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Session : Postgraduate Course 13 (Infection)

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Session Title : Key issues: when the patient is febrile after transplantation

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## **Basic interpretation of antibiogram**

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Antibiogram is a laboratory test used to determine the sensitivity pattern of a given microorganism to a range of antibiotics. Antibiogram should be interpreted when using antibiotics because of antibiotic resistance. In the treatment of infectious diseases, the risk of treatment failure may increase when discordant antibiotics were used, which are resistant to the causative strain. Therefore, when selecting antibiotics in the treatment of infectious diseases, empirical antibiotics are selected based on the estimation of causative strain and antibiotic susceptibility test, and the definitive antibiotics are selected based on the results of antibiotic susceptibility. Clinicians may choose antibiotics more confidently in infectious diseases if they practice estimating and interpreting antibiograms when choosing antibiotics. While, the reason why antibiotic susceptibility tests should be performed every time when a culture test is performed is that the antibiotic susceptibility to microorganism may change. Microorganism, including bacteria, increases the risk of acquiring resistance when exposed to antimicrobial agents. Microorganisms can also transmit the mechanisms of resistance to other strains through plasmids, thereby obtaining resistance even if they are not exposed to antibiotics. Therefore, to know the antibiotic susceptibility patterns in each medical institution or in each region may help to choose empirical antibiotics in the infectious diseases before the actual antimicrobial susceptibility results. Periodic monitoring of antibiotic susceptibility patterns in your own area is particularly important in terms of clinical decision-making in that it maximizes the prognosis of infectious disease patients, and infection control interventions in that it minimizes unnecessary antibiotic use. Understanding the mechanism of resistance is necessary to interpret antibiogram. Gram negative organisms acquire antibiotic resistance through the following mechanism: 1) beta-lactamase production, 2) altered antimicrobials permeability through the change of outer membrane, porin, efflux pump 3) target change of PBP ribosome, DNA, etc. Antibiotic resistance due to beta-lactamase can be extended to other antibiotics in addition to exposed ones to induce resistance, and most of these strains are the mechanisms of multidrug resistant organisms (MDRO). The beta-lactamase include ampC, extended spectrum beta-lactamase (ESBL), and carbapenemase. Tests for antibiograms vary; qualitative method, quantitative method, and E-test, etc. The most commonly used test is automated system, which uses MIC breakpoints to distinguish sensitivity, intermediate, and resistance. MIC is the minimal concentration of

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an antimicrobial necessary to inhibit the growth of a target microorganism. Each strain has different MIC breakpoints for available antibiotics, and standard criteria are periodically updated by CLSI, EUCAST. Definitive antibiotics can be selected from antibiogram, and when clinicians choose antibiotics for patients in actual clinical practice, they should consider the characteristics of antibiotic itself such as pharmacokinetics, pharmacodynamics, and tissue penetration, in addition to antibiogram. Let's interpret some antibiograms.