

observed in the proportion of HIV/ID specialists who answered all assessment questions correctly (5% pre vs. 68% post;  $P < 0.0001$ ;  $V = 0.397$ ). Improvements were also observed in several specific areas of assessment (table). Additionally, 43% of HIV/ID specialists indicated they planned to modify their treatment approach among adolescents as a result of participating in the education.

**Conclusion.** Participation in this online, interactive, case-based, educational intervention significantly improved HIV/ID specialists' ability to develop individualized strategies for adolescents living with HIV. These findings highlight the positive impact of well-designed online education.

Assessment of Educational Effectiveness			
Area of Assessment	% relative improvement (% of ID specialists selecting the correct response at pre- vs post-assessment)	P-value for change	Cramer's V for the magnitude of the change
Performing the appropriate evaluation and assessment for an adolescent who is re-entering care and had discontinued antiretroviral (ARV) therapy nearly a year prior	15% improvement (75% vs 86%)	$P < .0001$	$V = .144$ (Noticeable)
Selecting an ARV regimen informed by prior treatment history, resistance testing results, and contraceptive use	213% improvement (26% vs 83%)	$P < .0001$	$V = .565$ (Extensive)
Recognizing that treatment with INSTI-based regimen often results in an initial mild elevation in serum creatinine levels, which plateaus within the first month	95% improvement (46% vs 90%)	$P < .0001$	$V = .467$ (Extensive)

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### 2528. Inflammation and Plasma Selenium and Chromium in Ugandan Children Living with HIV

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**Session:** 265. HIV: Pediatric

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**Background.** Selenium deficiency has been reported to be associated with HIV disease progression and chromium deficiency with insulin resistance and hyperlipidemia. Here, we assessed selenium and chromium status in a cohort of Ugandan HIV+, HIV exposed uninfected (HEU) and HIV negative (HIV-) children and their associations with markers of systemic inflammation, immune activation, and gut integrity.

**Methods.** This is a cross-sectional study in HIV+, HEU and HIV unexposed uninfected (HIV-) children aged 2-10 years old enrolled in Uganda. HIV+ children were on stable ART with undetectable viral load. We measured plasma concentrations of selenium and chromium as well as markers of systemic inflammation, monocyte activation, gut integrity and insulin resistance (HOMA-IR).

**Results.** Among HIV+ children ( $n = 57$ ), 93% had viral load  $\leq 20$  copies/mL, mean CD4 was 34% and 77% were receiving a non-nucleotide reverse transcriptase regimen. Mean age of all participants was 7 years and 55% were girls. Mean selenium concentrations were higher in the HIV+ group (106  $\mu\text{g/L}$ ) compared with the HEU (84  $\mu\text{g/L}$ ) and HIV- (98  $\mu\text{g/L}$ ) groups ( $p$ ). Mean chromium concentrations were 1  $\mu\text{g/L}$ ; 1 HIV+ child and 6 HEU children had chromium levels  $> 1 \mu\text{g/L}$  ( $p$ ).

**Conclusion.** In this cohort of HIV+ children on ART in Uganda, plasma selenium and chromium concentrations appear sufficient. Higher plasma selenium concentrations were associated with lower systemic inflammation and higher gut integrity markers. Although our findings do not support the use of selenium supplementation broadly for HIV-infected children in Uganda, further studies are warranted to assess the role of selenium supplements in attenuating heightened inflammation.

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### 2529. Child HIV Exposure and CMV Seroprevalence in Botswana: No Associations with 24-Month Growth and Neurodevelopment

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**Background.** HIV-exposed but uninfected (HEU) children are at increased risk for poorer growth outcomes compared with HIV-unexposed/uninfected (HUU) children. Mechanisms underlying the poorer growth and delays in development of HEU children compared HUU children are not fully understood. We sought to define the relationship between child CMV status and HIV- exposure status and determine if a correlation existed between CMV status and growth (and neurodevelopmental) outcomes by 24 months of age in Botswana.

**Methods.** We used existing data and samples from the observational Botswana Tshipidi study, pregnant women living with HIV (WLHIV) and those without HIV, as well as their infants were enrolled and followed prospectively through 2 years post-partum. We tested 18-month child plasma samples from all available children for anti-HCMV IgG. We evaluated the association between positive (vs. negative) child CMV status at 18 months, and child growth, using the World Health Organization's Growth Standard adjusted for age and sex and neurodevelopment at 24 months of age, using the Bayley Scales of Child Development (BSID) III.

**Results.** Of 317 children tested for CMV IgG at 18 months, 215 (67.8%) tested positive. Significantly higher proportions of HUU children had positive CMV serology (82.6%) compared with HEU children (47.4%,  $P < 0.01$ ); 96.7% of HUU vs. 10.5% of HEU children breastfed. Child CMV infection was not associated with head circumference, weight-for-age, weight-for-height, nor height-for-age z-scores at 24 months. BSID III scores in receptive and expressive language, fine and gross motor, and cognitive domains at 24 months of age also did not differ by child CMV status.

