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A short note on bacterial culture identification

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ABSTRACT

Due to their high resistance to antibiotics, Gram-negative bacteria (GNB) are one of the world's most significant public health issues. Due to the high risk of morbidity and mortality associated with these microorganisms and the frequent need for patients to be admitted to the intensive care unit (ICU), these microorganisms have a significant impact on patient care in hospitals. The majority of clinical isolates come from two large groups: Enterobacteriaceae and non-fermenters. However, other gram-negative organisms, such as Neisseria and Haemophilus spp., that is clinically relevant Chlamydia trachomatis and Helicobacter pylori. The interprofessional team's role in managing patients with gram-negative bacteria is discussed in detail in this activity.

Keywords: Gram-negative bacteria; Public health; Microorganisms; Helicobacter pylori; Infectious diseases

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INTRODUCTION

Due to their high resistance to antibiotics, Gram-negative bacteria (GNB) are one of the world's most significant public health issues. Because they put patients in the intensive care unit at risk and cause high levels of morbidity and mortality, these microorganisms have a significant impact on patients' clinical outcomes in hospitals. The majority of clinical isolates come from two large groups: Enterobacteriaceae and non-fermenters. However, there are other gram-negative organisms that pose a clinical threat, such as Neisseria and Haemophilus spp., Chlamydia trachomatis and Helicobacter pylori.

In the United States, there is currently a shortage of infectious disease-trained pharmacists to fill antimicrobial stewardship positions. In order to improve appropriate antibiotic prescribing, pharmacists in a variety of other positions must assume these responsibilities. According to studies, thirty present of patients receiving broad-spectrum antibiotics during their stay in a hospital receive at least one antibiotic. Although estimates can vary depending on the institution and how "appropriate" is defined, it has been reported that the inappropriate use of antibiotics is as high as 50%. Adverse effects, secondary infections, drug interactions, increased costs, extended hospital stays, and hospital readmissions may result from inappropriate use. Additionally, the development of bacterial resistance may result in treatment failure. The timing of cultures, common culture sites, how to interpret the Gram stain, the role of rapid diagnostic tests, traditional antibiotic susceptibility testing, and automated testing are all discussed in this paper. Since we did not discuss testing for viruses or fungi, the term "antimicrobial" is used throughout the article rather than "antimicrobial."

Cultures should be obtained quickly by medical professionals to guide treatment, and prompt antibiotic administration should also be considered. Antibiotics should be administered within one hour of a sepsis diagnosis, according to the 2016 Surviving Sepsis Campaign guidelines, and cultures should not be delayed for more than 45 minutes. It is possible to reduce mortality in septic patients by administering the appropriate antibiotics within one hour. Before administering antibiotics, clinicians may be able to identify the contaminating organism, allowing for possible de-escalation through appropriate treatment. There may be a decrease in the blood-culture yield if cultures are drawn after the administration of antibiotics, which may result in an increase in the patient's cost and length of stay.

Cultures can be obtained from sterile or bacterially colonized locations. The risk of contamination from normal flora is increased and false results may result from those that

have been colonized with bacteria. The pericardial fluid, blood, and cerebral spinal fluid are all typically regarded as sterile locations. Sputum and nasal passages are well-known contamination sources. 17 Inadequate methods for collecting cultures may also make contamination more likely. The following is a list of things to keep in mind when interpreting the results of blood, respiratory, urine, skin and soft tissue, bone and joint, cerebral spinal fluid, and stool cultures.

