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**Session:** 225. Clinical Practice Issues: HIV, Sepsis, QI, Diagnosis  
*Saturday, October 6, 2018: 12:30 PM*

**Background.** Diagnostic tests are a crucial part of clinical care. However, they can often result in unnecessary testing with no patient impact. Diagnostic stewardship seeks to modify the process of ordering, performing and reporting diagnostic tests to improve resource utilization and patient outcomes. We have identified infectious diseases viral molecular tests that are meant for outpatient management that are often ordered during a hospital stay. Our objective was to quantify how often these tests were ordered and acted upon, as well as the cost associated with them.

**Methods.** HIV quantitative PCR, HIV genotype and HCV genotype were selected as the target tests to be evaluated in this study. We measured the number of times these tests performed at Memorial Hermann Hospital TMC from January to December 2017. The individual and total cost of these tests were calculated. We sampled charts to determine whether the test had been acted on during or after the hospitalization.

**Results.** During the study period, a total of 512 HIV viral loads, 29 HIV genotypes, and 58 Hepatitis C genotypes were ordered. The total expense on the HIV viral load tests was \$43,228, total expense on HIV genotypes was \$8,669, and for Hepatitis C genotype was \$43,055. Our chart sampling showed that HIV viral load was not acted on 65% of the time, HIV genotype test was not acted on 62% of the time and HCV genotype was not acted on 50% of the time.

**Conclusion.** Three molecular viral tests that were acted upon less than 50% of the time they were ordered, collectively added an expense of \$94,952 over the course of a year at MHH TMC. A diagnostic stewardship program based on education and selective restriction of diagnostic testing may result in avoidance of unnecessary testing and substantial savings.

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### 1917. Diagnostic Errors in Bacterial Osteomyelitis in Children

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**Background.** Delayed or erroneous diagnoses of bacterial infections may cause adverse outcomes in patients. Bacterial osteomyelitis has a low incidence, is only infrequently encountered by primary care pediatricians, and has obscure symptoms in children that make an early and accurate diagnosis challenging. The aim of this study was to determine the incidence and causes of diagnostic errors in pediatric patients in whom bacterial osteomyelitis was finally diagnosed.

**Methods.** Children who received a definitive diagnosis of acute or chronic bacterial osteomyelitis were enrolled at Tokyo Metropolitan Children's Medical Center between April 2010 and September 2017. The initial diagnoses were retrospectively reviewed by two pediatricians to evaluate the incidence of misdiagnosis and the types of diagnostic error involved, such as system-related and cognitive errors. Each type of error was subcategorized into associated factors including patient, task, team, organizational/ management, and individual factors, work conditions, and flaws in data gathering, information processing, and verification. The cumulative results for each pediatrician were averaged. A kappa statistic was calculated to assess interobserver agreement.

**Results.** The total incidence of misdiagnosis of bacterial osteomyelitis was 36% (27/75), of which 33.3% (13/39) and 38.9% (14/36) were misdiagnoses of acute and chronic osteomyelitis, respectively. The main type of diagnostic error was cognitive (89.3%). The number of subcategorized factors was 2.5 per diagnostic error. In cases of cognitive errors, the associated factors were flaws in data processing, data gathering, and verification, at 20 (30.2%), 15 (22.6%), and 17 (26.4%) cases, respectively. Inter-reviewer agreement was substantial, with kappa = 0.993 for the primary analysis and 0.805 for the subgroup analysis.

**Conclusion.** Cognitive errors were the primary cause of the misdiagnosis of bacterial osteomyelitis. Educational approaches focusing on improving data gathering, processing, and verification should improve diagnostic accuracy.

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### 1918. Is It Time to Assess the Role of Blood Cultures in the Current Practice of Medicine?

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**Background.** Today's physician must deal with data from traditional tests, as well from new sources like smart phones and texting, the electronic medical record (EMR), septic shock and sepsis "bundles," and the availability of PCR for the rapid

identification of organisms, all in an environment of antibiotic stewardship programs. We need to assess which methods of data collection are meaningful and efficient, and which can be modified.

