houston, Houston, Texas, [2]Division of Infectious Diseases, University of Texas McGovern Medical School at Houston, Houston, Texas, [3]Division of Infectious Diseases, University of Texas Health Science Center at Houston, McGovern Medical School, Houston, Texas

**Session:** 137. Adult CNS Infection
*Friday, October 6, 2017: 12:30 PM*

***Background.*** The diagnosis of healthcare-associated meningitis and ventriculitis (HCAMV) in patients with intracranial hemorrhage (ICH) is challenging. The purpose of this study was to evaluate the diagnostic accuracy of routine cerebrospinal fluid (CSF) studies including a cell index and a corrected white blood cell (WBC) count.

***Methods.*** Case control study of adult patients with the diagnosis of ICH and HCAMV at a large tertiary care hospital in Houston, Texas from 2003 to 2016. Cases were defined as patients with ICH and HCAMV as documented by a positive CSF culture. Controls were selected as patients with ICH without evidence of HCAMV, no previous antibiotic therapy and a negative CSF culture. Cases and controls were matched 1:2 by age, Glasgow Coma Scale (GCS) and Apache II scores. Cell index was calculated using the following formula: (CSF leukocytes / CSF erythrocytes) / (blood leukocytes / blood erythrocytes). Corrected WBC count was calculated using the following formula: CSF leukocytes - (CSF erythrocytes/1,000). Area under the curve of receiver operating characteristic (AUC-ROC) and 95% confidence interval (CI) for CSF cell index greater than or equal to absolute value of 1, corrected CSF WBC count greater than 5 K/uL, CSF lactate greater than 4 mmol/L, and CSF glucose less than 40 mmol/L, respectively, were calculated in order to determine the accuracy of these studies.

***Results.*** A total of 120 patients with ICH were included in this study; 40 patients had proven HCAMV whereas 80 patients had ICH with no evidence of HCAMV. Matching of cases and controls by age, GCS, and Apache II score was appropriate ($p$>0.05). The AUC-ROC values for CSF cell index, corrected CSF WBC count, CSF lactate, and CSF glucose were all low at 0.609 (95% CI = 0.449–0.768), 0.731 (95% CI = 0.589–0.872), 0.719 (95% CI = 0.573–0.864), and 0.609 (95% CI = 0.449–0.768), respectively.

***Conclusion.*** This study demonstrated poor accuracy of CSF cell index, corrected CSF WBC count, CSF lactate, and CSF glucose in diagnosis of HCAMV after ICH.

***Disclosures.*** **R. Hasbun**, Biomeriaux: Consultant, Consulting fee. Biofire: Speaker's Bureau, Speaker honorarium. Merck: Speaker's Bureau, Speaker honorarium. Pfizer: Speaker's Bureau, Speaker honorarium. Medicine's Co: Speaker's Bureau, Speaker honorarium.

**1007. Achieving Optimal Specialty Cerebrospinal Fluid (CSF) Testing: Are Electronic Medical Record Order Sets Helpful?**

Jessica I. Abrantes-Figueiredo, MD[1]; Virginia M. Bieluch, MD, FIDSA[2] and Michael D. Nailor, PharmD, BCPS (AQ-ID)[3]; [1]University of Connecticut Health Center, Farmington, Connecticut, [2]Medicine, Hospital of Central Connecticut, New Britain, Connecticut, [3]University of Connecticut School of Pharmacy, Storrs, Connecticut

**Session:** 137. Adult CNS Infection
*Friday, October 6, 2017: 12:30 PM*

***Background.*** Specialty PCR testing has become available for lumbar puncture to determine the cause of infectious meningitis and encephalitis. Testing with low pre-test probability may increase antimicrobial therapy while results are pending and create increased direct costs. We aim to describe the appropriateness of testing before and after the implementation of electronic medical record (EMR) order sets designed to reduce excessive testing of CSF by creating two lists of tests: (1) a routine panel for all patients and (2) a list of optional specialty tests designed to be utilized after the nucleated cells are resulted.

***Methods.*** Retrospective study of adult patients undergoing lumbar puncture with suspicion for CNS infection pre-and post-implementation of EMR order sets from January 2016–March 2017. Consecutive patients with complete charts were reviewed from a tertiary care center. Data collected included demographics, co-morbid conditions, clinical presentation, and lumbar puncture results. The primary outcome of interest was the frequency of CSF specialty testing in patients with ≤ 10 nucleated cells/μL in the CSF.

