Development and Assessment of Internet Case Based Multi-disciplinary Infectious Disease Workshops as a Learning Tool in Antimicrobial Therapeutics

UNIVERSITY OF MARYLAND
SCHOOL OF PHARMACY

Angela Wilks, Ph.D., Neha Sheth, PharmD., Shannon Tucker, MS
University of Maryland School of Pharmacy

Background

The introduction of a new faculty member specializing in infectious diseases provided an opportunity to revisit how Doctor of Pharmacy students apply basic microbiology principles and testing methods to patient cases. Since many students struggle with complex disease states[1], providing students with a strong grounding in the application of basic science concepts in the therapeutic decision making process is essential. Infectious diseases are one of the most common diseases to appear across the spectrum of pharmacy practices ranging from diabetes to oncology. Knowing that the applying basic science concepts into therapeutic decisions for complex patients is difficult for many medical disciplines, we've incorporated an Infectious Disease Workshop (IDW) that used a stepwise approach to reinforce basic science concepts in the context of a patient case.

Objectives

To create an online infectious disease workshop (IDW) that maximizes the skills and competencies of student pharmacists in the experimental and therapeutic principles of infectious diseases.

To provide a framework to assess student synthesis of these principles as a result of completing the workshop.

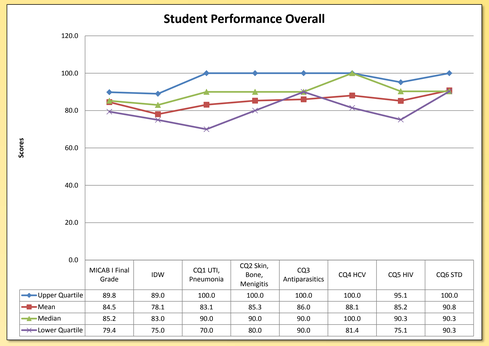
Development

With the increased cost of laboratory experiments, time needed to perform laboratory experiment and the amount of instructors needed to have all students participate in performing actual laboratory work; it was decided to simulate microbiology laboratory experiment online.[1,2] The infectious disease workshop was developed by the instructors of the course and instructional design and technology experts. The instructors included a Ph.D. researcher of microbiology and a clinical pharmacist specializing in infectious diseases. With the knowledge of the instructional design team we were able to incorporate patient assessment, laboratory simulations (Kirby-Bauer, MIC and synergy grids) and required interpretation of data from laboratory tests (susceptibility testing) to demonstrate the student pharmacist's ability to determine patient appropriate empiric therapy (via antibiograms) and streamlined treatment. Virtual laboratory exercises assessed the student's ability in data reading, calculations, reporting of results and development of a patient appropriate therapeutic plan.

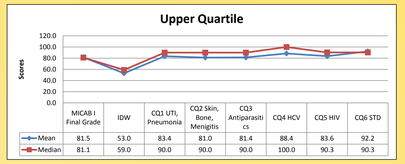
Results

When evaluating student performance we did not find a strong correlation between student scores on the IDW and either scores on individual case quiz results or mean case quiz results (r = 0.127/p = 0.012). Since the IDW was not included in student's final grade calculations, it is unclear if students exhibiting poor performance did so because of the formative nature of the activity.

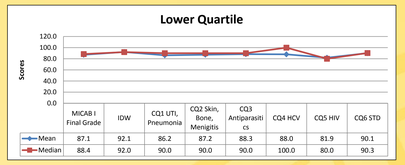
95 students completed an evaluation of the IDW as a part of the final course evaluation for PHAR540 Microbiology and Antibiotics II. We did not find a correlation between the students who felt the activity helped them apply their knowledge of microbiology and antibiotics to the therapeutic context and those who felt the activity should be provided for future students (r = 0.676 / p = 0.002). The lack of correlation may have been caused by the activity length. A few students mentioned they would have benefited more from the activity if it were broken into smaller units.



