Oral Abstract Session:

37. Antimicrobial Stewardship

Thursday: 10:45 a.m. - 12:15 p.m.
Room: SDCC 33 ABC

Moderators:
DAVID SCHWARTZ, MD; John H. Stroger Hospital of Cook County
SARA COSGROVE, MD, FIDSA, FSHEA; Johns Hopkins Medical Institutions

Presenters:

109 10:45 a.m. **Effect of an Outpatient Antimicrobial Stewardship Intervention on Appropriate Prescribing by Primary Care Pediatricians**
JEFFREY GERBER, MD, PHD[1], PRIYA PRASAD, MPH[1], A. RUSSELL LOCALIO, PHD[2], ALEXANDER FIKS, MD, MSCE[1], ROBERT GRUNDMEIER, MD[1], LOUIS BELL, MD[1], RICHARD WASSERMAN, MD[3], RON KEREN, MD[1] and THEOKLIS ZAOUTIS, MD, MSCE[1]; [1]The Children's Hospital of Philadelphia, Philadelphia, PA, [2]University of Pennsylvania School of Medicine, Philadelphia, PA, [3]University of Vermont College of Medicine, Burlington, VT

110 11:00 a.m. **A Telemedicine Based Anti-microbial Stewardship Program**
JAVEED SIDDIQUI, MD, MPH[1], CHRIS KUTZ, PHARM D[2], NANCY LARGE, PHARM D[2], MICHAEL NORTON, PHARM D[2], PAMELA WILEY, CLS (ASCP)[2] and COURTNEY MCMAHON, BSN, CIC[2]; [1]TeleMed2U, Roseville, CA, [2]Sonoma Valley Hospital, Sonoma, CA

111 11:15 a.m. **Impact of Adherence to Antimicrobial Stewardship Program on Mortality of Patients with Febrile Neutropenia**
REGIS ROSA, M.D. M.S.; UFRGS - Faculty of Medicine, Porto Alegre, Brazil, LUCIANO GOLDANI, PHD, MD; Infectious Diseases Unit, Hospital de Clinicas de Porto Alegre, Porto Alegre, Brazil and RODRIGO DOS SANTOS, MD; Hospital de Clínicas de Porto Alegre, Porto Alegre, Brazil

112 11:30 a.m. **Medical Students' Perceptions, Attitudes and Knowledge About Appropriate Antimicrobial Prescribing and Quality of Antimicrobial Education: A Multicenter Survey**
LILIAN ABBO, MD[1], SARA COSGROVE, MD, FIDSA, FSHEA[2], PAUL POTTINGER, MD[3], MARGARET PEREYRA, MA, DRP.H[1], ERIC HADHAZY[4], RONDA SINKOWITZ-COCHRAN, MPH[5], ARJUN SRINIVASAN, MD, FSHEA[5] and THOMAS M. HOOTON, MD[1]; [1]University of Miami Miller School of Medicine, Miami, FL, [2]Johns Hopkins Medical Institutions, Baltimore, MD, [3]University of Washington Medical Center, Seattle, WA, [4]Johns Hopkins Medical School, Baltimore, MD, [5]Centers for Disease Control and Prevention, Atlanta, GA

113 11:45 a.m. **First Year Cost-Savings Analysis of a Prospective Audit with Feedback Antimicrobial Stewardship Program at a Pediatric Teaching Hospital**
EMILY A. THORELL, MD[1], JARED A. OLSON, PHARMD[2], ADAM L. HERSH, MD, PHD[1], SETH ANDREWS[2], DOUG WOLFE[2] and ANDREW PAVIA, MD, FIDSA, FSHEA[1]; [1]University of Utah School of Medicine, Salt Lake City, UT, [2]Primary Children's Medical Center, Salt Lake City, UT

