# AN AUDIT ON MICROBIOLOGY CULTURE REPORTS: ANTIBIOGRAM FORMULATION FOR SOUTH INDIAN SECONDARY HOSPITAL

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| **Dr. Ahikam Devadason J*** | Junior Doctor, MBBS, CSI Mission General Hospital, Woraiyur, Trichy. *Corresponding Author |
| **Dr. M. Bhuvaneswari** | Microbiologist, MBBS, MD, CSI Mission General Hospital, Woraiyur, Trichy |

**ABSTRACT** An antibiogram is a periodic summary of antimicrobial susceptibilities of local bacterial isolates submitted to the hospital's microbiology lab. An audit was undertaken in a secondary hospital from South India to create a hospital antibiogram from culture reports for the period December 2019-July 2020. A total of 167 positive cultures were isolated. The commonest isolate was Escherichia coli (n=66), followed by Staphylococcus aureus (n=31). From the formulated antibiogram, Amikacin is a good first-line antibiotic for the treatment of urinary tract infection. Also, 52% of S. aureus organisms are resistant to methicillin (MRSA- Methicillin resistant Staphylococcus aureus). The antibiotic resistance noted on the antibiogram is a grim reminder to judiciously use our antibiotics.

## AIM:
To formulate an antibiogram from positive cultures in a Secondary Hospital in South India

## BACKGROUND:
Antibiotics are an essential part in modern medicine. They are very vital as people are not just treated, but also cured, from even life-threatening infections[1]. However, their irrational and injudicious use has resulted in the evolution of microbes that are resistant to antibiotics.

This calls for meticulous and careful use of antibiotics. It is vital to know the antibiotic susceptibility pattern of microbes in a given institution in order to give appropriate antibiotic therapy.

The antibiogram is a periodic summary of antimicrobial susceptibilities of local bacterial isolates submitted to the hospital's microbiology lab[1]. It is formulated by monitoring antimicrobial resistance trends. Thus, an antibiogram will be of prime importance when it comes to empirical antibiotic treatment. As the antibiogram varies from hospital to hospital and from time to time, this audit was undertaken to create one for our hospital.

## METHODOLOGY:
Culture reports from December 2019 – July 2020 with positive growth and antibiotic sensitivity were manually collected and data was entered into MS Excel.

The variables collected were: Hospital number, Gender, Age, Date collected, Specimen source, Organism isolated and Susceptibility pattern.

The data entered in Excel, were then analyzed with the use of Jamovi, an open-source statistical software.

After data analysis, the antibiogram was created with the use of MS Excel.

## RESULTS:
A total of 167 positive cultures were isolated. The 5 commonest isolates were:
1. Escherichia coli (n=66)
2. Staphylococcus aureus (n=31)
3. Klebsiella species (n=18)
4. Enterococci species (n=10)
5. Pseudomonas aeruginosa (n=9)

Out of the isolates, the source was predominantly urine (n=73) accounting for 44% of the cultures. This was followed by pus (28%) and blood (15%).

To make an antibiogram, a minimum of 30 culture reports[2] are essential. Hence, antibiogram was created for the organisms: E. coli and S. aureus

## DISCUSSION:
There is some practice-changing information that can be gathered from the antibiogram.

E. coli is the commonest organism causing urinary tract infections. As deciphered from the table above, Amikacin is a good first-line treatment for urinary tract infections. Also, to be noted is that both Cefaperazone-Sulbactam and Piperacillin-Tazobactam have similar sensitivity rates. Therefore, when a patient with urosepsis is not responding clinically to Cefaperazone-Sulbactam, then antibiotic can be directly upgraded to Meropenem instead of a trial with Piperacillin-Tazobactam.

**Table1: Susceptibility pattern of Escherichia coli**

| Escherichia coli (n=66) | |
|---|---|
| Amikacin | 88% |
| Ampicillin | 11% |
| Amoxyclavulanic acid | 8% |
| Cefazolin | 23% |
| Cephalexin | 30% |
| Cefepime | 44% |
| Cephotaxime | 41% |
| Cefuroxime | 34% |
| Ceftriaxone | 25% |
| Ciprofloxacin | 33% |
| Cotrimoxazole | 26% |
| Meropenem | 91% |
| Ofloxacin | 33% |
| Oxacillin | 0% |
| Pipercillin-Tazobactam | 84% |
| Gentamicin | 46% |
| Cefaperazone-Sulbactam | 85% |

**Table 2: Susceptibility pattern of Staphylococcus aureus**

| Staphylococcus aureus (n=31) | |
|---|---|
| Amikacin | 93% |
| Ampicillin | 0% |
| Azithromycin | 52% |
| Cefazolin | 48% |
| Cephalexin | 48% |
| Cefuroxime | 48% |
| Ciprofloxacin | 30% |
| Clindamycin | 78% |
| Cloxacillin | 48% |
| Cotrimoxazole | 63% |
| Linezolid | 97% |
| Levofloxacin | 43% |
| Oxacillin | 48% |
| Teicoplanin | 100% |

| Vancomycin | 100% |
|---|---|
| Gentamicin | 84% |
| Erythromycin | 50% |

Concerning S. aureus, the sensitivity to Oxacillin is only 48%. This implies that 52% of S. aureus are MRSA (Methicillin-resistant Staphylococcus aureus).

## CONCLUSIONS:
The antibiogram shows the sensitivity pattern of the organisms isolated from patients of our hospital. It can be very useful to guide empiric antibiotic therapy.

The antibiotic resistance noted on the antibiogram is a grim reminder to judiciously use our antibiotics.

The antibiogram, being dynamic, must be constantly updated and revised.

## REFERENCES:
1. Joshi S. Hospital antibiogram: a necessity. Indian J Med Microbiol. 2010 Oct-Dec;28(4):277-80. doi: 10.4103/0255-0857.71802. PMID: 20966554.
2. Janet F. Hindler, John Stelling, Analysis and Presentation of Cumulative Antibiograms: A New Consensus Guideline from the Clinical and Laboratory Standards Institute, *Clinical Infectious Diseases*, Volume 44, Issue 6, 15 March 2007, Pages 867–873, https://doi.org/10.1086/511864