Journal of Rawalpindi Medical College (JRMC); 2008;12(1):41-43

Antibiotic Susceptibility Pattern in a Tertiary Care Institution

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Abstract

Background: Isolation of different types of organisms from urine, high vaginal swab (HVS), pus and blood and determining their sensitivity and resistance pattern.

Methods: The study was conducted in the Department of Pathology (Microbiology Section) Rawalpindi General Hospital. Four thousand and seventy five (4075) indoor and outdoor patients were analyzed by taking their different samples i.e. Blood, Urine, HVS and Pus, which were then cultured on different media i.e. MacConkey's and Blood agar. CLED media was preferred for urine.

Results: Out of 4075 samples, 515 cultures yielded growth. These included 170 samples of HVS, 163 of pus, 158 of urine and 24 of blood. Escherichia coli (29.8%), Staphylococcus species (26.52%) and Pseudomonas (18.66%) were the most common organisms isolated.

Conclusion: Due to high resistance, antibiotic use policy should, strictly adhere to WHO guidelines and their unnecessary use should be discouraged.

Introduction

When penicillin was first discovered by Fleming, it was considered a magic bullet. It was very effective in most of the infections but with passage of time it has lost it efficacy against major pathogens due to several reasons.

Recent studies reveal that antibiograms are very beneficial as they help the clinicians in selection of proper antibiotics.[1-3] Moreover, injudicious use of antibiotics can be checked.

This paper regarding antibiotic susceptibility pattern gives an account of the type of organisms isolated from different samples i.e. blood, urine, HVS and pus and their sensitivity and resistance pattern. This sensitivity pattern and statistical analysis helps a lot when determining the empirical treatment of various infections

Patients and Methods

The study was conducted in the Department of Pathology (Microbiology Section) Rawalpindi General Hospital over a period of 6 months from June to December 2004. Samples of 4075 indoor and outdoor patients presenting with different complaints were analyzed. Samples studied were of urine, blood, HVS and pus. Culture media preferred were Mac Conkey's and blood agar while for urine CLED was used.

The specimens were handled in the following manner: Labelling and numbering of the specimens was done. Urine was kept at 4°C. A direct slide of Gram Stain was made and then culture applied. For urine,CLED media was used. For all others i.e. HVS, pus and blood,–Mac Conkey's and blood agar were used.

Results

Out of 4075 cases 2100 samples were of urine, 1400 samples were of HVS, 271 samples of pus and 304 samples were of blood. 515 cultures yielded growth out of the total 4075. These included 170 samples of HVS, 163 of pus, 158 of urine and 24 of blood.

The most common pathogen isolated was Escherichia coli (29.8%) while the second most common pathogen was Staphylococcus species (26.52%). They were followed by Pseudomonas (18.6%), Klebsiella (13.9%), Streptococcus species (7.2%), Acinetobacter (1.96%), Morganella morganii (1.7%), and Proteus (1.5%). The least common pathogens found were Candida and Diphtheroids (1.0% each). These results are shown in Tables 1 and 2

Regarding Gram positive organisms, the most sensitive drug found was imipenem which was effective in 100% .It was followed by vancomycin (73%), amikacin (70%), enoxacin (56.4%), ceftriaxone (51.7%), methicillin (50%), cefaclor(49.4%), cephradine (48.8%), erythromycin (42.9%), co-amoxiclav (36.4%), cefoperazone-sulbactam (33%) and ciprofloxacin (31.7%).The least sensitive drugs found were ofloxacin

(26.45%), teicoplanin(24.7%) and ampicillin (24.1%).

Table: 1 Organisms isolated

SPECIMEN		STAPHYLOCOCCUS	STREPTOCOCCUS	ESCHERICHIA	KLEBSIELLA	MORGANELLA	PSEUDOMONAS	PROTEUS	ACINETOBACTER	NEISSERIA	TOTAL
HVS	*%*	*15.9*	*11.8*	*27.6*	*7.1*	*1.8*	*31.2*	*1.8*	*2.9*	*0*	
	Total No.	27	20	47	12	3	53	3	5	0	170
Pus	*%*	*60.7*	*4.3*	*0*	*11.0*	*1.2*	*17.8*	*2.5*	*2.5*	*0*	
	Total No.	99	7	0	18	2	29	4	4	0	163
Urine	*%*	*1.9*	*3.2*	*62.7*	*19.6*	*2.5*	*7.0*	*0.6*	*0.6*	*1.9*	
	Total No.	3	5	99	31	4	11	1	1	3	158
Blood	*%*	*20.8*	*16.7*	*20.8*	*41.7*	*0*	*0*	*0*	*0*	*0*	
	Total No.	5	4	5	10	0	0	0	0	0	24
Total		134	36	151	71	9	93	8	10	3	515