114 12:00 p.m. **Point Prevalence Survey of Antimicrobial Use in U.S. Acute Care Hospitals**
SHELLEY MAGILL, MD, PHD[1], LAURA MCALLISTER, MPH[1], MELINDA NEUHAUSER, PHARMD, MPH[1], ZINTARS G. BELDAVS, MS[2], GHINWA DUMYATI, MD, FSHEA[3], JULIE DURAN, MPH[4], JONATHAN EDWARDS, MSTAT[1], MARION A. KAINER, MBBS, MPH[5], RUTH LYNFIELD, MD[6], RICHARD MELCHREIT, MD[7], JOELLE NADLE, MPH[8], SUSAN M. RAY, MD[9], DEBORAH THOMPSON, MD, MSPH[10], LUCY WILSON, MD[11] and SCOTT FRIDKIN, MD[1];

[1]Centers for Disease Control and Prevention, Atlanta, GA, [2]Oregon Health Authority, Portland, OR, [3]University of Rochester, Rochester, NY, [4]Colorado Department of Public Health and Environment, Denver, CO, [5]Tennessee Dept. of Health, Nashville, TN, [6]Minnesota Department of Health, St. Paul, MN, [7]Connecticut Department of Public Health, Hartford, CT, [8]California Emerging Infections Program, Oakland, CA, [9]Emory University School of Medicine and Georgia Emerging Infections Program, Atlanta, GA, [10]New Mexico Department of Health, Santa Fe, NM, [11]Maryland Department of Health and Mental Hygiene, Baltimore, MD

Session #37 Presentations:

---

109. Effect of an Outpatient Antimicrobial Stewardship Intervention on Appropriate Prescribing by Primary Care Pediatricians

Part of Session: 37. Antimicrobial Stewardship

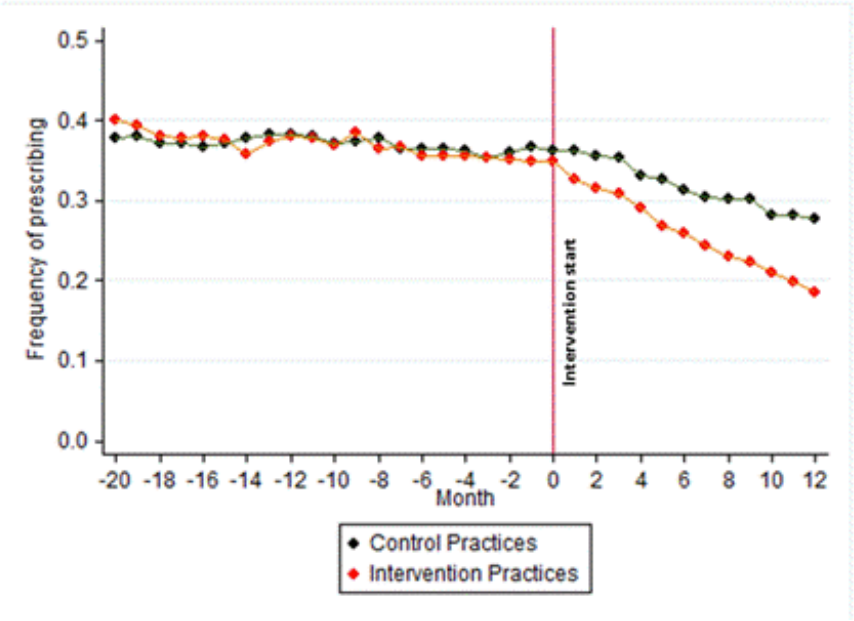
10:45 a.m.

JEFFREY GERBER, MD, PHD[1], PRIYA PRASAD, MPH[1], A. RUSSELL LOCALIO, PHD[2], ALEXANDER FIKS, MD, MSCE[1], ROBERT GRUNDMEIER, MD[1], LOUIS BELL, MD[1], RICHARD WASSERMAN, MD[3], RON KEREN, MD[1] and THEOKLIS ZAOUTIS, MD, MSCE[1]; [1]The Children's Hospital of Philadelphia, Philadelphia, PA, [2]University of Pennsylvania School of Medicine, Philadelphia, PA, [3]University of Vermont College of Medicine, Burlington, VT

Background: Antimicrobial stewardship programs have been shown to be effective on hospitalized patients. The majority of antibiotic prescribing, however, occurs in the outpatient setting for acute respiratory tract infections (ARTIs). Given the frequency of ARTI in children, existence of antibiotic prescribing guidelines for children with ARTI, and documented variance from these guidelines by practitioners, children with ARTIs are a prime target for outpatient antimicrobial stewardship.

