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 MSIs (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 MSIs (1.77, SD 1.03) (P < 0.01). There was no difference on knowledge-based items between MSIIIs (2.96 SD 0.74) and MSIs (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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**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 ( Seprts), 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, 5.8, Kahoot 7.24, Catchphrase 7.07, Seprts 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, 63.8% for Seprts, and 61.0% for BugOut!. The percent of students indicating that the game increased their level of interest in ID was 94.1% for Chutes and Ladders, 75.6% for Kahoot, Carmen STD go, and BugOut!, and 65.9% for Seprts.

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

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**Session:** 160. ID Medical Education

**Friday, October 6, 2017: 12:30 PM**

**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 histologic materials. Core 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 simplest 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.** 33 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 (4.75 vs. 3.88, P = 0.01). Year 2 fellows showed equal knowledge and superior application of AS principles compared with their counterparts in the year prior.

**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 tracked serially over two years.

**Disclosures.** All authors: No reported disclosures.
**Background.** Effective antimicrobial stewardship (AS) requires interdisciplinary teamwork, quality improvement (QI), and knowledge of systems. Simulation (sim) is used to train and evaluate learners on processes. We developed a series of simulated AS committee meetings to train infectious disease (ID) fellows in synthesis of AS interventions. Sim debriefs and fellow/faculty surveys assessed the learners and the format. Methods. 3 simulated AS committee meetings and pre-lectures were developed. Inauthentic roles were assigned with instructions to review AS literature pertinent to that role. SIMs were conducted over 1.5 hours. Notional results of proposals were given, prompting new QI cycles. SIMs concluded with debriefs. Individual and team performance were evaluated using a common tool. Pre and post surveys were collected from fellows and faculty members to assess the format.

**Results.** 6 fellows participated in the series. The 3 scenario tasks were as follows: decrease Clostridium difficile rates in a hospital, decrease outpatient antibiotic prescriptions for viral infections, and improve perioperative antibiotic use via telehealth. 83.3% of fellows pre and 100% post sim series reported educating others on AS principles in the previous 1 month. Fellows commented “I enjoy the format,” “the sims were very engaging”, and suggested more scenarios be added into the curriculum. 8 faculty members completed pre/post surveys. 25% of faculty pre and 0% post reported that fellow attitude on the existing preauthorization process was useless/unnecessary and 37.5% of faculty pre and 62.5% post reported it was useful/necessary. No changes were seen in other areas of AS performance queried. Comments included that simulated clinicians “great,” and the fellows “take [the sim] seriously.” Faculty noted that the discussion reflected actual AS committee discussion and was useful in evaluation of learners.

**Conclusion.** Sim based training is an effective and enjoyable way to train ID fellows in AS. Fellows improved in knowledge, skills, and attitudes. Plans exist to use the series in the next academic year with senior fellows acting as moderators, and to evaluate the involvement of graduates in AS.

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1435. Use of an Email Question and Answer Service to Characterize Vaccine Education Needs in the U.S.
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**Background.** The Centers for Disease Control and Prevention (CDC) educates providers and the public about vaccine-preventable diseases and vaccines. Educational tools should be targeted to appropriate audiences and topic areas relevant to them. One tool in this CDC education service is the email question and answer service, NIPINFO@cdc.gov. Two CDC public health professionals (one physician and one non-physician) are assigned daily to answer questions.

We describe: 1) the distribution of queries by topic type, query source and level of difficulty; 2) analyses of questions involving safety, particularly safety of HPV vaccine; and 3) the impact of CDC introducing a new vaccine recommendation on the volume and type of queries related to that vaccine.

**Methods.** Queries were summarized from August 2013 through March 2016. Queries were coded by topic (disease/vaccine), subtopic (e.g., safety), source (primary provider, public provider, general public) and level of difficulty. Frequencies and strengths of associations were generated by SAS 9.3. We also studied the trend of volume of queries relative to the timing of new CDC vaccine recommendations.

**Results.** During the study period, 23,783 queries were answered. The top three query topics were “multiple” (meaning one or more questions about more than one vaccine) (20%), influenza (14%), and miscellaneous (8%). HPV, miscellaneous, and multiple vaccine questions were most frequently rated the most difficult. The percentage of similar difficult questions among the public (36%) and providers (41%) was higher than that among HPV queries who were more likely than non-HPV queries to be about safety (19% and 10% respectively P<0.001). HPV queries were more likely to come from the general public (31%) compared with other types of questions (20%). The timing of CDC vaccine policy publications did not affect the volume of questions received on that topic after the policy was published.

**Conclusion.** The most common primary query topics were multiple vaccines, influenza, and miscellaneous. Safety of HPV vaccine is a topic that stimulates challenging questions. Publications of CDC vaccine recommendations did not affect timing or volume of queries in this evaluation.

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1436. Virology Online: a free, web-based, adaptive-learning course
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**Background.** We developed an innovative, online, interactive learning tool called Macrophage (www.macrophage.co) to replace virology lectures for 165 first-year medical students in the microbiology/infectious diseases course at Columbia University. Macrophage Virology (MV) teaches using video lessons followed by questions. Students are asked to review questions they have the most trouble with according to binary machine learning algorithms. We evaluated this novel blended-learning curriculum.

**Methods.** MV consists of 54 videos (~4 minutes) and 354 questions (multiple choice; select all; fill in the blank) reviewed by content experts. MV replaced 7 lecture hours. Topics include introductory virology as well as pathogenesis, clinical features, and treatment/prevention of respiratory viruses, enteric viruses, herpesviruses, and viral encephalitis. Online learning was complemented with team-based learning. MV and lecture were evaluated using a 5-point Likert scale for efficiency of learning, perceived long-term retention, preparedness for exam, and enjoyment. Responses were analyzed with a binomial test comparing MV to lecture. Student comments were analyzed for common themes. Finally, we analyzed the improvement in the mean performance of students on 28 questions repeated from last year’s exam, using the Mann-Whitney U test.

**Results.** Students rated MV as superior to lecture in terms of efficiency (61% found it “more” or “a lot more” efficient vs. 16% “less” or “a lot less,” N = 163, P = 2e-7), retention (67% vs. 9%, P = 4e-12), exam preparedness (57% vs. 11%, P = 1e-8), and enjoyment (59% vs. 14%, P = 1e-7). Written feedback indicated that MV was “fun” and “engaging,” and that the short videos and numerous questions made it more effective than lecture. Performance on repeated exam questions improved from 86.1% to 90.1% with MV (P = 4e-5).

**Conclusion.** Students preferred Macrophage Virology, an interactive online platform that reduces passive listening time and utilizes machine learning to adapt to each individual user. Pre-clinical medical school curricula remain predominantly lecture-based, but this study suggests that digital tools, which have the advantage of being both permanent and scalable, have the potential to be more effective.

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