**Methods.** We reviewed a handwritten log of the preliminary demographics of patients with positive blood cultures from a 6-year study period, then confirmed this number with the financial department, as well as the locations where blood cultures were drawn, and the charges generated. Our data identify those who died, but do not identify the cause of death nor the causative nature of the patient's bacteremia for mortality.

**Results.** We found that the majority of orders were for "two sets of blood cultures 30 minutes apart," but there were multiple orders for one or more additional sets; in many cases, additional cultures were ordered because of temperature elevation or leukocytosis; in other instances, the indication for the blood culture was not clear. The number and volume of blood cultures ordered for individual patient encounters came at the discretion of the individual physician. The percentage of positive blood cultures was approximately 5%, of an average 17,000 cultures done per year, with total charges of more than \$60 M over a 6-year period. Thus, we have a common test with low sensitivity resulting in a high financial expenditure

**Conclusion.** Since data sharing among medical teams is now easier because of new tests and electronic data gathering advances in medicine, it is also easier to assess which traditional patterns of data collection are most effective and which should be reviewed. All blood culture order guidelines for local hospital systems should be reviewed and assessed for efficacy and efficiency by the appropriate personnel. National organizations should consolidate and codify one set of clinically relevant and case-based guidelines from those which are available.

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### 1919. Outpatient Care-Seeking Prior to Acute Respiratory Infection Hospitalization in the United States, 2012–2014

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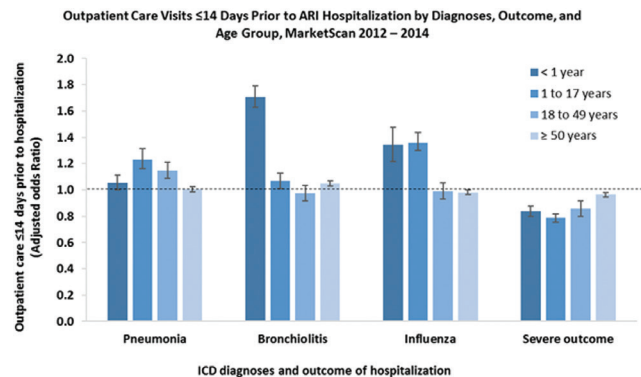
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**Background.** Acute respiratory infection (ARI) diagnoses encompass syndromes such as pneumonia and bronchiolitis, and are among the leading causes of hospitalization. While outpatient care could present an opportunity to prevent subsequent hospitalization, few studies have measured healthcare utilization preceding hospitalization. We characterized outpatient visits in the 2 weeks prior to ARI hospitalization using commercial insurance and Medicare claims in MarketScan from 2012 to 2014.

**Methods.** We included inpatients with an ICD9 discharge diagnosis for ARI (460–466), pneumonia (480–486), or influenza (487–488) and evaluated outpatient records ≤14 days prior to admission, excluding the day of admission. We defined an outpatient visit as health encounters with a reasonable potential for medical care receipt (e.g., medical device delivery). We used the previous 12 months of medical records to define patients' Charlson Index and health care utilization, including any prior hospitalizations and preventive and ambulatory care sensitive condition (ACSC) visits. Severe outcomes were defined as intensive care unit admission or death. We used multivariable logistic regression stratified by age group to evaluate demographic, clinical, health utilization, and outcome factors associated with outpatient care prior to admission.

**Results.** We identified 407,096 ARI hospitalizations, among which 60% of patients had ≥1 outpatient visit prior to admission; 36% of visits occurred 1 day prior to admission. Children aged <1 were more likely to have a preceding visit compared with other age groups (67% vs. 57% to 59%,  $P < 0.001$ ). In all age groups, persons with preventive care and ACSC visits in the past year, a Charlson score ≥1, female sex, non-capitated health plans, and salaried employment were more likely to have a preceding outpatient visit. Patients with severe outcomes were significantly less likely to have a preceding visit, while specific diagnoses varied by age group (figure).

