Pharmacy Student Survey

During the course of your pharmacy education, have you ever had one of the following thoughts?

"Oh, well we never really covered that in class..."

"OK, so where do I find that information, exactly?"

"Ugh, this lecture again?"

The purpose of this survey is to avoid such questions - at least when it comes to antimicrobials. This survey will assess 4th year pharmacy students' knowledge and attitudes about antimicrobial use and resistance as well as the quantity and perceived quality of education about antimicrobials in a sample of US pharmacy schools. We ultimately hope to identify areas of potential improvement in pharmacy school curricula.

Your participation in this survey is completely voluntary and your decision of whether or not to participate will have absolutely no effect on your academic standing. Your responses will be anonymous (de-identified) and will only be seen individually by the study investigators. Responses will be aggregated for general release. This survey will not collect any personally identifiable data other than age, gender, and pharmacy school. We will try to make sure that the information we collect from you is kept private and used only for this research study. Completing this questionnaire will serve as your consent to take part in this research study.

The survey should take about 15-20 minutes to complete. Please take the survey only once. You must complete all the questions in order to receive a compensation email with a $5 Amazon.com electronic gift card. However, you may stop this study at any time without any penalty to you.

We understand it is tempting to "look up answers," but PLEASE do not use references and answer honestly based on your current knowledge.

If you have any questions, please contact the principal investigator, Julie Ann Justo, PharmD, via email (justoj@sccp.sc.edu) or telephone (803-777-8855).

Thank you for your time and participation!

Please tell us about yourself:

1 Which of the following pharmacy schools are you attending?

- ☐ Chicago State University
- ☐ Midwestern University
- ☐ Nova Southeastern University
- ☐ Palm Beach Atlantic University
- ☐ South Carolina College of Pharmacy
- ☐ Temple University
- ☐ University at Buffalo
- ☐ University of California San Francisco
- ☐ University of Illinois at Chicago
- ☐ University of Iowa
- ☐ University of Michigan
- ☐ University of Nebraska
- ☐ University of Washington
- ☐ Wayne State University

2 Tell us your age (please enter a number) _____

3 Please tell us your gender

☐ Female
☐ Male

4 Which practice area of pharmacy are you considering? Please select all that apply

- ☐ Community
- ☐ Hospital
- ☐ Clinical (non-dispensing)
- ☐ Compounding
- ☐ Nuclear
- ☐ Managed Care
- ☐ Consultant
- ☐ Pharmacy Administration
- ☐ Academia
- ☐ Pharmaceutical Industry
- ☐ Other
- ☐ Undecided

5 Are you considering pursuing post-graduate training (e.g. residency, fellowship)?

- ☐ Yes
- ☐ No

5B If so, what type of post-graduate training are you considering? Please select all that apply

- ☐ PGY-1 Residency
- ☐ PGY-2 Residency
- ☐ Fellowship
- ☐ Other
- ☐ Undecided

5C Which specialty(ies) are you considering, if any? Please select all that apply

- ☐ Ambulatory Care
- ☐ Cardiology
- ☐ Critical Care
- ☐ Emergency Medicine
- ☐ Informatics
- ☐ Infectious Diseases
- ☐ Internal Medicine
- ☐ Nutrition
- ☐ Oncology
- ☐ Pediatrics
- ☐ Psychiatry
- ☐ Transplant
- ☐ Other
- ☐ Undecided

6 Have you had any research experience or pharmacology education regarding antimicrobials prior to entering pharmacy school?

☐ Yes
☐ No

7. Tell us how much you Agree or Disagree with each of the following statements

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Antimicrobials are overused nationally in healthcare	☐	☐	☐	☐	☐
Antimicrobials are overused at the hospitals where I have rotated	☐	☐	☐	☐	☐
Antimicrobial resistance is not a significant problem nationally	☐	☐	☐	☐	☐
Antimicrobial resistance is not a significant problem at the hospitals where I have rotated	☐	☐	☐	☐	☐
Better use of antimicrobials will reduce problems with antimicrobial-resistant organisms	☐	☐	☐	☐	☐
Appropriate use of antimicrobials can cause antimicrobial resistance	☐	☐	☐	☐	☐
Strong knowledge of antimicrobials is important in my pharmacy career	☐	☐	☐	☐	☐
I would like more education on antimicrobial resistance	☐	☐	☐	☐	☐
I would like more education on the appropriate use of antimicrobials	☐	☐	☐	☐	☐
New antimicrobials will be developed in the future that will keep up with the problem of "resistance"	☐	☐	☐	☐	☐
Prescribing broad-spectrum antimicrobials when equally effective, narrower-spectrum antimicrobials are available increases antimicrobial resistance	☐	☐	☐	☐	☐
Poor Infection Control practices by healthcare professionals cause spread of antimicrobial resistance	☐	☐	☐	☐	☐
Inappropriate use of antimicrobials causes antimicrobial resistance	☐	☐	☐	☐	☐
Inappropriate use of antimicrobials can harm patients	☐	☐	☐	☐	☐

