

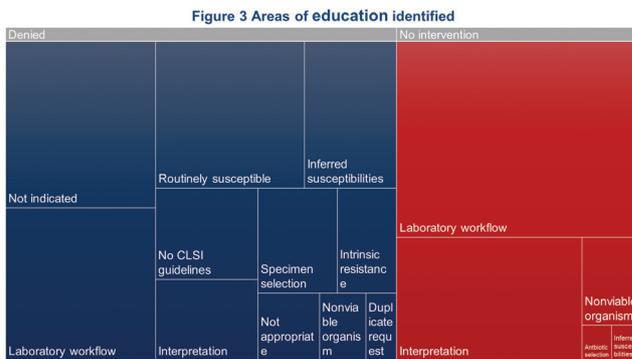
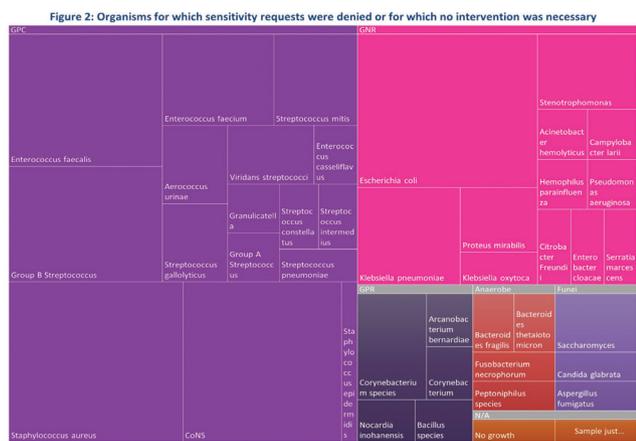
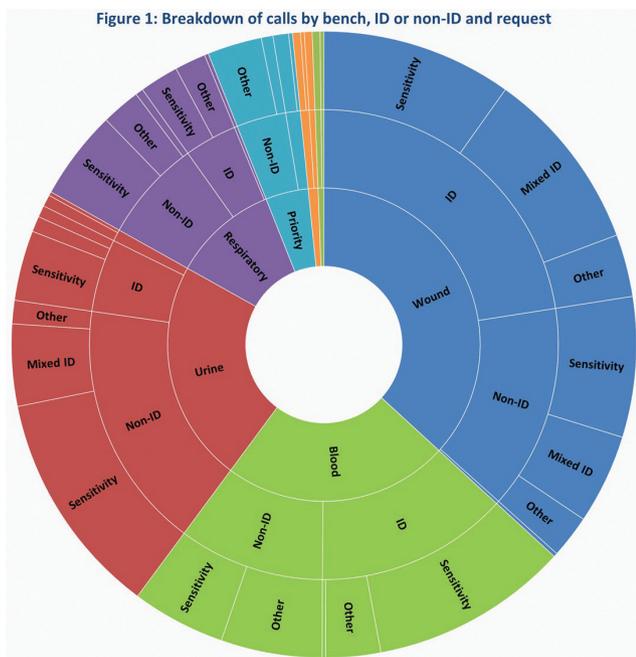
Background. The microbiology laboratory is central to the treatment and surveillance of infectious disease, and effective communication is crucial. We used phone call requests from healthcare providers to the Yale New Haven Hospital microbiology laboratory to identify areas for education and improved result communication.

Methods. Requests for additional testing are routinely documented by medical technologists using a standardized form. These are reviewed by a technologist, clinical pathology resident, microbiology fellow or laboratory director, and further testing is approved or denied. Requests from 8/15/16 to 12/15/16 were analyzed by the rationale for testing, the outcome, and the reason for approving or denying the request.