Methods: We conducted a cluster-randomized trial to increase appropriate antibiotic prescribing for common ARTIs within a large, pediatric primary care network. We block-randomized 18 practices to intervention or control group by practice location and patient volume. The antimicrobial stewardship intervention included 1 on-site clinician educational session and personalized, quarterly audit and feedback of guideline-based antibiotic prescribing for sinusitis, Group A Streptococcal pharyngitis, and pneumonia. ARTI cases defined by ICD9 codes and antibiotic orders were identified from the network's common electronic health record. After excluding encounters by children with chronic medical conditions, antibiotic allergies, and antibiotic use in prior 3 months, off-guideline targeted ARTI antibiotic prescribing rates were compared between intervention and control sites before and after the intervention (10/08-6/11). We fit a mixed effect generalized linear logistic model, with fixed effects for time and intervention and random effects for site and time, to generate weighted averages of the rates of antibiotic prescribing for targeted ARTIs. **Results:** During the study period, there were 1,435,605 office visits by 185,212 patients to 174 clinicians at 18 practices. At 12 months post intervention, there was a statistically significant difference in the rate of off-guideline antibiotic prescribing for ARTI: off-guideline prescribing in the intervention group decreased from 32% to 17%, while it decreased from 33% to 24% in the control group (p=0.001) (Fig 1).

Figure 1: Rate of Off-Guideline, Innapropriate Antibiotic Prescribing



Conclusion: Clinician education coupled with audit and feedback of antibiotic prescribing significantly improved adherence to prescribing guidelines for the treatment of common ARTI.

110. A Telemedicine Based Anti-microbial Stewardship Program

Part of Session: 37. Antimicrobial Stewardship

11:00 a.m.

JAVEED SIDDIQUI, MD, MPH[1], CHRIS KUTZ, PHARM D[2], NANCY LARGE, PHARM D[2], MICHAEL NORTON, PHARM D[2], PAMELA WILEY, CLS (ASCP)[2] and COURTNEY MCMAHON, BSN, CIC[2]; [1]TeleMed2U, Roseville, CA, [2]Sonoma Valley Hospital, Sonoma, CA

Background: For community and rural hospitals the lack of access to an infectious diseases physician can often be the rate-limiting step to starting an antimicrobial stewardship program [ASP]. Sonoma Valley Hospital [SVH] is an 83-bed hospital located in the City of Sonoma that has not had access to an Infectious Diseases physician since 2000. In January 2007 SVH began an in-patient telemedicine based Infectious Diseases program that included the development and implementation of an ASP. **Methods:** Through telemedicine SVH was able to implement an ASP consisting of: 1. Reviewing the antibiogram 2. Anti-infective formulary development 3. Targeted oversight of antimicrobial usage 4. Extensive provider based education programs. The Operational Aspects of the Telemedicine ASP: 1. Pharmacist reviews all anti-microbial orders daily 2. A daily telemedicine conference between the pharmacist and the infectious diseases physician occurs 3. Cases that require review are identified 4. The infectious diseases physician will contact the prescribing physician to discuss the case 5. If requested by the prescribing physician or if there is a difference in opinion, an infectious diseases consultation is conducted via telemedicine. The ASP committee identified that Fluoroquinolone and Piperacillin/tazobactam were being inappropriately utilized at SVH. An educational campaign was initiated to educate physician on appropriate use of these anti-bacterials. Educational programs conducted were: Noon Conferences Staff meetings: Emergency Department, Medicine and Surgery. The goals of the education programs were: 1. Review of cases 2. Evidence-based treatment guidelines 3. Review of SVH empiric treatment guidelines based on the SVH anti-biogram **Results:** From 2008 to 2011 the use of Fluoroquinolone decreased by 77 % and the use of Piperacillin/Tazobactam decreased by 72%. The data reflects annual hospital expenditures for stated anti-microbials. These results were achieved without restricting the use of either flouroquinolones or Piperacillin/Tazobactam. **Conclusion:** Telemedicine has allowed Sonoma Valley Hospital to develop, implement and maintain a comprehensive ASP. We believe this is one of the first telemedicine based ASP program in the United States.

