



## Antibiotic resistant Pattern in a Tertiary Care Hospital of Eastern India

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### ABSTRACT:

**Introduction:** Antibiotic resistance is of great concern now days. This study aims to delineate the antibiogram pattern of a tertiary care hospital in Odisha

**Methods:** A one year study from Jun 2017 to July 2018 was conducted in the Microbiology department of the hospital. All the specimens and antibiotic sensitivity were processed according to the standard guidelines. Microorganisms and their sensitivity data were reviewed and compiled by using hospital information system.

**Results:** The isolates showed resistance to the commonly used antibiotics like amoxyclav, ofloxacin, cefixime etc.

**Conclusion:** These decreased antibiotic sensitivities reflect increased bacterial selection pressure as a result of widespread antibiotic use. A combined approach involving the clinicians and microbiologists is necessary to address this increasingly difficult problem.

**Keywords:** Antibiotic sensitivity, Enterobacteriaceae, Gram positive organism

### Introduction

Antimicrobial resistance (AMR) within a wide range of infectious agents is a growing public health threat of broad concern to countries and multiple sectors. Increasingly, governments around the world are beginning to pay attention to a problem so serious that it threatens the achievements of modern medicine. A post-antibiotic era in which common infections and minor injuries can kill far from being an apocalyptic fantasy, is instead a very real possibility for the 21 century Antimicrobials are chemicals that kill or inhibit the growth of micro-organisms and are used to treat microbial infections. Some are produced naturally by microbes but many are synthetic. Antimicrobials include antibiotics, antivirals, antifungals and other drugs such as antimalarials.

Micro-organisms are termed 'antimicrobial-resistant' or 'drug-resistant' when they are no

longer inhibited by an antimicrobial to which they were previously sensitive. Such resistance is called 'acquired resistance' and is encoded by resistance genes in the DNA of the microbe. Resistance genes can arise through spontaneous mutations in the microbial DNA, but some have evolved over many years due to natural selection by natural antimicrobials in the environment. These genes can also transfer from drug-resistant microbes to drug-sensitive ones.

The first drug-resistant bacterium in a clinical setting was identified in the late 1940s; only 4 years after mass treatment with penicillin had been introduced. Since then the emergence and spread of drug-resistant microbes has continued to grow. Highly resistant bacteria, such as meticillin-resistant *Staphylococcus aureus* (MRSA) and vancomycin-resistant enterococci, account for a high percentage of hospital-acquired infections, which cost the NHS an estimated £1 billion per year. An antibiogram is an overall profile of antimicrobial susceptibility

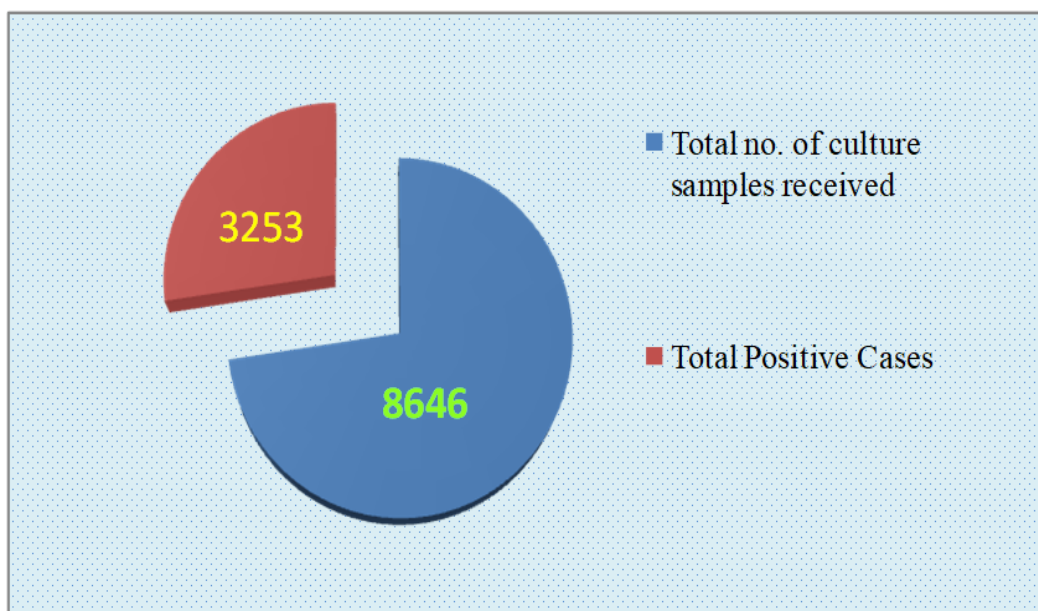
testing results of a specific microorganism to a battery of antimicrobial drugs. This profile is generated by the laboratory using aggregate data from a hospital or healthcare system; data are summarized periodically and presented showing percentages of organisms tested that are susceptible to a particular antimicrobial drug. Only results for antimicrobial drugs that are routinely tested and clinically useful should be presented to clinicians. Antibiograms help guide the clinician and pharmacist in selecting the best empiric antimicrobial treatment in the event of pending microbiology culture and susceptibility results.