Results. We recorded 497 requests from 411 specimens (Figure 1). 281 requests were for susceptibility testing, 99 were for workup of mixed cultures, 71 of these on the wound bench. Of the remaining 117 classified as other, 57 were calls looking for results, additional information or interpretation of results, followed by testing for Gene Xpert MTB/RIF on 18. 302 requests were approved, 120 denied, and for 75, no further testing was necessary. Of the 195 calls that were either denied or for which no intervention was necessary, 101 calls were for susceptibility testing (Figure 2), 23 for workup of mixed infections, and 71 for a variety of reasons. Non-ID providers made 135 of these calls compared with 58 by ID providers. 87 requests made by non-ID providers were denied compared with 32 by ID providers.

These requests were reviewed for educational opportunities (Figure 3). A hand-out describing laboratory workflow was created for ID fellows and PharmDs. Result reporting and susceptibility testing for specific bug-drug combinations were updated after discussion with antibiotic stewardship. A microbiology 'survival guide' will be created for on-call pathology residents.

Conclusion. Phone call requests to the microbiology laboratory can be used to identify opportunities for education based on provider Background. The electronic medical record can be used for antimicrobial stewardship and result updates. The microbiology laboratory reduces low-value care by educating providers when additional testing is not beneficial.



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1428. HIV PrEP and PEP in Graduate Medical Education: A Novel Curriculum

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Background. HIV pre-exposure prophylaxis (PrEP) is highly effective but underutilized. Medical trainees cite a need for additional PrEP training. We established a pilot curriculum focused on key PrEP and post exposure prophylaxis (PEP) components with these objectives: identify candidates eligible for PrEP/PEP; appropriate monitoring on treatment; STI screening of at-risk patients; treatments for common STIs. To our knowledge, this is the first description of a formalized curriculum for medical trainees in PrEP/PEP.

Methods. The Oval Center is a comprehensive sexual health clinic in Bronx, New York, focusing on STI and PrEP/PEP. Participant learners include internal medicine residents and I.D. fellows who choose the center as a 2-week clinical elective and/or additional continuity site. The curriculum is composed of 3 core components: 1) patient care, 2) didactics (2 sessions by ID faculty focused on practice guidelines), 3) directed readings (current treatment guidelines/seminal papers). Learners completed a pre- and/or post-training confidential questionnaire that assessed confidence in components of PrEP/PEP and STI care on a 5-point Likert scale.

Results. 8 learners have completed the curriculum to date: 4 fellows and 4 residents. All learners reported high confidence in aspects of STI and PrEP care, for example, in conducting appropriate STI screening and treatment and recommending and monitoring patients on PrEP (median score 5). Preliminary pre-post analysis of 4 learners demonstrated the greatest increase in confidence in addressing health needs of the LGBTQ population (median Δ1.5), and recommending and monitoring patients on PEP (median Δ2)

Conclusion. This pilot demonstrates that a curriculum focused on PrEP/PEP is feasible. Preliminary analysis demonstrates that learners had high confidence in prescribing PrEP/PEP and treating common STIs, although numbers were small. Plans to expand the curriculum are currently underway. Rigorous curriculum evaluation is ongoing, including pre-post analysis of all participant learners and evaluation of curriculum impact on behavioral outcomes, such as change in learners' self-reported rates of PrEP prescribing. Prompt dissemination of this or similar models may help improve PrEP/PEP uptake and STI care for future providers.

Disclosures. All authors: No reported disclosures.

1429. Flipping Expectations: Are Active Learning Strategies Sufficient or Necessary To Teach Principles of Antimicrobial Stewardship in Medical School?

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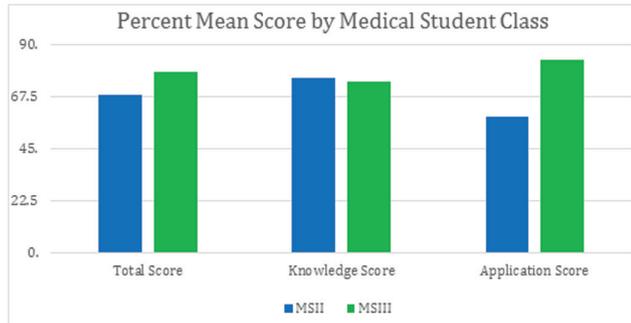
Background. Teaching principles of antimicrobial stewardship (AS) in medical training is an integral part of developing skills in systems based practices and health policy. While most medical schools have introduced AS concepts in the preclinical years, data on the effectiveness of such curricula are limited. We developed an AS module within the second-year preclinical microbiology course using a "flipped classroom" approach, providing instructional content as webcasts while dedicating lecture time to engaging in case-based content. The purpose of our investigation was to compare the effects of a formal AS curriculum with learning which occurs in a situated, clinical context during core clerkships on performance outcomes.