8. If made available to you, please rate the usefulness of each of the following options for learning about antimicrobial prescribing and resistance

	Very Useful	Useful	Neutral	Not Useful	Not At All Useful	N/A
Grand Rounds lectures	☐	☐	☐	☐	☐	☐
Lecture series for pharmacy students	☐	☐	☐	☐	☐	☐
Interactive patient-oriented problem-solving modules on the internet	☐	☐	☐	☐	☐	☐
Interactive patient-oriented problem-solving modules on CD-ROM	☐	☐	☐	☐	☐	☐
Problem-solving sessions attended by small groups of pharmacy students and residents or faculty	☐	☐	☐	☐	☐	☐
Role-playing sessions dealing with patients demanding antimicrobial therapy	☐	☐	☐	☐	☐	☐

9. How often do you use each of the following sources to learn about antimicrobial use and resistance?

	Often	Sometimes	Rarely	Never	Not Familiar
Infectious Diseases pharmacists	☐	☐	☐	☐	☐
Infectious Diseases physicians	☐	☐	☐	☐	☐
Non-infectious diseases pharmacists	☐	☐	☐	☐	☐
Infectious Diseases Society of America Guidelines	☐	☐	☐	☐	☐
Other guidelines by professional organizations	☐	☐	☐	☐	☐
Hospital physicians	☐	☐	☐	☐	☐
Pharmaceutical representatives	☐	☐	☐	☐	☐
Medical/pharmacy journals	☐	☐	☐	☐	☐
Sanford Guide	☐	☐	☐	☐	☐
Johns Hopkins Antibiotic Guide	☐	☐	☐	☐	☐
iPhone or smartphone apps	☐	☐	☐	☐	☐
Drug databases (e.g. Lexi-Comp, Micromedex, Clinical Pharmacology)	☐	☐	☐	☐	☐
UpToDate	☐	☐	☐	☐	☐
Wikipedia	☐	☐	☐	☐	☐
Textbooks or study guides	☐	☐	☐	☐	☐
Peers (other students)	☐	☐	☐	☐	☐

Others used often (please specify) _____

10 Have you completed an advanced pharmacy practice experience (APPE) in Infectious Diseases during pharmacy school?

- ☐ Yes
- ☐ No

11. Have you attended any formal lecture(s) that address the following topics during pharmacy school?

	Yes	No	I don't remember
Rational use of antibiotics in general	☐	☐	☐
When to start antibiotics	☐	☐	☐
How to select the correct regimen (dosing, route, and frequency)	☐	☐	☐
How to select the correct duration of treatment for specific infections	☐	☐	☐
How to monitor for efficacy and safety with the chosen antimicrobial therapy	☐	☐	☐

12 How would you rate your pharmacy education regarding appropriate use of antimicrobials so far?

- ☐ Very useful
- ☐ Useful
- ☐ Neutral
- ☐ Not useful
- ☐ Not at all useful
- ☐ I have not received any education so far

13. How well do you feel your pharmacy education has prepared you to do the following upon graduation?

	Very Good	Good	Average	Poor	Very Poor	Not Familiar
To know when to start antimicrobial therapy	☐	☐	☐	☐	☐	☐
How to select the best antimicrobial for a specific infection	☐	☐	☐	☐	☐	☐
How to select an appropriate regimen (dose, route, frequency)	☐	☐	☐	☐	☐	☐
How to monitor for efficacy and safety of the chosen antimicrobial therapy	☐	☐	☐	☐	☐	☐
To describe the correct spectrum of antimicrobial therapy for different antimicrobials (what is covered by each drug)	☐	☐	☐	☐	☐	☐
Understand the basic mechanisms of antimicrobial resistance	☐	☐	☐	☐	☐	☐
How to streamline or de-escalate antimicrobial therapy	☐	☐	☐	☐	☐	☐
How to interpret antibiograms	☐	☐	☐	☐	☐	☐
How to find reliable sources of information to treat infections	☐	☐	☐	☐	☐	☐
How to transition from intravenous to oral antimicrobials (IV to PO switch)	☐	☐	☐	☐	☐	☐
How to handle a patient who demands antimicrobial therapy that is not indicated	☐	☐	☐	☐	☐	☐

14 When do you think your pharmacy school should spend more time teaching about the appropriate use of antimicrobials?

- ☐ First year
- ☐ Second year
- ☐ Third year
- ☐ Fourth year
- ☐ All of the above
- ☐ None of the above

Knowledge: Please answer the following case scenarios regarding antimicrobial use and resistance

15 A 50 year-old woman presents to clinic with 3 days of dysuria and feeling feverish. On exam she has a temperature of 101.8 F, her blood pressure and heart rate are normal and at her baseline. She has mild back pain and suprapubic tenderness. She is menopausal, but sexually active with only one male partner. Labs are ordered, including a urinalysis showing 80 white cells/high-powered field and positive leukocyte esterase and nitrites; culture is pending. Renal function is normal. She has never taken antibiotics before and there is no documented antimicrobial resistance to urinary pathogens in this area. You would recommend the following to the physician:

- ☐ Treat with nitrofurantoin for 14 days
- ☐ Treat with trimethoprim/sulfamethoxazole for 14 days
- ☐ Treat with ciprofloxacin, adjusting if the organism is resistant, and plan for a 7-day treatment course
- ☐ Treat with vancomycin and piperacillin/tazobactam
- ☐ Treat with vancomycin alone
- ☐ Await culture results before starting an antimicrobial
- ☐ Refer to a urologist

16 Which of the following antimicrobials does not cover anaerobes?

- ☐ Metronidazole
- ☐ Clindamycin
- ☐ Ampicillin/sulbactam
- ☐ Piperacillin/tazobactam
- ☐ Levofloxacin

17 A 28 year-old man is hospitalized with fevers, chills and productive cough. A chest X-ray reveals a right lower lobe infiltrate. The resident physician makes the diagnosis of community-acquired pneumonia and starts IV levofloxacin. After 24 hours, he feels better and his fever is improving, but he still has a productive cough. Blood and sputum cultures reveal Streptococcus pneumoniae (resistant to penicillin) and susceptible to fluoroquinolones. He is able to eat; oral absorption is good. With regards to antimicrobial therapy, what would you recommend the physician do next?

- ☐ Continue intravenous levofloxacin
- ☐ Switch to oral levofloxacin
- ☐ Switch to ampicillin/sulbactam
- ☐ Switch to piperacillin/tazobactam
- ☐ Add vancomycin
- ☐ Switch to vancomycin plus piperacillin/tazobactam

18 A 14-year old female with pharyngitis gets a prescription for 10 days of ciprofloxacin (Cipro) from a neighbor. Within 5 days of taking the antibiotic she presents to the ER with fever and more than 8 watery bowel movements over 12 hours. What do you think is the most likely cause of her diarrhea?

- ☐ Food poisoning
- ☐ Antibiotic-associated diarrhea
- ☐ Clostridium difficile-associated diarrhea
- ☐ Typhoid fever
- ☐ Non-typhoid salmonellosis associated with food contamination

19 A 78 year-old gentleman is hospitalized for elective knee replacement surgery. The orthopedist requests 5 days of postoperative prophylactic antibiotics. What are the possible risks associated with prescribing 5 days of antibiotics in this case?

- ☐ Antibiotic resistance
- ☐ It reinforces the perception that long courses of antibiotics should be prescribed for surgical prophylaxis
- ☐ Adverse drug reaction
- ☐ Clostridium difficile-associated diarrhea
- ☐ All of the above
- ☐ No real risk

20. For each of the following combinations of antimicrobials/organisms please match the most likely mechanism of antimicrobial resistance

	Efflux pumps	Alteration of binding sites	Thickening of the cell wall	Enzymatic	Intrinsic (not acquired)
Beta-lactam resistance in E. coli	☐	☐	☐	☐	☐
Methicillin-resistant Staphylococcus aureus (MRSA)	☐	☐	☐	☐	☐
Vancomycin-intermediate Staphylococcus aureus (VISA)	☐	☐	☐	☐	☐
Cefazolin resistance in Enterococcus spp.	☐	☐	☐	☐	☐

21 The lab calls you with a blood culture positive for extended-spectrum beta-lactamase (ESBL) E. coli. Which one is your preferred empiric antibiotic to treat this bacteremia?

- ☐ Daptomycin
- ☐ Vancomycin
- ☐ Piperacillin/tazobactam
- ☐ Vancomycin and piperacillin/tazobactam
- ☐ Ceftriaxone
- ☐ Micafungin
- ☐ Meropenem

22 According to Centers for Disease Control and Prevention (CDC) guidelines, intravenous vancomycin use is discouraged in which of the following situations?

- ☐ For the eradication of MRSA colonization
- ☐ For the treatment of methicillin-susceptible Staphylococcus aureus (MSSA) bacteremia in a patient on hemodialysis
- ☐ Treatment of 1 out of 4 positive blood cultures with Staphylococcus haemolyticus in a patient with no central lines
- ☐ All of the above
- ☐ None of the above

23 Did you use any resources to help you answer the clinical questions in this survey?

- ☐ Yes
- ☐ No

24 Are you familiar with the term "Antimicrobial Stewardship?"

- ☐ Very familiar
- ☐ Familiar
- ☐ Not familiar (I've heard the term, but am not sure what it is about)
- ☐ Not at all familiar (I've never heard it before)

25 During the course of your pharmacy education, have you ever made a recommendation(s) regarding antimicrobials directly to another clinician (e.g. physician, nurse)?

- ☐ Yes
- ☐ No

25B If so, was your recommendation(s) generally accepted?

- ☐ Yes
- ☐ No

26 Almost done! Please provide any feedback here (optional): _____