Total 8646 no of different specimens were collected from patients attending the outdoor and indoor of a tertiary care hospital of eastern Odisha. The samples were aseptically collected and processed as per the prescribed guidelines in the textbook. Isolates were subjected to antibiotic susceptibility testing by Kirby—bauer disc diffusion method according to CLSI guideline. Then the data were collected and results were calculated.

### RESULTS

Out of total 8646 number of various samples, 3253 number of samples was culture positive

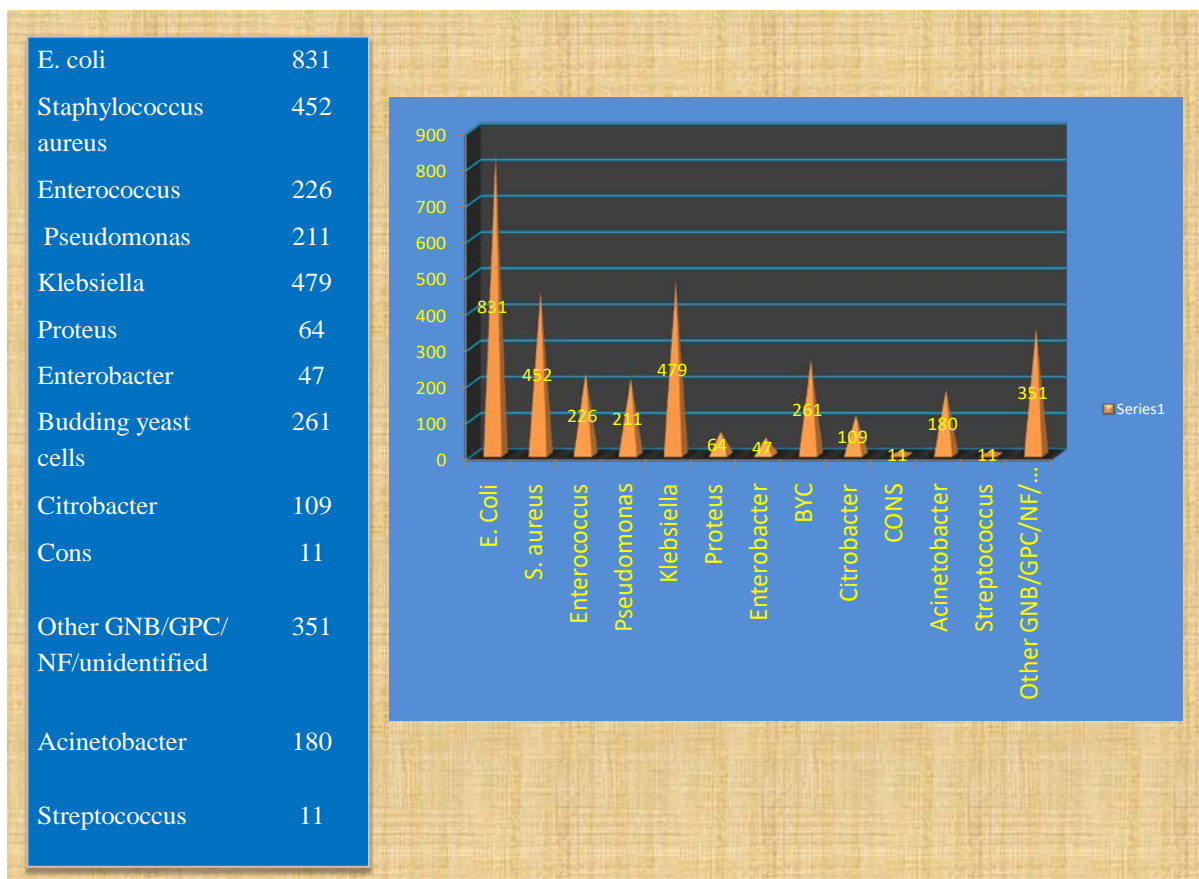
### MATERIALS AND METHODS



Maximum number of samples was received from the outdoor patients followed by wards.