111. Impact of Adherence to Antimicrobial Stewardship Program on Mortality of Patients with Febrile Neutropenia

Part of Session: 37. Antimicrobial Stewardship

11:15 a.m.

REGIS ROSA, M.D. M.S.; UFRGS - Faculty of Medicine, Porto Alegre, Brazil, LUCIANO GOLDANI, PHD, MD; Infectious Diseases Unit, Hospital de Clinicas de Porto Alegre, Porto Alegre, Brazil and RODRIGO DOS SANTOS, MD; Hospital de Clínicas de Porto Alegre, Porto Alegre, Brazil

Background: Empirical therapy with broad-spectrum antimicrobial is part of the febrile neutropenia (FN) initial management. Enough evidence on which antibiotics schemes should be initially administered already exists; however, no randomized trial has evaluated whether adherence to antimicrobial stewardship programs (ASPs) results in lower rates of mortality in this setting.

Methods: The present prospective cohort, performed in a tertiary hospital from October 2009 to August 2011, evaluated the impact of ASP adherence, measured by initial antimicrobial prescribing, on mortality of 295 episodes of FN (in 145 adults) that required intravenous treatment. Cox-proportional hazards regression and Poisson regression were applied to assess mortality predictors and factors associated with noncompliance to ASP protocol, respectively.

Results: After multivariate analysis, the adherence to ASP proved to be an independent protective factor for death 28 days after the beginning of FN episode (adjusted hazard ratio [HR], 0.29; confidence interval 95%, [95% CI], 0.11 to 0.72). The predictors found to noncompliance to ASP were hypotension (adjusted relative risk [RR], 1.90; 95% CI, 1.37 to 2.63), diarrhea (RR, 2.13; 95% CI, 1.66 to 2.73), perianal pain (RR, 2.08; 95% CI, 1.54 to 2.82), suspected source of infection in oral cavity (RR, 2.45; 95% CI 1.75 to 3.43) and cutaneous manifestations of infection (RR, 2.34; 95% CI, 1.81 to 3.04).

Conclusion: The antimicrobial choice is important during initial management of patients with fever and neutropenia; the adherence to ASP, which calls for rational use of antibiotics, was associated with lower mortality rates during the course of FN. The presence of signs or symptoms that demand changes in initial therapy poses risks to non-adherence to the program recommendations.

112. Medical Students' Perceptions, Attitudes and Knowledge About Appropriate Antimicrobial Prescribing and Quality of Antimicrobial Education: A Multicenter Survey

Part of Session: 37. Antimicrobial Stewardship

11:30 a.m.

LILIAN ABBO, MD[1], SARA COSGROVE, MD, FIDSA, FSHEA[2], PAUL POTTINGER, MD[3], MARGARET PEREYRA, MA, DRP.H[1], ERIC HADHAZY[4], RONDA SINKOWITZ-COCHRAN, MPH[5], ARJUN SRINIVASAN, MD, FSHEA[5] and THOMAS M. HOOTON, MD[1]; [1]University of Miami Miller School of Medicine, Miami, FL, [2]Johns Hopkins Medical Institutions, Baltimore, MD, [3]University of Washington Medical Center, Seattle, WA, [4]Johns Hopkins Medical School, Baltimore, MD, [5]Centers for Disease Control and Prevention, Atlanta, GA

Background: Appropriate antimicrobial prescribing warrants attention as antimicrobial resistance (AMR) threatens the public's health worldwide. A better understanding of medical students' perceptions, attitudes and knowledge about antimicrobial prescribing and the quality of their training may facilitate earlier education of future prescribers.