Methods. We administered a knowledge and application-based assessment to second year students who had completed the flipped classroom AS module in their preclinical microbiology course, as well as to third year students who completed their core medicine clerkship but had not had any formal teaching in AS. Mean scores from

the total assessment (7 points), knowledge-based questions (4 points) and application-based questions (3 points) were compared using an independent samples t-test.

Results. 171 second and 55 third-year medical students completed the assessment. Overall mean scores were significantly higher for MSIIIs (5.47, SD 1.10) compared with MSII (4.79, SD 1.40) ($P < 0.01$). This difference in scores was due to superior performance on the application-based questions by MSIIIs (2.51, SD 0.63) compared with MSII (1.77, SD 1.03) ($P < 0.01$). There was no difference on knowledge-based items between MSIIIs (2.96 SD 0.74) and MSII (3.02, SD 0.80) ($P = 0.62$). Overall scores for MSIIIs completing their medicine clerkship later in the year vs. earlier trended higher (5.69 vs. 5.32, $P = 0.60$).

Conclusion. MSIIIs demonstrated equal knowledge and superior application of AS principles despite not having had a formal curriculum in the subject. Active learning strategies, such as the flipped classroom, may not be able to substitute for experiential learning when it comes to teaching systems based practices such as AS. An iterative approach to teaching AS, starting in the preclinical years, may be more meaningful and warrants further evaluation.



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1430. Problem Based Learning (PBL) in an Infectious Diseases Fellowship

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Background. Problem Based Learning (PBL) is an active learning process that adheres to key principles of adult learning theory. PBL is widely used in undergraduate medical education. To our knowledge there have been no published reports of PBL based curricula at the residency/fellowship level. Factors include time and labor for development, scheduling constraints, and competing clinical demands. We describe the implementation of a PBL based curriculum in an ID fellowship and its potential application to the American College of Graduate Medical Education (ACGME) Milestones.

Methods. From 2003–5 a PBL-based core curriculum was developed for the ID fellowship at the Cleveland Clinic, replacing a didactic lecture-based curriculum. The PBL group consisted of 6–7 fellows and one preceptor, 2 hours per week. Cases were presented as diagnostic unknowns including radiographs, images, and pathologic materials. Course materials were presented through MOODLE, a web-based, interactive platform. Fellows worked separately and were allowed access to reference materials. Answers were submitted in a standardized short-essay format. For each case, the fellow listed his/her “top 3” differential diagnoses, described the pros and cons for each diagnosis, and then chose the single best answer. “Grade 1” was assigned if the actual diagnosis matched the fellow’s top choice; “grade 2” if the actual diagnosis was one of the top 3 diagnoses; grade “3” if the actual diagnosis was not within the top 3. Descriptive statistics and repeated-measures ANOVA was used to analyze test scores.

Results. 32 fellows completed the PBL curriculum (2005–2015). Each trainee completed an average of 130 cases. About 60% of cases were derived from the preceptor’s patients, the remainder were abstracted from the literature. Year 2 fellows demonstrated significantly more grade 1 and 2 responses compared with Year 1 fellows. Diagnostic accuracy (grade 1 responses) increased for individual trainees when tracked serially over two years.

Conclusion. An on-line PBL curriculum can be successfully integrated into an ID fellowship. A simple scoring system can be used to grade PBLs, and track development of medical knowledge and medical decision making, two of the ACGME Milestones.