**Conclusion.** We observed high rates of CMV seropositivity in 18-month-old children in Botswana with significantly higher CMV seropositivity among HUU children likely owing to breastfeeding. Positive CMV serostatus was not associated with child growth or neurodevelopmental outcomes at 24 months.

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### 2530. TACO Tuesday as a Medical Education Tool

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**Session:** 266. Medical Education: Medical School to Practice

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**Background.** Novel strategies in medical education including the flipped classroom, test-enhanced learning, and gaming have proven to be effective for preclinical learners but little is known about their efficacy in post-graduate education. We implemented an educational tool in our Infectious Diseases (ID) Fellowship Training program called TACO (To Assess Cognitive Operations) Tuesday that utilizes aspects of the flipped classroom, test-enhanced learning, and gaming to improve ID fellow engagement, satisfaction, knowledge retention, and board examination preparation in association with a weekly ID core didactic curriculum.

**Methods.** One to three multiple choice clinical vignettes were emailed to ID fellows the day prior to their weekly didactic lecture. The first fellow to answer all questions correctly was the winner for the week. The correct answer choices along with detailed rationales were distributed to all fellows at the end of the week. After one year of using this educational tool, we surveyed fellows to evaluate its impact on their engagement with the weekly didactic sessions, self-perception of content retention, and sense of preparation for the ID board examination.

**Results.** We had a response rate of 82% with 9 of 11 fellows polled participating. Of those, two-thirds attempted to answer the multiple-choice questions prior to lecture and most (77%) reviewed the correct answer choices and rationales weekly. All participants felt the educational tool helped improve their engagement with the lectures and half felt it increased overall satisfaction with their educational experience. The majority felt the tool increased content retention and their level of preparation for the ID board examination. Implementation of this tool was associated with a higher mean IDSA in-training examination score compared with scores from the previous year (518 vs 469).

**Conclusion.** ID fellows found that an educational tool utilizing a flipped classroom, test-enhanced learning, and gaming in association with a weekly core didactic curriculum increased their engagement, satisfaction, knowledge retention, and board examination preparation. Future studies will investigate the impact of this tool on knowledge retention and ID board examination scores within our institution as well as across institutions.

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### 2531. Using Peer-to-Peer Education to Increase Awareness and Uptake of HPV Vaccine Among Chinese International Students

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**Session:** 266. Medical Education: Medical School to Practice

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**Background.** There are more than one million international college students in the United States. The University of Southern California hosts about 5,000 Chinese International

Students (CIS). HPV-related cancers are common in China and the HPV vaccine was only recently introduced to the Chinese population. CIS in the United States have low HPV vaccination rates upon arrival. Once these students become aware of the affordability and the accessibility of the vaccine, they often contact a provider to start the vaccination series. The HPV vaccine is available to all eligible students at the USC student health center and is free of charge to students with Aetna Student Health Insurance. We examined the impact of a peer-to-peer education program about HPV disease and vaccination amongst CIS and assessed the impact of the program via an analysis of HPV immunization rates amongst CIS.

**Methods.** The study was IRB approved. Mandarin-speaking USC students volunteered to serve as peer educators in response to an inquiry from academic advisors. 18 CIS were trained by MiOra as Immunization Community Health Educators (ICHE) on HPV disease and vaccination as well as sexually transmitted infections and prevention. CIS educated peers at tables set up throughout USC.

**Results.** Initial data from 100 CIS students who were surveyed and educated in April 2019 were analyzed. 59 out of 99 (59.6%) students reported that they have either received or are in the process of receiving the HPV vaccine. 93 out of 99 (93.9%) indicated "no knowledge" or "some knowledge" about HPV and HPV vaccine while only 6 students (6.1%) reported "a great deal of knowledge." 56 out of 99 (56.6%) thought that it is "unlikely" or "impossible" for them to acquire HPV. 92 out of 97 (94.9%) said they would be interested in getting vaccinated if it were free.

**Conclusion.** Many CIS have limited understanding of HPV risk factors and HPV vaccine; however, when informed, the majority of students indicated they would likely vaccinate if it was covered by insurance. Peer-to-peer education was very effective. Of the first 400 students educated, 80 visited the student health center. This is an ongoing project. We will continue to collect and report data on the impact of the peer-to-peer education and factors influencing.

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### 2532. Identifying Educational Needs and Improving Provider Knowledge Regarding the Management of Febrile Neutropenia

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**Session:** 266. Medical Education: Medical School to Practice  
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**Background.** In a retrospective chart review of 211 first episodes of febrile neutropenia (FN) in in-patients with acute myelogenous leukemia evaluating rates of appropriate vs. inappropriate management, we identified frequent noncompliance with national guidelines for the management of FN. We utilized these data to develop an educational intervention targeting front-line providers.

**Methods.** Based on findings from our chart review, we developed and implemented an interactive, case-based didactic session for advanced practice providers (APPs) and medical students/residents rotating on hematology, targeting inappropriate antibiotic use. Pretest questions were embedded into the lecture, preceding content related to each learning objective. Lecture material included content from national guidelines, literature addressing misconceptions (e.g., vancomycin usage for persistent fever), and data from our institutional antibiogram (Figure 1). A post-test was given directly after the lecture to evaluate knowledge gained.