Regarding Gram negative organisms the most sensitive drug found was imipenem(100%), followed by amikacin (83.7%), sparfloxacin (73.9%), ceftazidime (71.5%), enoxacin (64.6%), ceftriaxone (61.1%), cefoperazone-sulbactam (56.6%) ciprofloxacin (44.6%), cefaclor(38.8%),and tazobactam-piperacillin (29.8%).

Table: 2 Positive Patients

Specimens	Total No. of Cases		Positive Cases (Sensitive & Resistant)	
HVS	1400	34.36%	170	12.14%
Urine	2100	51.53%	158	7.52%
Pus	271	6.65%	163	60.15%
Blood	304	7.46%	24	7.89%
Total	4075		515	

The least sensitive ones were cephradine (19.7%), ofloxacin (18.5%), co-amoxiclav (18.2%), gentamycin(13.3%) and cefotaxime(10.4%).The most and least effective drugs are summarised in table 3

Discussion

The antibiograms are very beneficial as they help the clinicians for selection of proper antibiotics. Moreover, the injudicious use of antibiotics can be checked[3].The spectrum of bacteria isolated in this study showed a predominance of Staphylococcus species (60.3%) in pus, Escherichia coli (62.0%) in urine, Pseudomonas (30.9%) in HVS and Staphylococcus and Escherichia coli (20.8 % each) in case of blood.The study shows that the organisms are becoming resistant to commonly used antibiotics and gaining more and more resistance to newer antibiotics.

This has also been shown in other studies[4-8]. This is due to indiscriminate and injudicious use of these antibiotics even in expert hands of clinicians.

Table 3: Antibiotics Showing Maximum and Minimum Efficacy

Organisms	Most Effective Drugs	Least Effective Drugs
Staphylococcus species	Amikacin Vancomycin Imipenem Sparfloxacin Enoxacin Ceftriaxone	Co-amoxiclav Erythromycin Cephradine Doxycycline
Streptococcus species	Sparfloxacin Imipenem Vancomycin Amikacin Co-amoxiclav Ampicillin	Erythromycin Ceftazidime Gentamycin
Proteus species	Enoxacin Imipenem Sulzone Sparfloxacin	Cephradine Co-amoxiclav Cotrimoxazole Amikacin Ciprofloxacin
Pseudomonas	Imipenem Sparfloxacin Amikacin Enoxacin	Cephradine Cefaclor Co-amoxiclav
Klebsiella	Imipenem Amikacin Sparfloxacin Ceftazidime	Cephradine Co-amoxiclav Cefaclor Enoxacin
Escherichia coli	Imipenem Amikacin Ceftriaxone	Cephradine Enoxacin Sparfloxacin
Morganella morganii	Imipenem Amikacin Ceftazidime Sparfloxacin Enoxabid	Enoxacin Cefaclor Cephradine
Acinetobacter	Imipenem Amikacin Sparfloxacin	Cephradine Cefaclor Enoxacin Ciprofloxacin Ceftazidime Pipereidic acid
Neisseria species	Ampicillin Cotrimoxazole Chloramphenicol Cefotaxime	Ofloxacin
Brannhamella catarrhalis	Imipenem Amikacin Sparfloxacin Enoxacin	Cefaclor Cephradine Cotrimoxazole
		Ceftazidime

This practice should be balanced and importance of bacterial culture and sensitivity testing should be realized. Furthermore, it is the need of the hour that antibiotic policies should be formulated and implemented to resist and overcome this emerging problem.

Some of the reasons regarding poor yield of growth on culture media in our study were:

- Quantity of blood sent for culture and sensitivity was not sufficient (Normally 15–20 cc is actually required to yield growth on culture media)
- Negative results were often seen because the patients had been partially treated with antibiotics.

In conclusion, the organisms isolated from indoor patients are usually hospital pathogens and acquired nosocomially and show a very resistant pattern as there is no antibiotic policy and use of expensive antibiotics ultimately results in the bacteria acquiring resistance.

Regarding antibiotic use policy, strict adherence to WHO guidelines must be encouraged and unnecessary use should be discouraged.

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