Methods: A 24-item electronic survey on antimicrobials was administered to fourth year medical students at the University of Miami, Johns Hopkins University, and the University of Washington from January to March 2012.

Results: 317 of 519 students completed the survey (61% response rate). Almost all students agreed that strong knowledge of antimicrobials is important in their careers (92%) and that inappropriate use of antimicrobials causes AMR (97%) and can harm patients (97%). A higher proportion agreed that antimicrobials are overused nationally compared to hospitals where they had rotated (94% vs.65%; $p<0.001$). 90% of respondents would like more education on appropriate use of antimicrobials and 79% on AMR. The resources considered most useful for learning about antimicrobial prescribing and AMR were lecture series (86%) and small group problem-solving sessions (78%). Only 15% had completed an ID rotation during medical school; students' who had rotated on a clinical ID service rated the quality of their antimicrobial education on a 5-point scale from "not at all useful" to "very useful", significantly higher compared to those who had not

(mean 3.93 [SD± .67] vs. 3.44 [SD± .85], p=.0003). Students' mean correct knowledge score, based on 11 items, was 51% with statistically significant differences found between the study sites (48%, 50%, 55%, p<0.050). Overall, 45% of the students selected the appropriate treatment for a complicated UTI and 32% the appropriate antimicrobial for ESBL bacteremia. 60% of students were unfamiliar with the term "antimicrobial stewardship".

Conclusion: Medical students are aware of AMR and are receptive to more education on the topic, but have gaps in knowledge and poor awareness of the term antimicrobial stewardship. Medical school curricula should incorporate more antimicrobial stewardship education to help address the growing problem of antimicrobial resistance.

113. First Year Cost-Savings Analysis of a Prospective Audit with Feedback Antimicrobial Stewardship Program at a Pediatric Teaching Hospital

Part of Session: 37. Antimicrobial Stewardship

11:45 a.m.

EMILY A. THORELL, MD[1], JARED A. OLSON, PHARMD[2], ADAM L. HERSH, MD, PHD[1], SETH ANDREWS[2], DOUG WOLFE[2] and ANDREW PAVIA, MD, FIDSA, FSHEA[1]; [1]University of Utah School of Medicine, Salt Lake City, UT, [2]Primary Children's Medical Center, Salt Lake City, UT

Background:

Antimicrobial stewardship programs (ASPs) are emerging in pediatric hospitals. Little is known about their overall impact including economic outcomes. In July 2010, we initiated a comprehensive ASP using prospective audit with feedback at Primary Children's Medical Center (PCMC), part of the Intermountain Healthcare (IH) System, in Salt Lake City, UT. The program includes both pharmacist and pediatric infectious diseases physician support. ASP reviews up to 30 antimicrobials daily, approves requests for administration of palivizumab per American Academy of Pediatrics guidelines, monitors antimicrobial use, resistance, and cost, and develops relevant clinical pathways.

Methods:

Using IH's sophisticated cost-accounting system that enables detailed microanalysis of medical costs and antimicrobial administration, we compared antimicrobial use and costs of the first 12 months of the program (7/2010-6/2011) to the preceding year. We measured antimicrobial administration for the 17 highest cost and usage antimicrobials using days of therapy (DOT) /1000 pt-days. Palivizumab use was also analyzed. Cost analysis included the number of doses avoided as well as aggregate saving on antimicrobial waste and administration costs.

Results:

Comparing the first 12 months of the ASP to the preceding period, a total of 5829 doses of the top 17 antimicrobials were avoided, resulting in a decrease in DOT/1000 pt-days from 589 to 545 and cost savings of $110,480. There was a decrease in palivizumab dosing from 4.1 to 3.5 doses/1000 pt-days saving $38,670. Total usage savings were $149,150. Unexpected benefits of the ASP included identifying an antimicrobial purchasing overcharge of $88,875. Overall direct savings, not including decreased length of stay or adverse events were $238,000, which covered the cost of the program.

Conclusion:

Implementation of a pediatric ASP demonstrated a significant decrease in antimicrobial use and cost savings. Palivizumab use was improved resulting in additional savings. Because we only considered drug acquisition and administration costs and evaluated only a portion of ASP activities, the overall impact may be greater. Demonstrating both clinical and economic impacts of a pediatric ASP is important to justify ongoing administrative support.

