



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

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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 states¹, 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.

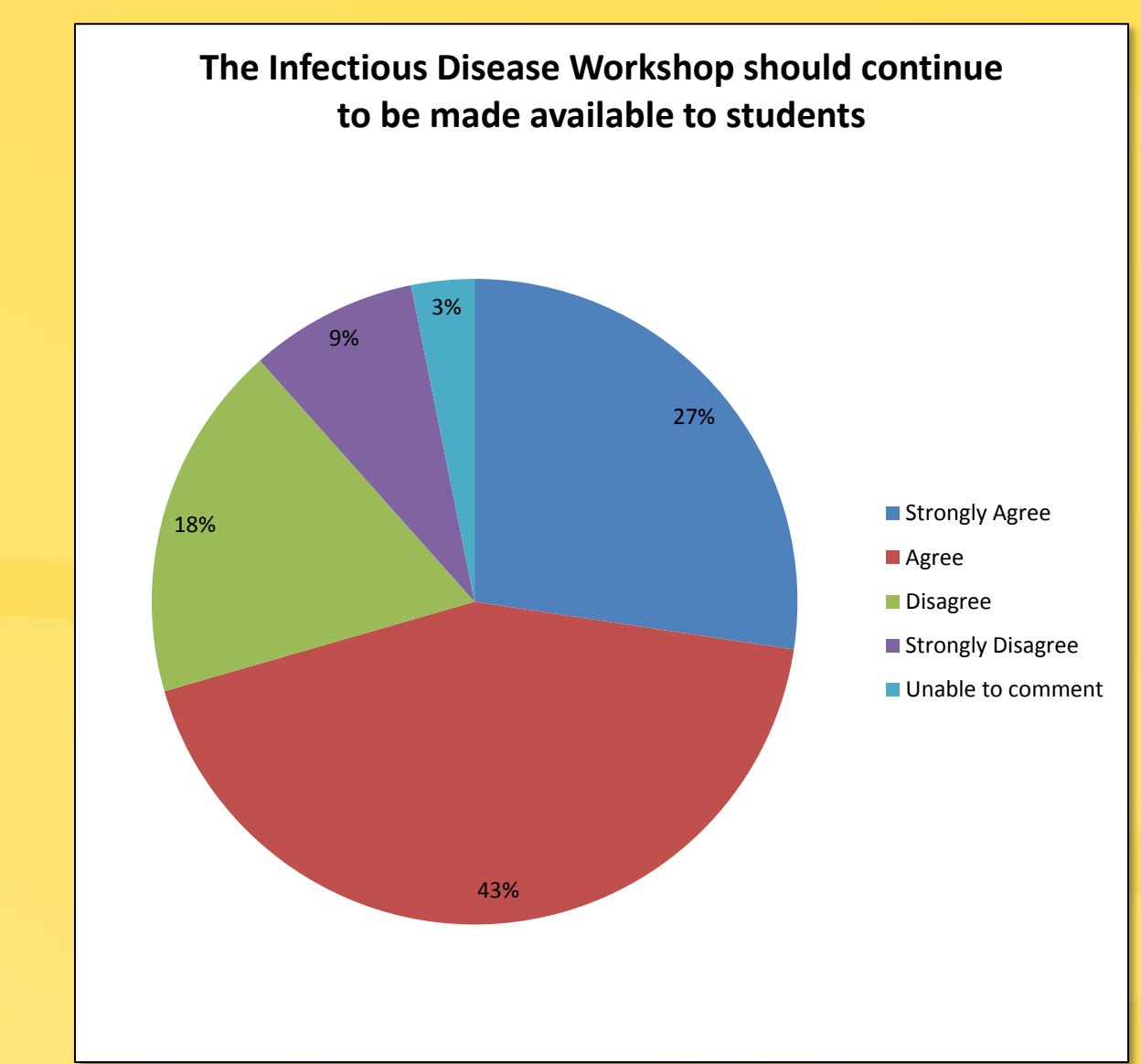
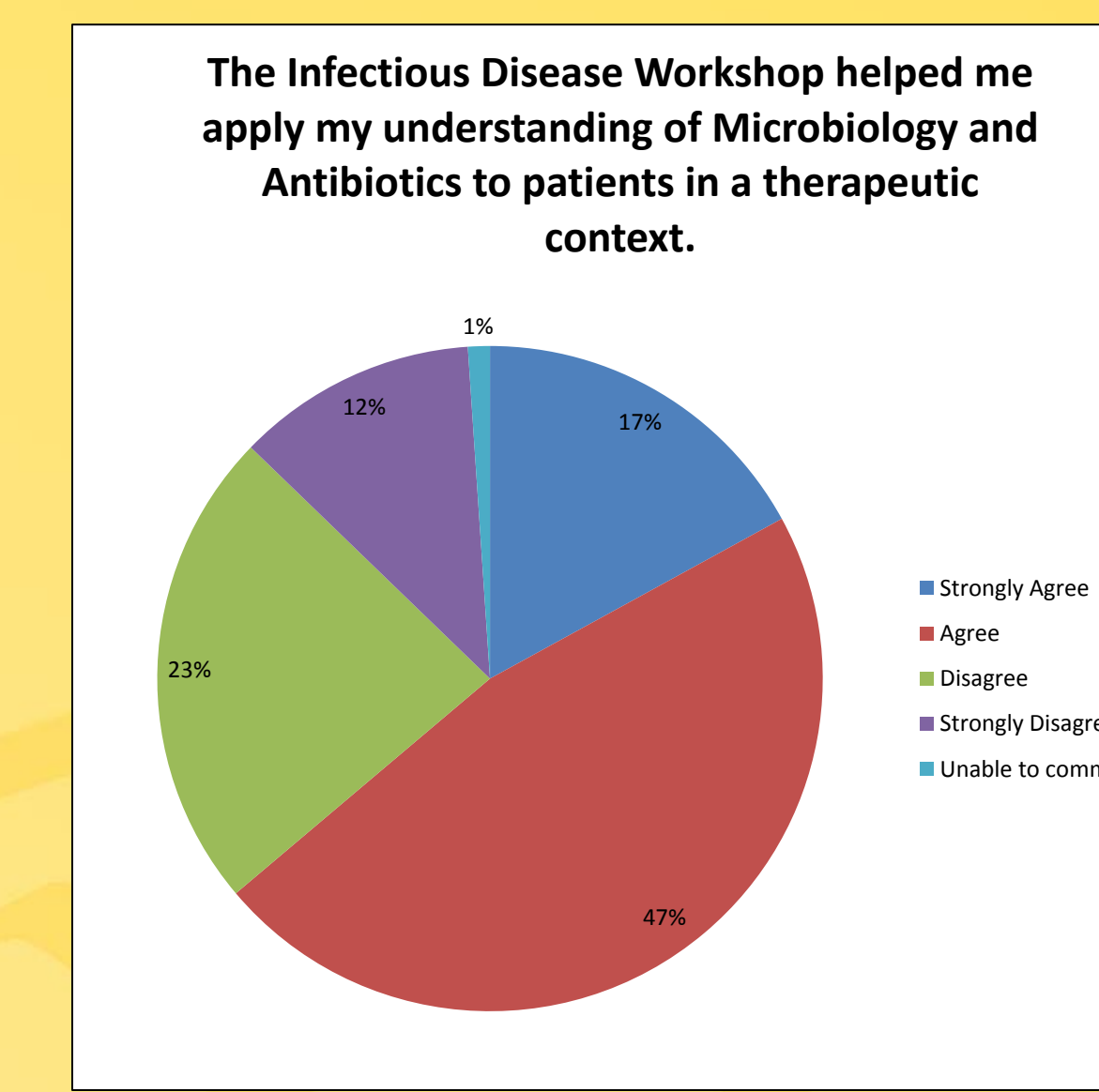
