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Opinion Article

Microbiological techniques for tracking the presence of multiresistant bacteria

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DESCRIPTION

One of the primary channels for the transmission of multiresistant bacteria is the existence of colonised individuals; hence its containment is a clinical and public health concern. Early discovery of these bacteria's colonisation requires surveillance research. The many molecular and culturing-based microbiological approaches for identifying carriers of multiresistant bacteria are discussed in this article. Included are species that have a significant clinical or epidemiological impact or cause therapeutic challenges. Methicillin-resistant Acinetobacter baumannii, multiresistant *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Enterococcus spp*. resistant to glycopeptides, enterobacteriaceae producing extended spectrum-lactamases and plasmid-mediated Ampicillinase C (AmpC), and enterobacteriaceae producing carbapenemases.

Treatment choices are becoming more limited as some of the main bacterial infections become more resistant to numerous medications. Gram-positive and Gram-negative bacteria are both susceptible to multidrug resistance (MDR), which is defined as non-susceptibility to at least one antibiotic in three or more families. The spread of Gram-negative bacteria, which are highly drug-resistant, is of special significance.

***Staphylococcus aureus* that is resistant to the antibiotic methicillin *Methicillin-resistant Staphylococcus aureus* (MRSA):** In addition to regularly colonizing people, *S. aureus* is also capable of acting as an opportunistic pathogen and causing a variety of illnesses. According to statistics from the European Antimicrobial Resistance Surveillance Network (EARS-Net), Spain had an MRSA prevalence of 22.6% while the other participating European nations had an overall MRSA prevalence of 18% in 2013. The request should specifically mention that it relates to "a culture for microbiological surveillance." Since this information is required to make a determination, the bacteria and resistance issue that must be tracked should also be mentioned. The need to build suitable detection methods is driven by the clinical and epidemiological implications.

Selection of culture media and incubation conditions: Culture in selective and varied media is the primary method for detecting MRSA colonisation. The detection of MRSA and perhaps the colonisation by *methicillin-resistant S. aureus* is made possible by the combination of a mannitol salt agar plate (MSA or Chapman medium) and an MSA-cefoxitin plate (4 mg/l) (MSSA). After 48 hours of incubation, some authors calculated sensitivity to be 96% and specificity to be 100%. The selection of mutants with constitutive overproduction (derepression) of the inducible chromosomal cephalosporin's AmpC is the primary mechanism of resistance to penicillin's or cephalosporin's.

Molecular techniques: By identifying the antibiotic resistance gene in question, molecular techniques enable quick identification of resistant bacteria. The biggest benefit is that a result can be acquired within 1-3 hours of the sample being received, or on the same working day. It is vital to note that molecular technologies are more sensitive than culture-based techniques and have the potential to be directly applied to clinical specimens, which is crucial for making infection-control decisions. They cannot completely replace microbiological culture, which allows for the identification of the species and the viability of the strain and makes it possible to carry out tests for antibiotic susceptibility or molecular typing. Other drawbacks include the fact that only those genes designed in the test are identified.

Although there are other distinct or more complicated modalities, real-time PCR-based molecular techniques are the most frequently employed in clinical practice and are also the most economical. It is important to clarify the approach utilized when a broad-spectrum-lactamase gene is found using molecular techniques on a clinical material.

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