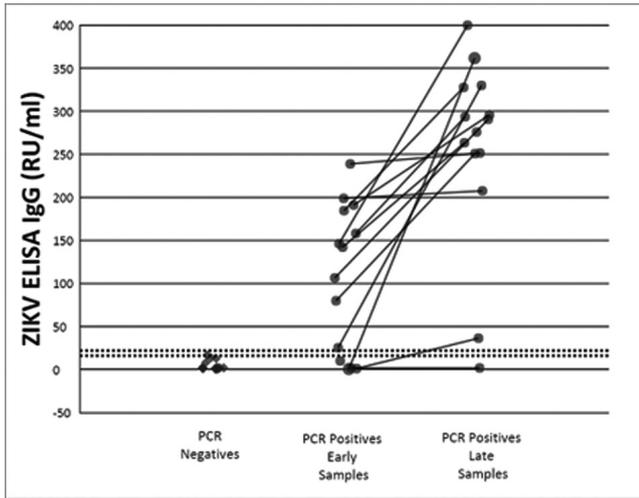


Figure 1. Plot of anti-ZIKV IgG levels in distinct groups of patients. Left (diamonds) are ZIKV-negative historic controls. Right (connected circles) are ZIKV PCR-positive patients tested on separate times. One patient has a concentration above 400 RU/ml in the second sample. The single PCR positive patient who remains below the cut-off is a pregnant female.



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845. Utilizing an Equitable and Multifaceted Zika Screening Tool to Identify At-Risk Individuals For Testing and Education: Successes, Challenges, and Lessons Learned in Harris County, Texas.

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Background. Harris County Public Health (HCPH) is the health department for Harris County, Texas jurisdiction, representing 2.3 million residents. Located in the nation's Third most populous county, HCPH's 13 wellness clinics and WIC centers provide services for over 100,000 patients annually.

Since late 2015, HCPH confirmed 46 individuals with Zika infection/disease, including two infants with microcephaly and congenital disease. Over two-thirds of these infections were in individuals of Hispanic origin, including all twelve infected pregnant women, two of whom were unaccompanied minors.

Due to Harris County's geographic vulnerability to Zika, highly mobile residents, and HCPH's largely low-income Hispanic and refugee clinic population, equitably screening and educating patients about Zika exposure is of paramount importance.

Methods. Using U.S. CDC guidelines, HCPH developed a multifaceted Zika Screening Tool (ZST) for use within clinics. Front desk staff, outreach workers, nursing staff, and clinical providers all participate in various portions of the education-based screening process. The ZST is updated as new CDC guidance becomes available.

Results. All pregnant and high-risk patients received Zika education. Forty-five patients, mostly pregnant females, were additionally referred for testing and further care.

Conclusion. HCPH's ZST successfully identified high-risk patients for education and testing. This presentation will explore HCPH's equity-based rationale for education-oriented screening, the ZST's evolution over time, and describe ZST forms and their integration into the clinic visit. Successful implementation strategies, challenges, and lessons learned will also be discussed, along with the role of the ZST as an integral part of HCPH's overall multidisciplinary Zika response effort.

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1004. Are New Biomarkers Useful in the Diagnosis of Meningitis in Adults?

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Background. Meningitis is infection of the central nervous system with high mortality and morbidity in adults. Markers for diagnostic purposes can therefore be useful guides in differential diagnosis. Procalcitonin (PCT), platelet distribution width (PDW) and red blood cell distribution width (RDW) can be easily calculated with

automated blood systems, and have been regarded as biomarkers showing inflammation in infection-related diseases. The purpose of this study was to determine the diagnostic significance of these biomarkers in adult meningitis.

Methods. This study was a retrospective investigation. Diagnosis of meningitis was based on clinical findings and microbiological and biochemical investigations of CSF specimens. Patients' white blood cell count (WBC), C-reactive protein (CRP), PDW, RDW and PCT levels at time of presentation were compared. $P < 0.05$ was regarded as statistically significant.