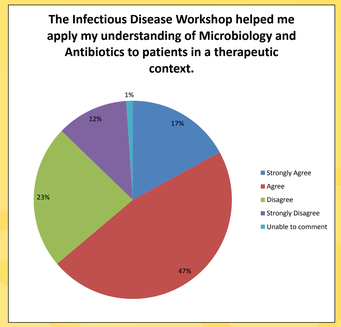
	MICAB I Final Grade	IDW	CQ1 UTI, Pneumonia	CQ2 Skin, Bone, Menigitis	CQ3 Antiparasitics	CQ4 HCV	CQ5 HIV	CQ6 STD
Upper Quartile	89.8	89.0	100.0	100.0	100.0	100.0	95.1	100.0
Mean	84.5	78.1	83.1	85.3	86.0	88.1	85.2	90.8
Median	85.2	83.0	90.0	90.0	90.0	100.0	90.3	90.3
Lower Quartile	79.4	75.0	70.0	80.0	90.0	81.4	75.1	90.3

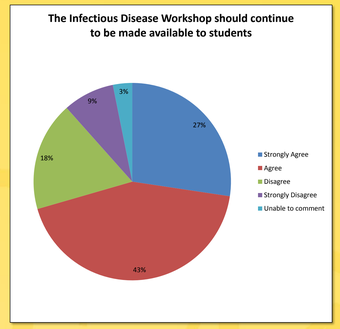


	MICAB I Final Grade	IDW	CQ1 UTI, Pneumonia	CQ2 Skin, Bone, Menigitis	CQ3 Antiparasitics	CQ4 HCV	CQ5 HIV	CQ6 STD
Mean	81.5	53.0	83.4	81.0	81.4	88.4	83.6	92.2
Median	81.1	59.0	90.0	90.0	90.0	100.0	90.3	90.3

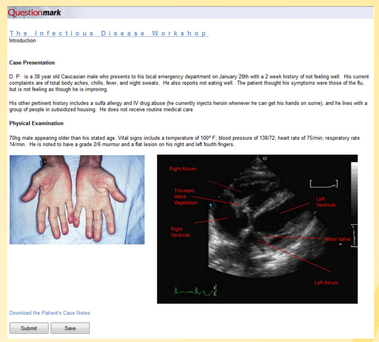


	MICAB I Final Grade	IDW	CQ1 UTI, Pneumonia	CQ2 Skin, Bone, Menigitis	CQ3 Antiparasitics	CQ4 HCV	CQ5 HIV	CQ6 STD
Mean	87.1	92.1	86.2	87.2	88.3	88.0	81.9	90.1
Median	88.4	92.0	90.0	90.0	90.0	100.0	80.0	90.3

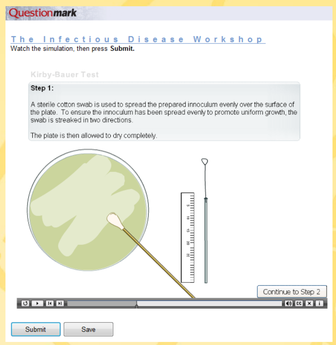




Infectious Disease Workshop Example

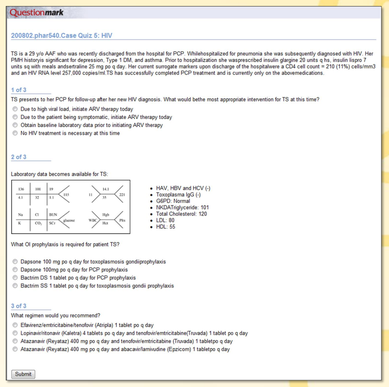


Patient Introduction

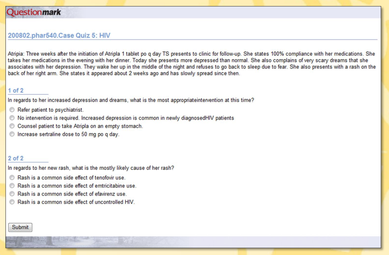


Kirby Bauer Simulation

Case Quiz Example (HIV)



HIV Case Quiz



HIV Case Quiz (Continued)

Conclusions

Infectious diseases and antimicrobial therapeutics is a particularly challenging arena in pharmaceutical care for a number of reasons not least of which are the increased complexity of the discipline.[1] The IDW allows for development of a flexible knowledge base of basic science to be utilized effectively in the therapeutic decision making process. The student's performance on the IDW assessment of basic science concepts in a problem-based learning therapeutic scenario improved their overall performance in subsequent examination of the material in case-based formats. Though data from this study was not statistically significant it raised awareness of the utility of this assignment in the overall performance of student pharmacists. The results of the study have led the instructors of this course to introduce case based learning earlier in the course series in order to assess students performance on case based problem solving pre and post the IDW.

Bibliography

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Masiello I, Ramberg R, Lonka K. Attitudes to the application of a web-based learning system in a microbiology course.
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Notes

The Infectious Disease Workshop was constructed using Adobe Captivate and Questionmark Perception.

Additional Members of the Instructional Design Team:
Christopher Klimas, Richard Ruane