Place	Culture received	Culture positive
Wards	2120	821(38%)
CABINS	1095	386(35%)
OPD	4150	1351(33%)
Cabins & Others	1033	484(49%)

The most common organism isolated from the samples were E.coli followed by Klebsiella in Gram negative bacteria and Staphylococcus aureus and Enterococcus in Gram positive cocci.



E.coli showed maximum resistance to the commonly used antibiotics like amoxyclav(82%) and ciprofloxacin(87%)

Resistance pattern of <i>E. coli</i> isolates (in no.)									
Ac (N=758)	Gen (N=23)	Ak (N=792)	Net (N=405)	Of (N=676)	Nx (N=483)	CFM (N=353)	Cip (N=135)	Nit (N=572)	Pit (N=357)
621(82%)	12(52%)	115(15%)	67(17%)	514(59%)	368(76%)	272(77%)	118(87%)	47(8%)	150(42%)

Ofloxacin and amoxyclav showed maximum resistance to Staphylococcus aureus.

Resistance pattern of <i>S. aureus</i> isolates									
Ac (N=413)	Ak (N=432)	Of (N=399)	NET (N=331)	CIP (N=32)	CPZ (N=68)	Lz (N=438)	CTR (N=365)	VA (N=113)	LE (N=380)
326(78%)	54(12%)	285(71%)	64(19%)	16(50%)	35(51%)	77(18%)	126(34%)	26(23%)	68(18%)

Enterococci showed maximum resistance to penicillin and amikacin.

Resistance pattern of <i>Enterococci</i> isolates								
AMC (N=210)	AMK (N=196)	OF (N=196)	PEN (N=194)	PIT (N=144)	LNC (N=192)	LZ (N=217)	VA (N=196)	LE (N=195)
88(42%)	162(83%)	150(77%)	173(89%)	63(43%)	139(72%)	42(20%)	67(34%)	144(74%)

Klebsiella showed maximum resistant to Amoxyclav(85%) and cefixime((92%)

Resistance pattern of <i>Klebsiella</i> isolates							
AMC (N=409)	PIT (N=316)	GEN (N=31)	AMK (N=434)	OF (N=282)	NX (N=107)	CXM (N=181)	CAC (N=319)
<b>350</b> (85%)	<b>155</b> (49%)	<b>18</b> (58%)	<b>158</b> (37%)	<b>162</b> (57%)	<b>60</b> (56%)	<b>167</b> (92%)	<b>209</b> (66%)

Among the commonly used antipseudomonal drugs tobramycin and piperacillin showed maximum resistance.

Resistance pattern of <i>Pseudomonas</i> isolates									
PEP (N=20)	PIT (N=188)	AMK (N=185)	NET (N=140)	TBR (N=35)	OF (N=78)	CIP (N=85)	CTR (N=138)	CFS (N=114)	CAC (N=137)
<b>13</b> (65%)	<b>67</b> (36%)	<b>69</b> (38%)	<b>61</b> (44%)	<b>30</b> (84%)	<b>40</b> (52%)	<b>23</b> (27%)	<b>82</b> (60%)	<b>63</b> (56%)	<b>71</b> (52%)

## CONCLUSION

The emergence of antibiotic-resistant organisms is of great concern in the medical community. Antibiotic resistance among bacteria is becoming more and more serious problem throughout the world. It is said that evolution of bacteria towards resistance to antimicrobial drugs, including multidrug resistance, is unavoidable because it represents a particular aspect of the general evolution of bacteria that is unstoppable. The hospital antibiogram is a periodic summary of antimicrobial susceptibilities of local bacterial isolates submitted to the hospital's clinical microbiology laboratory. Antibiograms are often used by clinicians to assess local susceptibility rates, as an aid in selecting empiric antibiotic therapy, and in monitoring resistance trends over time within an institution. Antibiograms can also

used to compare susceptibility rates across institutions and track resistance trends. Enterobacteriaceae is a large and heterogeneous family of gram negative, facultative anaerobic, enteric bacilli whose normal place is in gastrointestinal tract of human and animals. Drug resistance in enteric bacilli is largely attributed to the vast transfer of resistance plasmids among different genera of Enterobacteriaceae. Use of drugs in animal foods leads to faster growth of animals, however, this is associated with an increase in drug-resistant intestinal organisms in fecal flora of farm workers .

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