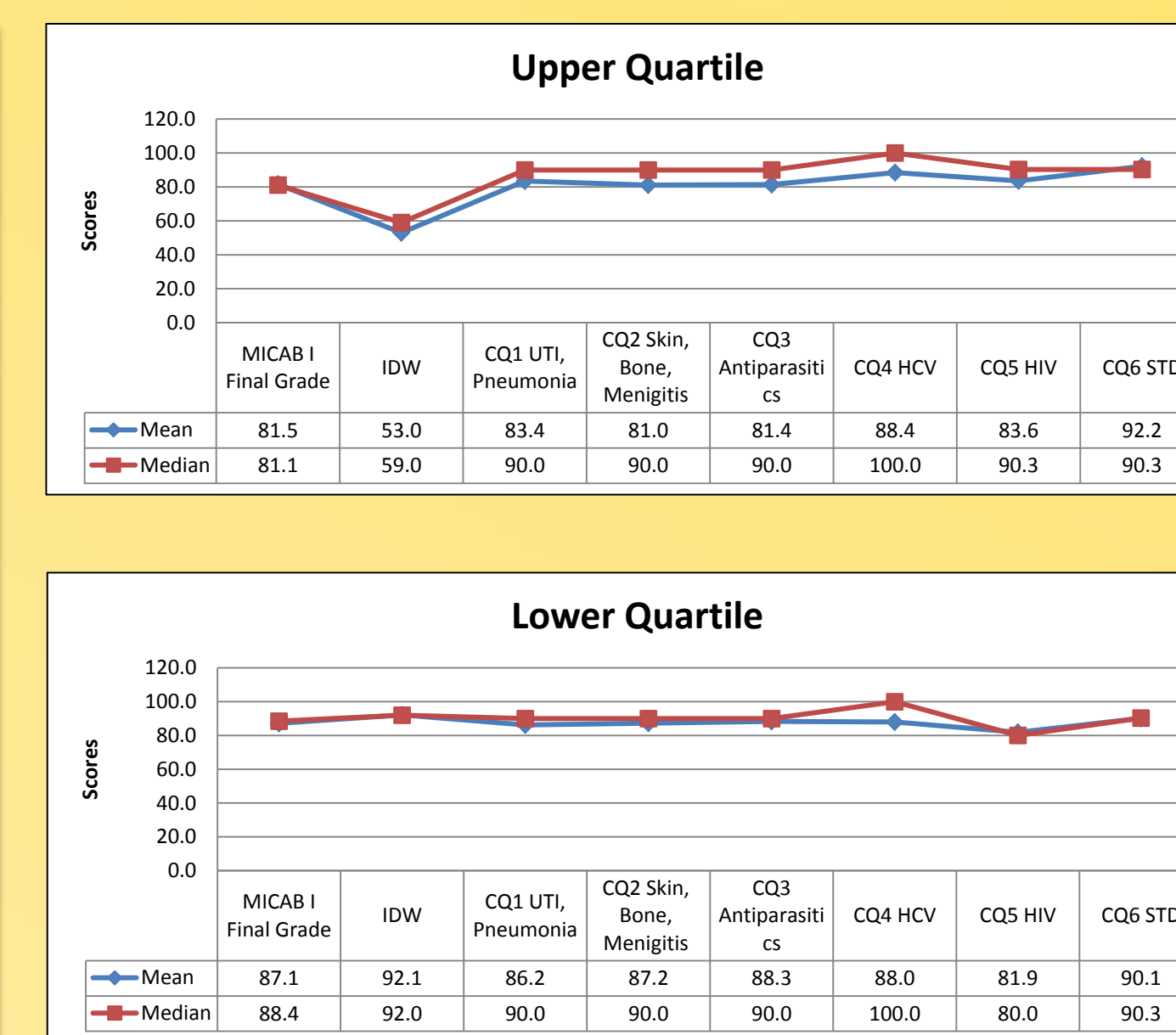
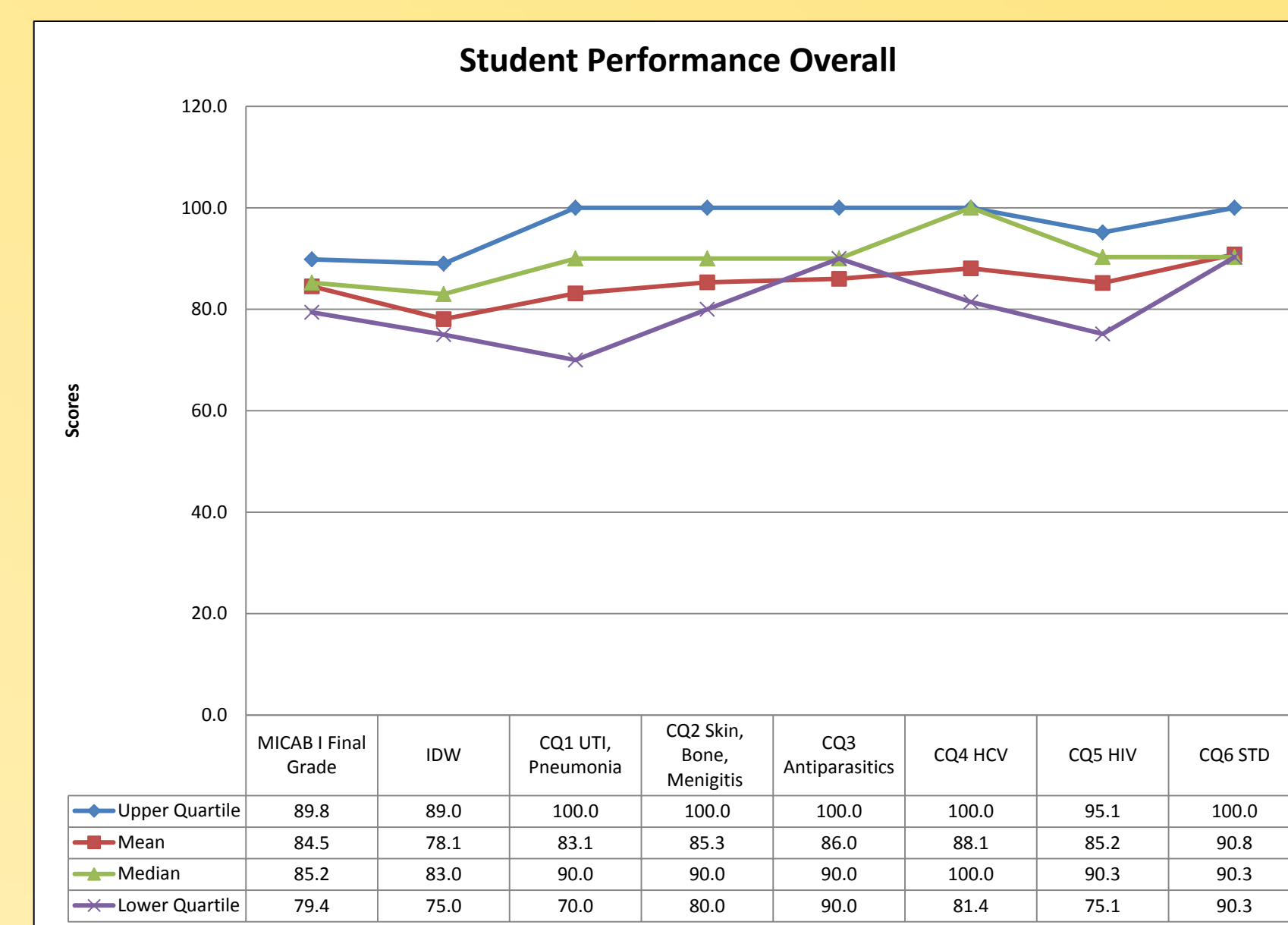
Development

