Antimicrobial Susceptibility Testing Interprofessional Education Activity with Medical Laboratory Science Students and Pharmacy Students

MEDICAL COLLEGE OF WISCONSIN SCHOOL OF PHARMACY

MARQUETTE UNIVERSITY



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BE THE DIFFERENCE.

Background

- Few examples in the academic literature of collaborations between Medical Laboratory Science and Doctor of Pharmacy students
 - Ohio Northern University: two one-hour IPE activities with students from exercise physiology, medical laboratory science, nursing, and pharmacy; cases involved cultural competency in four different scenarios

Musser, M.R., DiPietro Mager, N., Walden, L., Montenery, S. and Terrell, S., 2016. Development of a Novel Interprofessional Education Activity with Undergraduate Students: Design, Assessment, and Lessons Learned. *Health, Interprofessional Practice and Education*, 3(1), p.eP1096. DOI: <u>http://doi.org/10.7710/2159-1253.1096</u>

Project Origin

Pharmacy Students:

 No microbiology laboratory experience in didactic curriculum

 Antimicrobial spectrum of activity identified as an area for improvement in infectious disease coursework

Medical Laboratory Science (MLS) Students:

 ✓ Desire to expand interprofessional education offerings with new healthcare provider partners

 Opportunity to increase clinical applications of MLS techniques

Project Goals



Develop a new partnership for interprofessional education (IPE) with Medical Laboratory Science (MLS) and Doctor of Pharmacy (PharmD) students



Provide opportunities not available in didactic curriculum, specifically:
hands-on microbiology experience for pharmacy students, and
clinical applications of microbiology techniques for MLS students

IPE Event Timeline

April 2022

IPE Event 2

IPE Event 1

Planning & COVID-19 virtual transition

2020

April 2021







Students MCW PharmD students Marquette MLS students

Pharmacy: optional event for Personal and Professional Development (PPD) credit **Format** Virtual via Zoom with breakout rooms

Activities

- Live demonstration of antimicrobial susceptibility testing techniques
- 2. Breakout rooms with "stations"

IPE Event General Format



Introductions (& event ground rules)



Ice Breaker Activity





Rotate through three stations

Facilitator-led debrief



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Student reflections and Interprofessional Collaborative Competencies Attainment Survey (ICCAS)

Activities

- Live demonstration of antimicrobial susceptibility testing techniques
- 2. Breakout rooms with "stations"

Broth Micro/Macrodilution



 $0.5\ \mu\text{g/mL}\ 1\ \mu\text{g/mL}\ 2\ \mu\text{g/mL}\ 4\ \mu\text{g/mL}\ 8\ \mu\text{g/mL}\ 16\ \mu\text{g/mL}$





Activities

- Live demonstration of antimicrobial susceptibility testing techniques
- 2. Breakout rooms with "stations"

Station 1: Broth Microdilution

Station 2: Disk Diffusion

Station 3: Supplemental Testing and Networking

Station 1: Broth Microdilution

96-well <u>Template</u> to Determine MIC Values (this is also found your worksheet)

1	2	3	4	5	6	7	8	3	10	11	12
LEV	LEV	LEV	LEV	LEV	LEV	LEV	LEV	AMP	AMP	AMP	AMP
32	16	8	4	z	100	0.5	0.25	64	32	16	8
CIP	CIP	CIP	CIP	CIP	CIP	CIP	CIP	TOB	TOB	TOB	TOE
32	16	8	4	2	1	0.5	0.25	16	8	4	2
CFZ	CFZ	CFZ	CFZ	CF2	CFZ	CF2	A/S	A/S	AIS	A/S	A/S
64	32	16	8	4	2	1	64	32	16	8	4
FEP	FEP	FEP	FEP	FEP	FEP	FEP	CAX	CAX	CAX	CAX	CAX
64	32	16	8	4	2	1	8	4	2	1	0.5
CAZ	CAZ	CAZ	CAZ	CAZ	CAZ	P/T	P/T	P2T	PIT	P/T	P/T
64	32	16	8	4	2	256	128	64	32	16	8
ERT	ERT	ERT	ERT	ERT	ERT	FOX	FOX	FOX	MIT	NIT	NIT
8	4	2	100	0.5	0.25	32	16	8	128	64	32
MER	MER	MER	MER	MER	MER	T/S	T/S	T/S	TIS	T/S	nos
16	8	4	2	1	0.5	16	8	4	2	1	PU
AZT	AZT	AZT	AZT	AZT	AZT	GEN	GEN	BEN	GEN	GEN	NEC
64	32	16	100	-4	2	32	16		d	2	NEG

Simulated

broth

microdilution

plates in

PowerPoint

Broth microdilution test results for you to interpret will follow on the next slides

Escherichia coli (Enterobacterales)



Use Clinical and Laboratory Standards Institute M100 to interpret minimum inhibitory concentrations

 Use CLSI M100 standards for aerobic bacteria to determine susceptibility interpretations for each of the organism/antimicrobial combinations listed below.