**Results.** Five inappropriate behaviors were identified (Figure 2): (1) changing empiric therapy despite clinical stability, (2) misunderstanding piperacillin/tazobactam's spectrum of activity, (3) inappropriate initiation of antibiotics active against resistant Gram-positive organisms; (4) failure to de-escalate therapy at 72 hours and (5) failure to add Gram-positive coverage when using aztreonam. Lectures were provided to 13 APPs and 17 medical students/residents over 6 sessions. An improvement in knowledge was noted for most learning objectives except for the third, for which misconceptions remained, especially regarding need for vancomycin in the setting of mucositis (Figures 3 and 4). Higher baseline knowledge was noted for medical students/residents than APPs. 93% of learners rated the lecture very/extremely helpful. Learners recommended future content focus on antifungal therapy.

**Conclusion.** We utilized local practice data to develop educational content for front-line providers. We will convert this lecture into a video-format to be incorporated into hematology rotations to reinforce key concepts. A prospective cohort study to evaluate the impact on prescribing behavior is underway.

Figure 1. Select Powerpoint Slides Demonstrating Lecture Material: Example Using Indications for Empiric Vancomycin

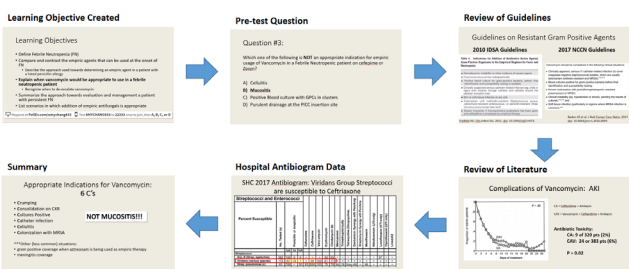


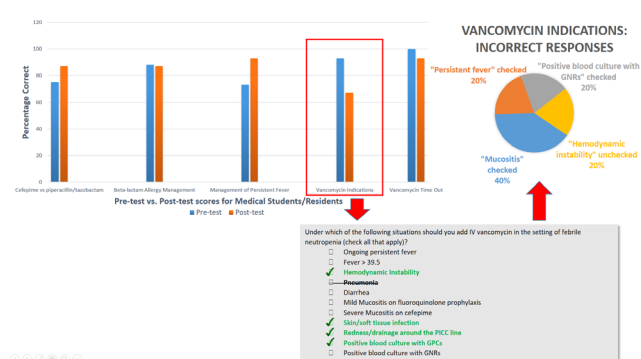
Figure 2. Identification of learning objectives: proportions of appropriate vs. inappropriate behavior

	Total (%)	Appropriate (%)	Inappropriate (%)
Number of patients with alteration of empiric agent at least once during admission	154 (73)	96 (45)	58 (27)
Switch to piperacillin/tazobactam	88 (42)	48 (23)	40 (19)
Switch to meropenem	91 (43)	70 (33)	21 (10)
Switch to cefepime	4 (2)	3 (1)	1 (0)
Addition of fluoroquinolone or aminoglycoside	36 (17)	34 (16)	2 (1)
Resistant gram positive agent use			
Initiation	160 (76)	124 (59)	36 (17)
Continued use at 72h	98 (46)	71 (34)	27 (13)
Aztreonam use	24 (11)	18 (8)	6 (3)

Figure 3. Pre-test vs. Post-test Scores for APPs



Figure 4. Pre-test vs. Post-test Scores for Medical Students/Residents



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### 2533. HIV Training Pathways in Residency: A National Survey of Curricula and Outcomes

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**Background.** Despite dramatic advances in the care of people with HIV (PWH), the shortage of HIV providers is worsening. An approach to this workforce shortage has been integration of robust HIV training into residency. We created a national survey to describe curricula and outcomes of formal HIV training pathways and how this may impact the HIV workforce shortage.

**Methods.** We designed a cross-sectional study of Internal Medicine (IM) and Family Medicine (FM) Residency HIV pathways in the United States. We identified programs via literature review, internet search, and snowball sampling. A draft survey was piloted with two pathway directors, and in January 2019, the final survey was sent via email to all pathway directors. This survey included 33-items, predominantly quantitative, and focused on program organization, curricular content, graduate outcomes, and challenges. We used descriptive statistics to summarize numeric responses.

**Results.** Twenty-five residency programs with dedicated HIV pathways were identified; 11 IM and 15 FM. The majority of the programs are in the West and Northeast United States. Twenty-four (96%) of programs have completed the survey. Since the first program was established in 2006, 228 residents have graduated from HIV pathways in the United States (151 IM, 77 FM). Programs have varying goals, application procedures, clinical requirements, didactic structures, graduation requirements, and assessments of competency. Of graduates, 108 (47%) have American Academy of HIV Medicine (AAHIVM) certification. Ninety-two (42%) of graduates are reported as currently providing primary care to ≥ 20 PWH (the majority in the West and Northeast