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.



Infectious Disease Workshop Example

Questionmark
The Infectious Disease Workshop
Introduction

Case Presentation
D. P. is a 38 year old Caucasian male who presents to his local emergency department on January 20th with a 2 week history of not feeling well. His current complaints are of total body aches, chills, fever, and night sweats. He also reports not eating well. The patient thought his symptoms were those of the flu, but is not feeling as though he is improving.

His other pertinent history includes a sulfa allergy and IV drug abuse the currently reports he has when he can get his hands on some, and he lives with a group of people in residential housing. He does not receive routine medical care.

Physical Examination
78kg male appearing older than his stated age. Vital signs include a temperature of 100°F, blood pressure of 130/72, heart rate of 75/min, respiratory rate 14/min. He is noted to have a grade 2/6 murmur and a fat lesion on his right and left fourth fingers.

Download the Patient's Case Notes
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Patient Introduction

Questionmark
The Infectious Disease Workshop
Watch the simulation, then press Submit.

Kirby-Bauer Test

Step 1:
A sterile cotton swab is used to spread the prepared inoculum evenly over the surface of the plate. To ensure the inoculum has been spread evenly to promote uniform growth, the swab is streaked in two directions.

The plate is then allowed to dry completely.

[Continue to Step 2]

[Submit] [Save]

Kirby Bauer Simulation

Case Quiz Example (HIV)

Questionmark
200892.phar540.Case Quiz 6: HIV

TS is a 25 y/o MAF who was recently discharged from the hospital for PCP. While hospitalized for pneumonia she was subsequently diagnosed with HIV. Her PMH history is significant for depression, Type 1 DM, and asthma. Prior to hospitalization she was prescribed zidovudine 300 mg po q 6h, zalcitabine 750 mg po q 6h, and didanosine 400 mg po q 6h. Her current surrogate markers upon discharge of the hospital are a CD4 cell count = 236 (17% reference) and an HIV RNA level 287,800 copies/mL. TS has successfully completed PCP treatment and is currently only on the above medications.

1 of 2
TS presents to her PCP for follow-up after her new HIV diagnosis. What would be the most appropriate intervention for TS at this time?
 Due to her low viral load, initiate ARV therapy today.
 Due to the patient being symptomatic, initiate ARV therapy today.
 Obtain baseline laboratory data prior to initiating ARV therapy.
 No HIV treatment is necessary at this time.

2 of 2
Laboratory data becomes available for TS:

CD4	236	CD4%	17%
CD4	236	CD4%	17%
CD4	236	CD4%	17%
CD4	236	CD4%	17%

- HIV, HIV and HCV (-)
- Zalcitabine 750 (1)
- CD4% Normal
- INCA750/zidovudine 301
- Real Cholesterol 120
- LDL 80
- HDL 10

What CR prophylaxis is required for patient TS?
 Dapsone 100 mg po q day for toxoplasmosis gondrophylaxis
 Dapsone 100 mg po q day for PCP prophylaxis
 Bactrim DS 1 tablet po q day for PCP prophylaxis
 Bactrim DS 1 tablet po q day for toxoplasmosis gondrophylaxis

3 of 2
What regimen would you recommend?
 Efavirenz/emtricitabine/rilpivirine (Atrineq) 1 tablet po q day
 Lopinavir/ritonavir (Kaletra) 4 tablets po q day and tenofovir/emtricitabine (Truvada) 1 tablet po q day
 Abacavir (Zygen) 400 mg po q day and lamivudine/emtricitabine (Truvada) 1 tablet q day
 Abacavir (Zygen) 400 mg po q day and abacavir/zidovudine (Zidacovir) 1 tablet q day

[Submit]

HIV Case Quiz

Questionmark
200892.phar540.Case Quiz 6: HIV

Atsika. Three weeks after the initiation of Atsika 1 tablet po q day TS presents to clinic for follow-up. She states 100% compliance with her medications. She takes her medications in the evening with her dinner. Today she presents more depressed than normal. She also complains of very scary dreams that she associates with her depression. They wake her up in the middle of the night and release to go back to sleep due to her. She also presents with a rash on the back of her right arm. She states it appeared about 2 weeks ago and has slowly spread since then.

1 of 2
In regards to her increased depression and dreams, what is the most appropriate intervention at this time?
 Refer patient to psychiatrist.
 No intervention is required. Increased depression is common in newly diagnosed HIV patients.
 Counsel patient to take Atsika on an empty stomach.
 Increase zalcitabine dose to 50 mg po q day.

2 of 2
In regards to her new rash, what is the most likely cause of her rash?
 Rash is a common side effect of zalcitabine use.
 Rash is a common side effect of emtricitabine use.
 Rash is a common side effect of didanosine use.
 Rash is a common side effect of uncontrolled HIV.

[Submit]

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. Caput Educ. 2005; 45:171-85.

Notes

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

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