RESPONSES AND ANALYSIS

Thank you to all who participated in our second AMR problem solving case study! In this case, we investigated a puzzling case of interesting blood culture results from a patient presenting at the emergency room department with a fever in a West African country. Below, we summarize the steps we took to identify the organism and guide treatment and have highlighted learning points.

Problem Solving	Learning Points
Blood cultures were sent from the emergency room and grew gram-positive cocci in clusters on gram-stain.	• Information and communication are critical when trying to solve most AMR problems. This case demonstrates just how critical communication is between the lab and treating physician. • This emergency room patient presented with fever and had no prior medical history and no in-dwelling prosthetic material.

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Problem Solving	Learning Points
The most likely organisms were staphylococcal species, including *Staphylococcus aureus, Staphylococcus lugdunensis* and coagulase-negative staphylococci such as *Staphyloccus epidermidis*.	• You need basic knowledge of organisms to help identify the pathogen. • Staphylococci are catalase positive and form clusters on gram-stain that look like a bunch of grapes. • *Micrococcus* (which is also catalase positive) and *Aerococcus spp* (weak catalase) may occur, but this is rare. • *Streptococcus* and *Enterococcus* are gram-positive cocci in pairs/chains (not clusters). • And yeast such as *Candida* may occasionally look like gram-positive cocci but are usually larger with a different oval shape with budding).

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You informed the physician the preliminary blood culture was positive, and they started vancomycin. The fever continued so one day later you performed a coagulase, and it was negative – consistent with a coagulase-negative staphylococci such as *Staphylococcus epidermidis.*	• Here we see the importance of communication and sharing timely result between the lab and treating physician.
Remembering the patient has no prosthetic material and growth only occurred in one blood of the two cultures, you inferred this organism was most-likely a skin contaminant and highly unlikely to be the cause of the patient's fever.	• Currently, most hospitals use a standard 3% as an acceptable rate of blood culture contamination, but there are many ways to reduce blood culture contamination during pre-analytical, analytical and post-analytical steps.

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Unfortunately, there was a break in communication in the lab and the physician was not informed of the results. Two days later the patient developed kidney-injury (vancomycin-related nephrotoxicity), remained febrile, and found malaria positive. Vancomycin was stopped. blood cultures were repeated and found negative.	• Before knowing that the gram-positive coccus in the blood was a contaminant, vancomycin was indicated. • However, as soon as it was confirmed to be a coagulase-negative staphylococcus and a contaminant, the vancomycin should have been stopped and other etiologies should have been considered. This would have likely prevented some vancomycin-induced kidney injury and simultaneously led the physician to consider other causes of fever, including malaria.

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Problem Solving	Learning Points
In this case, susceptibility testing is not needed. AST is not needed for contaminants.	• Inappropriate reporting of AST may mislead clinicians to prescribe unwarranted antimicrobials as occurred in this case. • Here is an example of an appropriate report for this situation: "Coagulase-negative staphylococcus, likely a contaminant. No additional workup or susceptibility testing performed. Please call the microbiology laboratory if susceptibility testing is warranted."