**Conclusion.** In a population of insured individuals, only 60% received outpatient care in the 2 weeks prior to ARI hospital admission. A greater understanding of healthcare seeking behaviors for potentially preventable hospitalizations is needed.



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### 1920. Ocular Involvement in Candidemia Patients at an Urban Tertiary Care Center: Is Inpatient Ophthalmologic Consultation Essential?

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**Background.** Visual loss is a feared consequence of candidemia. The IDSA recommends dilated eye examination for all patients diagnosed with candidemia, irrespective of symptoms. Approximately 1% of patients with candidemia have ocular involvement. Given the low incidence, we posit that inpatient ophthalmologic consultation may not be required for every candidemic patient.

**Methods.** We retrospectively reviewed records of all patients with candidemia from June 2015 to March 2017. Age, gender, comorbidities, time to initiation of antifungal treatment, *Candida* species and choice of antifungal medication were recorded. We also obtained time to ophthalmology consultation and associated cost.

**Results.** A total of 120 patients with candidemia were identified (mean age 61; 62% male, 38% female). Seventy-nine percent had an indwelling venous catheter, 37% had DM, 24% were immunosuppressed, 16% had CKD, 14% were receiving TPN, and 15% were IVDU. Ninety-five percent of patients had received antibiotics in the previous 30 days. Twenty-six percent had undergone major surgery in the preceding 90 days. The majority of isolates were *Candida albicans* (46%). Average duration of candidemia was 4 days (range 1–18). Of the 120 patients, 73 (60%) underwent Ophthalmology evaluation. Two of those patients (2.7%) endorsed ocular symptoms, but only one had objective ocular involvement (retinitis without vitritis) which did not necessitate intravitreal therapy or surgery. The majority of our patients (68%) were treated with fluconazole. Initiation of antifungal therapy ranged from the day candidemia was diagnosed to 5 days later. Time to Ophthalmology consultation (from the time consult was requested) ranged from 1 to 9 days. Total cost for all ophthalmology consultations approximated \$22,000.

**Conclusion.** Ocular involvement was rare in our study. No change in short-term management was made based on ocular findings. However, there was substantial cost associated with inpatient ophthalmology consultation and probably with length of stay in patients awaiting eye examination. Hence, we suggest that inpatient eye evaluation may be reserved for patients with ocular symptoms (and those unable to verbalize complaints) as long as outpatient ophthalmology examination can be arranged.

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### 1921. Attributable Inpatient Costs of Hospital-Onset *Clostridium difficile* Infection: A Nationwide Case-Control Study in Japan

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**Background.** Hospital-onset *Clostridium difficile* infections (CDIs) have a considerable clinical and economic impact on both patients and payers. Quantifying the economic impact of CDIs can guide treatment strategies. However, previous studies have generally focused on acute care hospitals, and few have included cost estimates from nonacute care hospitals such as rehabilitation centres and long-term care facilities. The aim of this study was to quantify the hospital-onset CDI-attributable inpatient costs and length-of-stay durations in all healthcare institutions that provide inpatient care (including acute and nonacute care) in Japan.

**Methods.** Using national-level insurance claims data, we analyzed patients who had been hospitalized between April 2010 and December 2016. CDI case patients were identified and matched with non-CDI control patients using hospitalization year, treating hospital, age, sex, surgical procedure, comorbidities, and main diagnoses. Using multivariable regression analyses, we estimated the CDI-attributable inpatient costs and length-of-stay durations while adjusting for variations in factors such as age, sex, comorbidities, surgery, prescribed antibiotic, geographic region, and hospitalization year. We also analyzed the CDI-attributable inpatient costs and length-of-stay durations according to hospital type (acute care and rehabilitation/long-term care).

**Results.** The analysis was conducted using 3,768 matched pairs. Overall CDI-attributable inpatient costs and length-of-stay durations were US\$3,213 and 11.96 days, respectively. Rehabilitation/long-term care hospitals had substantially higher inpatient costs and longer hospitalizations than acute care hospitals.