Antimicrobial	MIC	Interpretation
Ciprofloxacin (CIP)		
Cefazolin (CFZ, systemic)		
Cefazolin (CFZ, urine interpretation)		
Cefepime (FEP)		
Meropenem (MER)		
Piperacillin-tazobactam (P/T)		
Tobramycin (TOB)		
Nitrofurantoin (NIT)		
Trimethoprim-sulfamethoxazole (T/S)		

Station 1: Broth Microdilution



Group discussion questions

Consider the following questions as a group:

- A. How do laboratories ensure that results of broth microdilution testing are reproducible, so that the same results would be obtained regardless of the laboratory performing the testing?
- B. Laboratories may choose to suppress (i.e., hide) some antimicrobial susceptibility testing results in order to guide clinicians to more appropriate antibiotics. Which antimicrobials on this broth microdilution panel would you recommend suppressing for blood culture isolates, but not urine culture isolates? Can you think of other examples where suppressing certain antibiotics from being displayed would help improve prescribing practices?
- C. You are treating a patient with acute pyelonephritis (an infection of the kidneys, classified as a complicated urinary tract infection). Based on the results, would cefazolin be an appropriate treatment option? Explain your rationale.
- D. How would you explain the interpretation of piperacillin-tazobactam to a clinician? Can this be used to treat an infection?

Comments- What Went Well?

I think discussions went well. There was a lot of interest in what each profession does.

I enjoyed interacting with the PharmD students and I thought they knew the material I was explaining to them.

I liked getting to learn the different components of what the lab does when you send them a request. I was being single minded on what the lab could test for and forgot there are other things too like vanco dosing and not just microbes.

Set up of everything, and material used was easy to follow.

I think this was an interesting event and would recommend running it again next year, as it allows pharmacy students to pursue their interests in an area of specialty (ID) practice.

Comments- What Can Be Improved?

One of my small groups no one talked at all or had their cameras on, so they had to listen to me talk for 25 mins.

Our group was balanced with 1st and 2nd years, however, it felt like the 1st year students didn't say much. I couldn't tell if the 1st years were shy or if us 2nd year students were just going too fast through the information.

If the worksheet is to be continued, it may be interesting to pharmacy students to include a few extra questions regarding clinical-decision making. There were only one or two questions focused on interpreting whether an agent is appropriate based on the data/culture results; however, I think these questions are the ones that prompt the most conversation among pharmacy students.

Reflections from First IPE Event

Interprofessional education: students of two or more health professions learning with, from, and about each other





- 1. Increase learning opportunities for MLS students *from* pharmacy students
- 2. Increase opportunities to learn *with* one another from references and facilitators

Reflections from First IPE Event



Supplementary testing station was technical and difficult to translate into clinical cases



Students did not understand how to access or interpret CLSI M100 document



- Add activity with more lab and clinical overlap to improve collaboration between the disciplines
- 2. Make a video to explain how to access and interpret M100 document to watch before session

IPE Event #2 April 2022: **Major Changes**









Make a pre-work video demonstrating how to access and interpret the CLSI M100 document Add faculty facilitators to each breakout room to remove the responsibility of facilitating from MLS students

Change supplemental testing activity to an antibiogram activity

Set clear expectations: video on and active participation











0 X 4

- 89%





Comments- What Went Well?

Zoom. It was interesting to see how we got separated into our "breakout rooms". Pharmacy students and facilitators were friendly. The slide was well presented.

Our group was able to evaluate antimicrobial susceptibility results using multiple scopes of knowledge.

I really enjoyed the small groups; it promoted a positive environment to share freely.

I thought this created a relevant dynamic between lab and pharmacy in a healthcare setting.

Comments- What Can Be Improved?

It was very difficult to access and navigate through the CLSI material. Page numbers in the pdf document would have been nice.

We ran out of time in some activities so maybe adding more time to allow for completion.

I thought there was a good bridge between the works if pharmacy and medical laboratory. Overall I wouldn't change anything.

This was very helpful, and I almost wish it were offered while we were in ID1.

Future Directions

Move event to Session 3 to align better with pharmacy didactic curriculum

Invite medical students from the MCW Antimicrobial Stewardship and Infectious Disease Interest Group (ASIDIG)

Convert activity to in-person for hands-on practice with antimicrobial susceptibility testing techniques

Integrate CLSI orientation into the event or incentivize completion of the pre-work video

IPE Lessons Learned

Virtual formats require clear expectations and facilitator enforcement (cameras on!)

Faculty facilitators in each small group were necessary to ensure that students were working and learning together

Ideal IPE activities integrate the specialized knowledge of each medical discipline into translational clinical cases Orientation pre-work can be important (but is not always done)

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