Results. 137 patients were assessed. Ninety-five patients had acute bacterial meningitis (ABM), 17 had aseptic meningitis (AM) and 25 had chronic meningitis (CM). When patients were evaluated by age, AMB was more common in the elderly and AM in the young ($P < 0.05$). CRP and PCT levels at presentation were significantly higher in AM than in AM and CM ($P < 0.05$). WBC levels differed statistically significantly between ABM and CM ($P < 0.05$). PDW levels were significantly higher in AM than in CM ($P < 0.05$). RDW was statistically significantly higher in CM than in ABM and AM ($P < 0.05$). When ROC analysis was performed to differentiate ABM from the other forms (table). Correlation analysis between CSF biochemistry and biomarkers revealed that PCT was positively correlated with CRP, PDW and CSF protein and negatively correlated with CSF glucose.

Table: ROC analysis for PCT, CRP and WBC in subjects with ABM

Biomarker	Cut-off	AUC	Sensitivity	Specificity	PPV	NPV	P
PCT	0.9	0.713	56.3	86.1	90.7	44.9	<0.001
CRP	2.2	0.740	76.8	64.3	83.0	55.1	<0.001
WBC	14400	0.647	34.7	92.9	91.7	38.6	0.002

Conclusion. Our results suggest that PCT and CRP have diagnostic characteristics in favor of ABM at differential diagnosis in cases in which LP is contraindicated and/or CSF examination cannot be performed immediately or the agent cannot be identified. WBC and RDW can be useful guides in differentiating ABM from CM, and PDW and RDW in differentiating CM from ABM and AM.

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1005. Epidemiology, Outcomes and Prognosis of Central Nervous System Infections in Singapore. Preliminary results from The Singapore Neurologic Infections Programme (SNIP)

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Background. Central Nervous System (CNS) infections frequently result in devastating consequences although the aetiology is seldom definitively identified. To address this knowledge gap, we conducted a prospective study to describe the epidemiology of CNS infections in Singapore.

Methods. Patient enrollment was conducted in 5 adult tertiary hospitals in Singapore, between August 2013 and December 2016. Patients aged ≥ 16 years who met the inclusion criteria were enrolled. Demographic data, neuroimaging, neurophysiology and biochemical results were collected. Cases were classified as "Confirmed" or "Probable" depending on whether the aetiological agent was detected by either culture or molecular methods in the CSF. The modified Rankin Scale (mRS) was recorded at enrollment, 2 weeks and 6 months, with scores of 0–2 classified as good and 3–6 as poor outcome.

Results. A total of 2061 patients were screened, of whom 199 met the inclusion criteria.

A total of 106 (53.2%), 65 (32.7%) and 28 (14%) cases of meningitis, meningoencephalitis and encephalitis were diagnosed, respectively. An aetiological agent was identified in 119 (60%) of cases. *Mycobacterium tuberculosis* (MTb) was the most common cause of meningitis and meningoencephalitis with 23 (13.5%) cases. Herpes simplex virus was the most common aetiology for encephalitis with 3 (10.7%) cases. Immune-mediated aetiologies accounted for 8 (4%) of the total cases. Fatal outcomes were observed in 7 (3.5%) patients.

The absence of focal weakness (aOR 0.024 95% CI 0.001–0.535 $P = 0.018$) and absence of altered mental status (aOR 0.03; 95% CI 0.002–0.43; $P = 0.009$) at admission predicted good outcomes at 6 months. Vomiting was associated with poor prognosis (aOR 17.91; 95% CI 1.12–286.04; $P = 0.041$).

Conclusion. It is surprising that MTb was the most common aetiological agent although none were fatal. Our study identified aetiological diagnoses, clinical and biochemical results that correlated with outcome of CNS infections although it also underscores the need for better diagnostic tools for aetiological confirmation.

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

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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.

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

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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/ μ L in the CSF.

Results. Two hundred patients had ≤ 10 nucleated cells/ μ L 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/ μ L 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.

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

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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-1562T genotypes 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.

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

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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