BLOOD OF CULTURES AND SOFT TISSUE INFECTIONS

It is essential to make the distinction between bacteraemia and contamination when evaluating blood cultures. When bacteria from an outside source are introduced into a sample that has been collected, this is called contamination.18 an example of contamination is when normal skin bacteria are introduced during single-needle venepuncture. Medical devices like central venous catheters may also contain bacteria. Compared to venepuncture, the rate of contamination with central venous catheters is higher. As newer testing methods make it easier to identify bacteria, even in trace amounts, contaminant identification rates are rising. The clinician should assess the patient's clinical presentation and determine whether bacteraemia symptoms are present when assessing potential contamination. A patient's hypotension, tachycardia, and febrile state, for instance, would indicate the presence of bacteraemia. Additionally, it is essential to collect at least two samples from distinct organs. If a central venous catheter is present, the second location is frequently it. Repeat cultures are required if one of the two cultures produces an organism that is thought to be a likely contaminant. On the other hand, true bacteraemia typically occurs when the same organism grows in multiple samples. The Infectious Diseases Society of America (IDSA) recommends obtaining cultures for abscesses and carbuncles, despite their mention of empiric treatment without culture as being reasonable. In patients with gram-negative bacteria, only one positive culture is required to suggest true infection. The IDSA says that blood cultures should only be taken for cellulitis if a patient has particular factors. Some of these factors are: skin-surface cultures should only be obtained in the context of purulent drainage in patients with immunosuppression, cancer, animal bites, and/or immersion injuries34. In infections that do not require drainage, skin cultures frequently result in the identification of polymicrobial organisms that are not the cause of the infection, resulting in treatment that is too broad35. As with UTIs, the patient's history and examination are crucial in determining the diagnosis. S. aureus infection rates are higher in patients with purulent drainage, and group a streptococcal infection rates are higher in patients with non-purulent cellulitis.

DIFFUSION AND TESTING

Diffusion and dilution methods are combined in the E-test, a quantitative test. The test uses an E-test strip, which diffuses an antibiotic across a bacteria-filled agar plate rather than a disk. Along the length of the strip, various antibiotic concentrations have been implanted. The differences in concentration are not separated by one dilution, unlike in dilution testing; rather, they are closer together, which may make it possible to achieve greater precision. The zone of inhibition forms an ellipse and intersects the strip on the plate after 24 hours of incubation. The MIC value is determined by the intersection point. The E-test is advantageous because it employs a stable gradient with a higher inoculum of bacteria, allowing for a more precise reading of the MIC values. One of the drawbacks is that the strips can only test for one antibiotic, and the test can be expensive and time-consuming.

CONCLUSION

The timing of cultures, common culture sites, interpreting the Gram stain, rapid diagnostic tests, conventional antibiotic susceptibility testing, and automated testing were all discussed in this article as essential information for interpreting culture results. Antibiotics ought to be administered to the patient within an hour and cultures ought to be drawn prior to that time. While clinicians should be aware of the limitations of the diagnostic tests utilized at their institutions, cultures should be obtained in a manner that maximizes specificity and sensitivity. The best antibiotic can be chosen using conventional susceptibility testing or rapid diagnostic tests. Utilizing this guide can help clinicians and pharmacists increase patient safety.

REFERENCES

1. **Gunn BA.** Chocolate agar, a differential medium for gram-positive cocci. *J Clin Microbiol*. 1984;20: 822-3.
2. **Epps SV, Harvey RB, Hume ME et al.** Foodborne Campylobacter: infections, metabolism, pathogenesis and reservoirs. *Int J Environ Res.* 2013;10: 6292-304.
3. **Yonath A, Bashan A.** Ribosomal crystallography: initiation, peptide bond formation, and amino acid polymerization are hampered by antibiotics. *Annu Rev Microbiol.* 2004;58: 233-51.
4. **Cassells AC.** Pathogen and biological contamination management in plant tissue culture: phytopathogens, vitro pathogens, and vitro pests. Plant Cell Culture Protocols. *Methods mol Boil.* 2012;877: 57-80.
5. **Belland R, Ouellette S, Gieffers J** Chlamydia pneumoniae and atherosclerosis. *Cell Microbiol.* 2004;6: 117-27.
6. **Azoulay E, Russell L, Van de Louw A, et al.** Diagnosis of severe respiratory infections in immunocompromised patients. *Intensive Care Medicine.* 2020;46: 298-314.
7. **Stevenson TH, Castillo A, Lucia LM, et al.** Growth of Helicobacter pylori in various liquid and plating media. *Lett Appl Microbiol.* 2000;30: 192-6.
8. **Belland R, Ouellette S, Gieffers J, et al.** Chlamydia pneumoniae and atherosclerosis. *Cell Microbiol.* 6: 2004;117-27.
9. **Azoulay E, Russell L, Van de Louw A, et al.** Diagnosis of severe respiratory infections in immunocompromised patients. *Intensive Care Medicine.* 2020;46: 298-314.
10. **Stevenson TH, Castillo A, Lucia LM, et al.** Growth of Helicobacter pylori in various liquid and plating media. *Lett Appl Microbiol.* 2000;30: 192-6.