***Results.*** Two hundred patients had ≤ 10 nucleated cells/μL in the CSF ($n$ = 108 in pre-EMR group; $n$ = 92 in post-EMR group). Of these patients 74% and 48.9% had Herpes Simplex Virus (HSV) PCR testing done pre and post EMR changes ($P$ < 0.05). Enterovirus PCR testing remained similar among both groups (37% pre-EMR order sets vs. 36.9% post-EMR order sets, $P$ = 0.99). Lyme PCR testing decreased between pre- and post-groups (26.8% vs. 9.7%, $P$ < 0.05). CSF Epstein-Barr virus PCR testing also dropped significantly from 26.9% to 7.6% ($P$ < 0.05). All specialty PCR testing that was performed on patients with ≤ 10 nucleated cells/μL in the CSF were negative. Paradoxically, HSV antibody testing increased post-implementation of EMR order sets (21.7% vs. 0%, $P$ <0.05). Total costs of tests on average decreased by $70.71 per patient post EMR changes.

***Conclusion.*** In this cohort, CSF specialty testing was common but decreased after EMR changes. Laboratory stewardship can be improved with EMR changes but further education is needed to prevent unnecessary tests. Unwanted tests (HSV antibodies) may be increased as prescribers are unable to locate familiar tests.

***Disclosures.*** **M. D. Nailor**, Astellas: Scientific Advisor and Speaker's Bureau, Consulting fee and Speaker honorarium. Merck: Grant Investigator, Research grant.

**1008. Brain Abscess Risk Associated with Genotypic Polymorphism of the Matrix Metalloproteinase-1, -2, -3, and -9 in North Indian Population**

Priyanka Mishra, MSc[1]; Kashi Nath Prasad, MD[2]; Kamini Singh, PhD[3]; Rabi Narayan Sahu, MS[4]; Swayam Prakash, PhD[5] and Bal K Ojha, MS[6]; [1]Microbiology, Sanjay Gandhi Post Graduate Institute of Medical Science, lucknow, India, [2]Microbiology, Sanjay Gandhi Post Graduate of Medical Science, lucknow, India, [3]Microbiology, Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow, India., lucknow, India, [4]Neurosurgery, Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow, India, lucknow, India, [5]Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow, India, [6]Sanjay Gandhi Postgraduate Institute of Medical Sciences, lucknow, India

**Session:** 137. Adult CNS Infection
*Friday, October 6, 2017: 12:30 PM*

***Background.*** Brain abscess develops in response to a parenchymal infection due to pyogenic bacteria. MMPs (matrix metalloproteinases) play vital role in many infectious and central nervous system (CNS) diseases. The present study evaluated the association of specific alleles/ genotypes of MMP-1, -2, -3, and -9 with brain abscess.

***Methods.*** A total of 100 brain abscess patients and 100 healthy controls were included in the study. Predisposing factors were identified in 70 brain abscess patients. Out of 100 brain abscess samples, 66 were culture positive. MMP-1-1607 1G/2G, MMP-2- C-1306-T, MMP-3 -1171 5A/6A, and MMP-9 C-1562Tgenotypes were detected by PCR-RFLP. Levels of these MMPs were determined in patients' sera by ELISA and correlated with different genotypes.

***Results.*** The genotypic distributions of MMP-1-1607 1G/2G, MMP-2-C-1306-T, MMP-3 -1171 5A/6A, and MMP-9 C-1562T were significantly different between patients and controls. Homozygous genotype of MMP-1, -3, and -9 ($P$ < 0.001, $P$ = 0.04, and $P$ = 0.03, respectively) and heterozygous genotype of MMP-2 ($P$ < 0.001) showed significant association with brain abscess. Individuals with mutant genotypes had elevated levels of these MMPs. Furthermore, heterozygous (5A/6A and C/T, respectively) genotypes of MMP-3 and -9 also showed significant association with brain abscess patients having predisposing factors. When comparison was made between culture positive and culture negative results, of MMP-1 2G/2G and MMP-9 T/T, C/T genotype showed significant association with culture positive patients

***Conclusion.*** Polymorphism of MMP-1-1607 1G/2G, MMP-2- C-1306-T, MMP-3 -1171 5A/6A, and MMP-9 C-1562T polymorphisms lead to increased production of these molecules, which appear to be a risk for the development of brain abscess in North Indian population.