Findings in the abstracts are embargoed until 12:01 a.m. PST, Oct. 17th with the exception of research findings presented at the **ID**Week press conferences.

114. Point Prevalence Survey of Antimicrobial Use in U.S. Acute Care Hospitals

Part of Session: 37. Antimicrobial Stewardship

12:00 p.m.

SHELLEY MAGILL, MD, PHD[1], LAURA MCALLISTER, MPH[1], MELINDA NEUHAUSER, PHARMD, MPH[1], ZINTARS G. BELDAVS, MS[2], GHINWA DUMYATI, MD, FSHEA[3], JULIE DURAN, MPH[4], JONATHAN EDWARDS, MSTAT[1], MARION A. KAINER, MBBS, MPH[5], RUTH LYNFIELD, MD[6], RICHARD MELCHREIT, MD[7], JOELLE NADLE, MPH[8], SUSAN M. RAY, MD[9], DEBORAH THOMPSON, MD, MSPH[10], LUCY WILSON, MD[11] and SCOTT FRIDKIN, MD[1]; [1]Centers for Disease Control and Prevention, Atlanta, GA, [2]Oregon Health Authority, Portland, OR, [3]University of Rochester, Rochester, NY, [4]Colorado Department of Public Health and Environment, Denver, CO, [5]Tennessee Dept. of Health, Nashville, TN, [6]Minnesota Department of Health, St. Paul, MN, [7]Connecticut Department of Public Health, Hartford, CT, [8]California Emerging Infections Program, Oakland, CA, [9]Emory University School of Medicine and Georgia Emerging Infections Program, Atlanta, GA, [10]New Mexico Department of Health, Santa Fe, NM, [11]Maryland Department of Health and Mental Hygiene, Baltimore, MD

Background: Developing interventions to improve antimicrobial use (AU) requires understanding the nature of and rationale for AU. Prevalence surveys are a resource-effective alternative to prospective surveillance that can provide data to target AU surveillance and interventions. In 2011, an AU prevalence survey was conducted with CDC's 10 Emerging Infections Program (EIP) sites to determine the prevalence and rationale for AU in acute care patients.

Methods: Hospitals in EIP sites (CA, CO, CT, GA, MD, MN, NM, NY, OR, TN) conducted 1-day surveys during May-Sept 2011. Hospital and EIP staff surveyed random samples of patients to identify those receiving antimicrobial drugs (ADs). EIP staff reviewed medical records to collect the rationale for AD use, infection sites, and the infection onset location (community onset [CO] vs. healthcare facility onset [HO]). For this analysis an AD was considered unique based on the generic substance name, without regard to administration route, with the exception of orally-administered and intravenously (IV)-administered vancomycin, which were considered distinct ADs. Data were analyzed in OpenEpi 2.3.1 and SAS 9.2.

Results: Of 11282 patients in 183 hospitals, 5635 (50%, 95% confidence interval [CI]: 49-51%) received ≥1 AD and 2821 (25%, 95% CI: 24-26%) received ≥2 ADs at the time of the survey. Of 9850 total ADs, 2228 (23%) were administered for prophylaxis, non-infection-related reasons, or for reasons not documented in the medical record. Of 7622 ADs given to treat active infections, 5260 (69%) were for CO infections. Vancomycin IV was the most common AD overall and in each infection onset category (Figure). Overall, 1102 of a total 4278 patients receiving AD treatment (26%) were given vancomycin IV. Piperacillin/tazobactam + vancomycin IV was the most common AD treatment combination, given to 8% of patients receiving treatment. Lower respiratory infection (LRI) was the most common infection for which ADs were given, accounting for 34% of all treatment for CO and HO infections.

Conclusion: Broad spectrum AD treatment was prevalent, even for CO infections. Understanding common reasons for AD use (e.g., LRI) can help focus education and stewardship efforts on areas in which improved use may have the greatest impact.