Title:
• Does knowledge of testing procedures or the format of culture and susceptibility reports from veterinary diagnostic laboratories (VDLs) influence antimicrobial selection decisions?

Authors:
• Dr. Megan Nickel, Dr. Locke Karriker, Dr. Orhan Sahin, Dr. Patrick Gorden, Dr. Paul Plummer, and Kristin Skoland

Statement of problem:
• Antibiotics, one of the greatest discoveries of humankind, continue to be threatened by growing antimicrobial resistance. To combat resistance, judicious use of antibiotics is required. To meet such standards, veterinarians need to understand the process, format and context of information provided by VDL antimicrobial susceptibility reports.

Objective(s):
• Determine if training how laboratory susceptibility results are generated changes antimicrobial selection.
• Determine if the format and context of antimicrobial susceptibility reports changes antimicrobial selection.

Brief materials and methods:
The enrollment objective for this study was 120 voluntary participants, preferably 60 veterinarians and 60 veterinary students. All interested participants were enrolled into the study, due to possible incompletions. Given the non-introductory nature of the training, not all participants will be included in the statistical analysis. Excluded participants will include students that have not completed core veterinary pharmacology coursework or veterinarians who do not practice swine medicine. The authors were blinded to which participants completed the training, but not to the enrolled participants. Overall, 117 veterinarians and 75 veterinary students were provided access to the training between 3/16/20 and 5/15/20.

To provide participants with a free, online and authenticated training opportunity, the Moodle learning management system was utilized in collaboration with the Center for Food Security and Public Health (CFSPH). Through various recruiting efforts, voluntary participants expressed interest to the primary investigators, who contacted CFSPH for enrollment. CFSPH personnel provided training access to participants by providing each with a unique username and password. The center tracked participant responses in a blinded manner within the platform and provided to the authors.

Within the platform, three enrollment groups were created, Duroc, Hampshire and Landrace. Interested veterinarians and veterinary students were sequentially allocated to each group. Within each group, participants began a one-hour training by answering three demographic questions. Participants entered the initial case review and were presented three swine bacteriology cases (A, B and C), with three different levels of antimicrobial susceptibility reports (1, 2 and 3). The case order varied for each group, while the level of information provided for the case susceptibility report increased with each presented case (Figure 1). Participants selected a single or combination treatment route for each case, including the specific antimicrobials and routes. Participants assumed that the client had adequate funds, staffing and supplies for each treatment option and route. A text box was provided for participants to justify answers.
After completion of the three cases, participants entered the video training portion of the platform. Within the platform there were two videos. At the end of each video a color was presented, and participants were required to select the correct color option prior to proceeding. The first video provided a behind the scenes bacteriology tour, from sample submission to the generation of antimicrobial susceptibility reports. The second video provided additional training on antimicrobial susceptibility testing and reporting, noting specific swine limitations. The Clinical and Laboratory Standards Institute (CLSI) VET08 and VET09 documents guided video two details.

Upon exiting the video training, participants entered the post-video case review. Here, participants were presented with the same cases and report levels as the initial case review. Participants were asked the same questions regarding antimicrobial, combination and route to allow participants to change their original response based on concepts learned in the training videos. The same assumptions were in place, along with the opportunity to justify each answer. The last section of the platform was the final questionnaire, in which participants were asked three open ended questions and three multiple choice questions. Questions focused on susceptibility report preference, usefulness of training and if the training had influenced their future antimicrobial selection decisions.

**Significant results:** *No statistical results to report at this time.*

Due to the COVID-19 pandemic and the curriculum and marketing challenges that ensued, the enrollment time was extended to a two-month duration. This extension was justified by the authors as a realistic timeframe for most participants to complete the training platform given the unexpected adjustments to previous personal, school and work commitments. Overall, 69 veterinarians and 49 veterinary students completed the training. Participating veterinarians represented six countries and veterinary students represented 15 colleges across the United States.

Due to this unexpected change, there are no statistical results to report at this time. CFSPH has transferred the participant responses to the authors in a blinded manner. Next steps include, organizing and summarizing the data from the Moodle platform for statistical analysis. The authors are planning to compare the participants’ initial and post-video antibiotic selections to determine if the training videos and/or susceptibility report variations influenced participants’ selection decisions. Differences between veterinarians and veterinary students will be noted. Significant results will be reported in the next quarter after statistical analysis.

Another area of interest for the authors is the final questionnaire. Participant responses will be further summarized regarding their susceptibility report preference and if the training influenced their future antimicrobial selection decisions. Preliminary results from the multiple choice questions indicate that 94% of participants agreed or strongly agreed that “the training was a useful adjunct to my veterinary pharmacology training,” 90% of participants agreed or strongly agreed that they would “recommend this training to a colleague” and 75% of participants agreed or strongly agreed that “the training has influenced my future antimicrobial selection decisions.” When asked which report style was preferred, 4% of participants chose the current VDL report format, 18% chose the next level with ISU VDL historical susceptibility information and 78% chose the most complex with ISU VDL and CLSI breakpoint information. Additional comments regarding knowledge gained from the training, along with positive and negative implications will be summarized in the next quarter. Overall, participants were thankful for the training and repeatedly commented on the need for similar and more in-depth opportunities in the future.

**Discussion of how results can be applied by practitioners:** *No results to report at this time.*
Figure 1: Participant Movement in Moodle Training Platform

120 Participants
60 Vets / 60 Students

GROUP 1 (Duroc)
20 Vets / 20 Students

GROUP 2 (Hampshire)
20 Vets / 20 Students

GROUP 3 (Landrace)
20 Vets / 20 Students

DEMOGRAPHIC QUESTIONS
3 Multiple Choice Qs

INITIAL CASE REVIEW (15 MIN)
1, Multiple Page PDF
5 Multiple Choice Qs & 3 open answer
5 Multiple Choice Qs & 3 open answer
1, Multiple Page PDF
5 Multiple Choice Qs & 3 open answer
1, Multiple Page PDF
5 Multiple Choice Qs & 3 open answer

TRAINING MODULE (30 MIN)
2 Videos → select color after each

POST-VIDEO CASE REVIEW (10 MIN)
Review Previous Case PDF
5 Multiple Choice Qs & 3 open answer
Review Previous Case PDF
5 Multiple Choice Qs & 3 open answer
Review Previous Case PDF
5 Multiple Choice Qs & 3 open answer

FINAL QUESTIONNAIRE (5 MIN)
3 Open Ended Qs
3 Multiple Choice Qs