***Disclosures.*** **All authors:** No reported disclosures.

**1009. The Etiologies and Clinical Characteristics of Patients Hospitalized with an Acute Febrile Illness and Central Nervous System Sydromes in Indonesia**

Abu Tholib Aman, MSc, PhD, SpMK (K)[1]; Muhammad Hussein Gasem, PhD, SpPD-KPTI[2]; Emiliana Tjitra, MSc, PhD[3]; Bachti Alisjahbana, PhD, SpPD-KPTI[4]; Herman Kosasih, PhD[5]; Ketut Tuti Merati, SpPD-KPTI[6]; Mansyur Arif, SpPK[7]; Muhammad Karyana, M.Kes[8]; Pratiwi Sudarmono, PhD, SpMK(K)[9]; Suharto Suharto, MPdk, DTMH, SpPD-KPTI[10]; Vivi Lisdawati, M.SI, Apt[11]; Aaron Neal, PhD[12] and Sophia Siddiqui, MPH[12] [1]Gadjah Mada University, Yogyakarta, Indonesia, [2]Faculty of Medicine, Diponegoro University, Semarang, Indonesia, [3]National Institute of Health Research and Development, Ministry of Health, Jakarta, Indonesia, Jakarta, Indonesia, [4]Faculty of Medicine, Hasan Sadikin General Hospital, Bandung, Indonesia, [5]INA-RESPOND, Jakarta, Indonesia, [6]Faculty of Medicine Udayana University & Sanglah Hospital, Bali, Indonesia, [7]Dr. Wahidin Soedirohusodo Hospital & Hasanuddin University, Makassar, Indonesia, [8]National Institute of Health Research and Development, Ministry of Health, Jakarta, IndonesiaD, Jakarta, Indonesia, [9]Cipto Mangunkusumo Hospital, Jakarta, Indonesia, [10]Faculty of Medicine, Airlangga University & Dr. Soetomo Hospital, Surabaya, Indonesia, [11]Sulianti Saroso Hospital, Jakarta, Indonesia, [12]Clinical Research Center, NIAID, National Institutes of Health, Bethesda, United States, Bethesda, Maryland

**Session:** 137. Adult CNS Infection
*Friday, October 6, 2017: 12:30 PM*

***Background.*** Acute febrile illness is a common reason for hospitalization in many developing countries, including Indonesia. While patients can often be categorized and managed based on clinical presentations, diagnostic capacity in these countries remains limited, leading to poor patient outcomes. For patients with central nervous system (CNS) infections, identifying the underlying etiologies is particularly important to prevent lifelong neurological complications and death.

***Methods.*** As part of a study conducted at 8 top-referral hospitals across Indonesia from 2013 to 2016, 114 of 1,486 enrolled subjects presented with an acute fever and a CNS syndrome. To identify the etiologies and clinical manifestations of these infections, as well as the management of febrile patients at the hospitals, demographic and clinical data were collected at enrollment, and blood samples

were collected for diagnostic testing at enrollment, once during days 14–28, and at 3 months after enrollment.

***Results.*** Subject ages ranged from 1 to 63.2 years old (median of 4.9 years old), and underlying diseases were reported in 35 (30.7%) subjects. Standard-of-care, molecular, and serological testing identified pathogens in 56 (49.1%) cases, as detailed in the table. Of the 19 subjects who died, 18 presented with decreased consciousness and 5 were infected with *Rickettsia typhi*, which was clinically misdiagnosed in each case.

***Conclusion.*** The findings from this study will improve the diagnosis and treatment of patients presenting with CNS syndromes in Indonesia. Additionally, the discovery of misdiagnosed, fatal etiologies highlights the general need for greater diagnostic testing capacity to aid clinicians and inform public health policy makers.

| | Acute febrile patients with neurological signs and symptoms | | | |
|---|---|---|---|---|
| Consciousness status (n) | Normal (61) | | Decreased (53) | |
| Mortality (%) | 1.6 | | 34 | |
| End-of-study status (n) | Discharged (60) | Died (1) | Discharged (35) | Died (18) |
| Etiology (n) | Unknown (32)<br>HHV-6 (9)<br>Dengue (8)<br>Chikungunya (5)<br>Influenza (3)<br>*K. pneumoniae* (1)<br>Amoeba (1)<br>*S.* Typhi (1) | Unknown (1) | Unknown (16)<br>Dengue (5)<br>HHV-6 (3)<br>Influenza (2)<br>*E. faecalis* (2)<br>Chikungunya (1)<br>*Leptospira spp.* (1)<br>*E. coli* (1)<br>*S. Aureus* (1)<br>Seoul Virus (1)<br>*S.*Typhi (1)<br>RSV (1) | Unknown (9)<br>*R. typhi* (5)<br>Dengue (1)<br>Influenza (1)<br>*Salmonella spp.* (1)<br>*S. pneumoniae* (1) |

***Disclosures.*** **All authors:** No reported disclosures.

**1010. Viral Infections of the Central Nervous System in Qatar: Epidemiology, Pathogenesis and Clinical Outcomes**

Fatma Ben Abid, MD[1]; Mohammed Abukhattab, MD[1]; Obada Salameh, MD[1]; Ahmed Gohar, MD[1]; Muna Al Masalmani, MD[1]; Abdullatif Al-Khal, MD[1] and Adeel Butt, MD, MS[2]; [1]Medicine, Hamad Medical Corporation, Doha, Qatar, [2]Hamad Medical Corporation, Doha, Qatar

**Session:** 137. Adult CNS Infection
*Friday, October 6, 2017: 12:30 PM*

***Background.*** Viral central nervous system (CNS) infections are common causes of morbidity and mortality globally. There are no existing data about viral CNS infections in Gulf Cooperation Council countries. We conducted this study to determine the etiology, clinical and epidimiological characteristics, and outcomes of viral central nerveous system infection in patients in Qatar.