**Conclusion.** This study quantified the hospital-onset CDI-attributable inpatient costs and hospitalizations in both acute and nonacute care hospitals. The inclusion of nonacute care hospitals provides a more accurate representation of the economic burden of CDIs.

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### 1922. The Challenges of Caring for People Who Inject Drugs: An Opportunity for an Infectious Diseases Service

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**Background.** The Royal London Hospital is a tertiary public hospital in the eastern region of London, UK—an ethnically diverse area with high levels of poverty and homelessness. Since its inception in 2015 the Infectious Diseases (ID) service has cared for 229 inpatients—10% were people who inject drugs (PWID). Such patients have complex problems including homelessness, domestic violence and psychiatric illness which impact their inpatient stay and discharge from the hospital.

**Methods.** To retrospectively evaluate the management and treatment of PWID managed by the ID team from April 2015 to June 2017 and identify strategies to improve care.

**Patients were identified via electronic records.** PWID not under the direct care of the ID team were excluded. Reason for admission, microbiological diagnosis, antibiotic choice, blood borne virus status, central venous access and other specialist input were noted.

**Results.** Twenty-two PWID were identified; 13 (59%) were male, median age was 39.5 years (IQR 32.5–46).

**Table 1:** Infectious Diagnoses of PWID

Complicated MSSA bacteremia	12
Complicated MRSA bacteremia	2
Complicated other bacteremia	2
Non bacteremic presentations	6
Pulmonary TB	3
Groin abscess	2
Vertebral osteomyelitis	1

Eighteen patients (82%) received antibiotics via a central line. There was one case of line-associated infection (*Candida glabrata*). Three patients (14%) left hospital against advice, eight attended follow-up after discharge. There were no deaths. The mean length of stay was 39 days. Thirteen patients were identified as homeless and eight of these (62%) were discharged to a home.

**Conclusion.** The majority of PWID managed by the ID team had complicated bacteremia requiring long courses of intravenous antibiotics. Despite concern regarding central access, line associated infection was rare. Significant proportions also had blood borne virus infection (86%) and over 50% had psychiatric illness and/or are homeless. Together these factors represent major obstacles to providing the considered “gold standard” care. These findings highlight the currently unmet need for an integrated multidisciplinary approach to the care of PWID.

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### 1923. OPAT or No-PAT? Evaluation of Outpatient Parenteral Antimicrobial Therapy (OPAT) Patients Receiving Daptomycin or Ertapenem for “Ease of Administration”

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**Background.** Outpatient parenteral antimicrobial therapy (OPAT) allows for long-course intravenous treatment of infections without lengthy hospital stays. Upon discharge, antimicrobial therapy may be broadened to ertapenem or daptomycin for “ease” of once-daily administration. Patients requiring subsequent readmission should be properly tailored to pre-OPAT regimens to minimize collateral damage and reduce cost. This study assessed the continuation of “ease of administration (EOA) regimens” upon hospital readmission during or immediately following OPAT.

**Methods.** This was a single-center, retrospective review of adult patients enrolled in OPAT and discharged between January 1, 2014 and September 30, 2017 on ertapenem or daptomycin for “EOA.” This was defined by the presence of the terms “convenience” or “EOA” in OPAT notes or by broadening of coverage to ertapenem or daptomycin upon OPAT enrollment despite adequate therapy with more narrow-spectrum agents. Patients receiving directed carbapenem or daptomycin therapy prior to OPAT enrollment were excluded. The primary outcome was the percentage of patients readmitted during or within 90 days of their OPAT course and maintained on an “EOA regimen” of antibiotics. Secondary outcomes included inpatient therapy cost, rates of *Clostridium difficile* infection, and adverse drug reactions. Demographics and outcomes were summarized using descriptive statistics.

**Results.** Of the 188 patients receiving an OPAT “EOA regimen,” 71 were readmitted, representing 113 unique readmissions. Patients were mostly male (81%) with a median age of 57 years. “EOA regimens” were continued in 27% of hospital