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1431. A study assessing the educational value of serious games in infectious diseases – Going beyond memorization

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Background. The method in which infectious diseases (ID) content is taught influences the career choices of healthcare professionals. A survey of medical residents found that memorization was the most common teaching method used for 78% of residents that were uninterested in a career in ID compared with only 33% for residents who were interested in an ID career. Alternatives to memorization need to be investigated and assessed

Methods. During a one-time 3 hour session, pharmacy students engaged in 6 game-based active learning strategies each lasting 20 minutes. These strategies included audience response (Kahoot!), simulation (Septris), problem-based learning (Carmen STD-go), a card game (BugOut!), a board game (Chutes and Ladders), and a quiz game (Catchphrase). Students then completed a survey for each game.

Results. Forty-one students participated in the study and completed surveys. Students used a Likert scale from 1 to 10 (1=lowest value, 10=highest value) to evaluate aspects of each game. The mean educational value scores were Chutes and Ladders 8.58, Kahoot 7.24, Catchphrase 7.07, Septris, 6.71, Carmen STD-go 6.20, and BugOut! 6.20. Educational value scores were statistically higher for the audience response, board, and quiz game compared with the simulation, card, and problem-based learning games. The percent of students that would recommend adding each game to the curriculum was 92.7% for Catchphrase, 87.8% for Chutes and Ladders, 82.9% for Kahoot, 78.0% for Carmen STD-go, 68.3% for Septris, and 61.0% for BugOut!. The percent of students indicating that the game increased their level of interest in ID was 92.7% for Chutes and Ladders, 87.8% for Catchphrase, 75.6% for Kahoot, Carmen STD-go, and BugOut!, and 65.9% for Septris.

Conclusion. The majority of students indicated that all games increased their level of interest in ID and would recommend adding them to their schools curriculum. These six active learning games appear to be viable options for inclusion into teaching techniques and may increase healthcare students’ career interest in ID.

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1432. Medical Education in Infectious Diseases. Using Smartphone Apps for Active Learning

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Background. Active Learning using smartphone technology can be implemented as a tool for teaching medical students (MS) and residents (Rs). The use of technology would increase participation and enhance student learning by engaging them in solving ID clinical case scenarios. Our objective was to describe the methods used and to share the opinions of the users of such active learning methods.

Methods. The smartphone applications used were Socrative and WhatsApp. We used Socrative during the Universidad Peruana de Ciencias Aplicadas (UPC) ID course for MS in two different ways. In selected lectures (4 of 32), teacher paced questions were asked based on clinical scenarios related to the topic reviewed, and by voluntary homework questionnaires (student paced). At the British American Hospital (BAH) Medicine Department (MS and Rs) Socrative was used similarly: during some noon lectures (teacher paced questions) and during the baseline MS exam and Rs mid-year exam and voluntary homework questions (student paced). WhatsApp is currently used at the BAH with questions sent from Monday to Friday. MS /Rs answer individually via WhatsApp to the mentor in charge. The right answer is given the next day. Questions using WhatsApp deal with recent cases seen at the Wards or in the outpatient clinic, and are designed so that the MS/Rs must do quick literature searches in order to provide the right answer.

Results. Forty-one MS/Rs answered the survey on Socrative use, 25 of 48 (52%) of UPC MS and 16 (89%) MS/Rs from the BAH. Forty (97%) believed using Socrative had influenced their learning and all but 2 believed it promoted participation from the class. 36 (87.8%) would like to have Socrative used in other lectures and 35 (85%) in other courses. Only one person voted against Socrative use in courses or lectures. With regards to WhatsApp use 16 MS/Rs from BAH answered the survey. Six had used before WhatsApp as a teaching tool. All felt the methodology was useful for learning and promoting reading and would recommend this methodology to promote learning on a student paced way.

Conclusion. Socrative and WhatsApp can be used for teaching ID through MS/ Rs smartphones. Most MS/Rs who were surveyed recommended the use of such methods in their education.

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1433. Use of simulation for antimicrobial stewardship Infectious Disease fellowship curriculum

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