***Methods.*** We retrospectively evaluated all cerebrospinal fluid findings from January 2011–March 2015 at any of the 7 hospitals in the Hamad Medical Corporation. We included those with an abnormal CSF findings and excluded those with missing medical records, no clinical evidence of CNS infection and those with proven bacterial infection. Based on pre-defined clinical and CSF (lab, culture, PCR) criteria, patients were classified as having meningitis, meningoencephalitis, encephalitis or myelitis. We reviewed the laboratory results to determine the proportion of persons with confirmed viral etiology.

***Results.*** Among 7690 patients with available CSF results, 550 cases met the case definition criteria for viral CNS infection (meningitis 75%; meningoencephalitis 16%; encephalitis 9%; myelitis 0.4%). Two-thirds (65%) were male and 50% were between 16-60 years old. The most common presenting signs and symptoms are listed in the table. Persons of Southeast Asian origin accounted for 39.6% of all infections. A definitive virologic etiologic agent was found in 38%, with enterovirus being the most common (44.3%) followed by Epstein–Barr virus (31%) and varicella-zoster virus (12.4%). The clinical outcome was overall good, only 2 cases died and the rest were discharged to home. Among those with confirmed viral etiology, 83.8% received ceftriaxone (mean duration 7.3 ± 5.2 days), 38% received vancomycin (mean duration 2.7 ± 5.4 days) and 38% received at least one other antibiotic.

***Conclusion.*** Viral etiology is common among those evaluated for CNS infection in Qatar, and is most commonly seen in Southeast Asian immigrants. Clinical outcomes are generally excellent in this group of patients. Antibiotics are overly used even when a viral etiology is confirmed. There is a need for clinician education regarding etiology and treatment of CNS infections.

**Table. Baseline characteristics and symptoms and signs**

| | N(%) |
|---|---|
| Male | 360(65%) |
| Female | 190(35%) |
| Qatari | 104(19%) |
| Non-Qatari | 446(81%) |
| Mean age, years ± SD | 20.5±18.9 |
| Travel in last one month | 87(16%) |
| Sick contact in last 1 month | 70(13%) |
| Diabetes Mellitus | 28 (5%) |
| Use of immunosuppressive drugs | 1 (0.2%) |
| **Symptoms** | |
| Fever | 467(85%) |
| Headaches | 296(54%) |
| Vomiting | 273(49%) |
| Nausea | 184(33%) |
| Reduced feeding/Appetite | 180(32%) |
| Altered mental Status | 178(32%) |
| photophobia | 106(19%) |
| Seizures | 92(16%) |
| Diarrhea | 74(13%) |
| Coma | 2(0.3%) |
| **Signs** | |
| Neck rigidity | 213(39%) |
| Kerning's Sign | 96(17%) |
| Brudzinski Sign | 62(11%) |
| Skin Rash | 41(7%) |
| Cranial nerve palsy | 8(1%) |
| Spastic paralysis | 1(0.2%) |
| Flaccid paralysis | 1(0.2%) |

***Disclosures.*** **A. Butt**, Merck: Investigator, Grant recipient

**1011. Acute Flaccid Myelitis Cases Presenting During a Spike in Respiratory Enterovirus D68 Circulation: Case Series From a Single Pediatric Referral Center.**

Samia Naccache, PhD[1]; Jeffery Bender, MD[2]; Jay Desai, MD[3]; Tam Van, PhD[1]; Lindsay Meyers, BS[4]; Jay Jones, MS[5]; Kanokporn Mongkolrattanothai, MD[2] and Jennifer Dien Bard, PhD[1]; [1]Pathology and Laboratory Medicine, Children's Hospital Los Angeles, Los Angeles, California, [2]Pediatrics, Children's Hospital Los Angeles, Los Angeles, California, [3]Division of Neurology, Children's Hospital Los Angeles, Los Angeles, California, [4]Biofire Diagnostics, Salt Lake City, Utah, [5]Biofire Diagnostics, LLC, Salt Lake City, Utah

**Session:** 137. Adult CNS Infection
*Friday, October 6, 2017: 12:30 PM*