

MICROBIOLOGY QUIZ

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Questions

- 1.MRSA stands for?
- 2.identify and interpret the given picture.

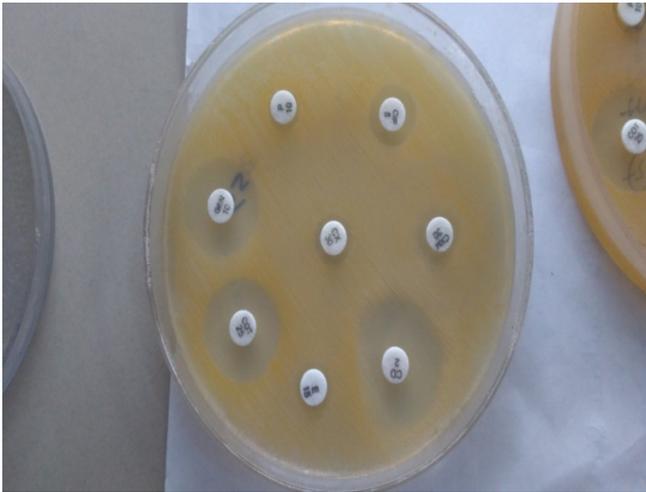


Figure 1

- 3.What is ICR?
- 4.What are the clinical indications of clindamycin ?
- 5.What are the drugs that can be used in MRSA infections.
- 6.what drugs have to to be avoided in MRSA infections.

Please refer page number 47 & 48 for answers

Answers:

1. **MRSA stands for** Methicillin resistant Staphylococcus aureus. It is the most common multidrug resistant organism causing HAI. The resistance is mediated by a chromosomally coded mec A gene which alters penicillin binding protein (PBP) on S.aureus cell membrane to PBP 2a.

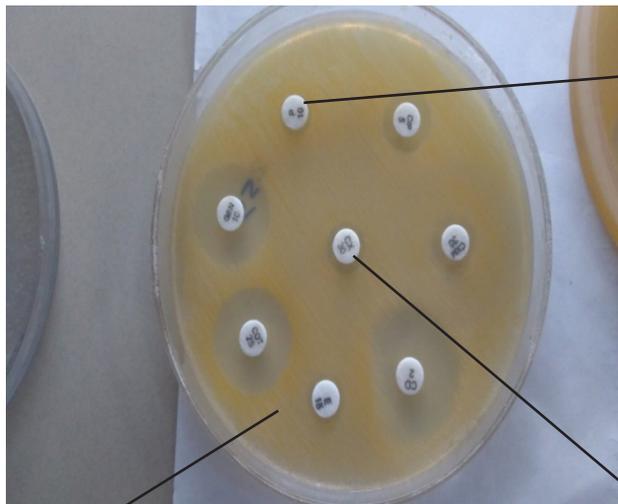
As PBP is essential protein needed for cell wall synthesis of bacteria. lactam drugs bind and inhibit this protein,there by inhibiting the cell wall synthesis.

This altered PBP 2a of MRSA has less affinity for β lactam antibiotics; hence MRSA are resistant to all lactam antibiotics including Penicillins, Cephalosporins (except Fifth generation cephalosporins like – ceftaroline, ceftobiprole only β lactam which is effective against MRSA), Carbapenems and Aztreonam.

2. Identify and interpret the given picture?

The given pictures is showing Antibiotic Susceptibility Testing (AST) performed by Kirby Bauer's Disc diffusion method. In this a lawn culture of MRSA (Methicillin Resistant Staphylococcus aureus) was done on Muller Hinton Agar and incubated at 37°C for 18-24hrs. The above isolate is resistant to Penicillin, Clindamycin(P), Ciprofloxacin(CIP), Erythromycin and Cefixime (CXM) and cefoxitin. MRSA isolates are resistant to all the beta lactam antibiotics and cefoxitin.

Cefoxitin is used to detect MRSA isolates



MRSA-resistant to all the beta lactam antibiotics (Penicillins and cephalosporins)

D zone-Flattening of the zone of inhibition around clindamycin towards the side of erythromycin.

Indicating Erythromycin has induced and allowed expression of clindamycin resistance. Thus the isolate is resistant to both Erythromycin and Clindamycin. Thus clindamycin is not useful in this patient with MRSA infection as it can result in treatment failure.

Cefoxitin Resistant (No Zone of Inhibition around the disc) indicating the isolate is MRSA

3. What is ICR?

Clindamycin is an alternative antibiotic in the treatment of *Staphylococcus aureus* infections, both in infections by methicillin susceptible and resistant (MSSA and MRSA) strains. The major problem of use of clindamycin for staphylococcal infections is the presence of inducible clindamycin resistance that can lead to treatment failure in such infections(1).

Inducible clindamycin resistance. (i MLSB phenotype)

Erythromycin is an inducer of clindamycin resistance (IMLSB), which induces production of erythromycin ribosomal methylase (erm) that allows expression of clindamycin resistance. Double disc diffusion (D test) is recommended by CLSI for detection of inducible clindamycin resistance [2]. A negative result for inducible clindamycin resistance (ICR) by D test confirms clindamycin susceptibility and provides a good therapeutic option, thus necessitates the detection of inducible clindamycin resistance [3]. A positive Dtest indicates the drug cannot be used. (Erythromycin resistant, Clindamycin sensitive) Thus a D test should be performed on all isolates of MRSA and the inducible clindamycin resistance must be taken into consideration by the clinicians while treating MRSA to avoid treatment failure.

4. What are the clinical indications of clindamycin ?

A. Clindamycin is an alternative to the penicillins and cephalosporins for the treatment of skin and soft tissue infections.

Clindamycin is the drug of choice, combined with penicillin, for severe group A streptococcal infection and possibly *C perfringens* infections.

Clindamycin is the drug of choice for moderate to severe diabetic foot infections, usually combined with a quinolone, although cephalexin is equally effective for mild to moderate infections.

Clindamycin is an alternative to penicillins and

cephalosporins for the treatment of septic arthritis and osteomyelitis, but is the drug of choice in diabetic osteomyelitis, combined with a quinolone.

Clindamycin is an alternative to penicillins for dental infections and endocarditis prophylaxis and is the treatment of choice for recurrent streptococcal pharyngitis/tonsillitis.

Clindamycin is the treatment of choice for anaerobic lung infections, including anaerobic lung abscess and necrotizing pneumonia.

Clindamycin may be employed as an alternative for treatment of intra-abdominal and pelvic infections , in the treatment of *C trachomatis* in pregnancy and as an alternative to metronidazole for the treatment of bacterial vaginosis.

Clindamycin is an alternative to trimethoprim/sulfamethoxazole for the treatment of *P carinii* pneumonia.

It should be used sparingly in in-patients because of its association with *C difficile* colonization and diarrhea.

5. What are the drugs that can be used in MRSA infections?

Clindamycin, Cotrimoxazole, Ceftaroline, Dalbavancin, Daptomycin, Dicloxacillin, Doxycycline, Linezolid, Quinupristin/Dalfopristin, Telavancin, Oritavancin, Tigecycline, Nafcillin, Vancomycin

Empirical therapy(IF MRSA STATUS IS NOT YET KNOWN). Vancomycin with or without an aminoglycoside.

Vancomycin is indicated only if MRS risk is high as in hospitalised patients with serious invasive infections.

Antibiotics should be cautiously chosen.

6. Drugs to be avoided in MRSA infections?

Erythromycin, Cephalexin, Ciprofloxacin,

References

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