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A PROSPECTIVE OBSERVATIONAL STUDY ON PRESCRIPTION PATTERN UTILIZATION AND AUDIT OF ANTIBIOTIC DRUGS IN GOVERNMENTAL AND NON-GOVERNMENTAL HOSPITALS IN RAJAHMUNDRY

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Abstract:

Introduction: *Antibiotics are currently the most commonly prescribed drugs in hospitals, worldwide. Healthcare is through both public and private sector facilities. About 80% of the healthcare in India is provided by the private sector, and 93% of hospitals are private.* ***Objective:*** *The objective of the study is to evaluate prescription pattern, utilization & audit of antibiotic drugs in governmental and non-governmental hospitals in Rajahmundry, AP.* ***Methodology:*** *The study design is a prospective observational study. A total of 150 cases related to antibiotic treatment were investigated in Governmental and Non-governmental hospitals in Rajahmundry, AP. Inclusion and Exclusion Criteria include Patients who were hospitalized due to infections and were on antibiotic treatment were enrolled in the study, Patients in all age groups of both men and women are included, Patients who are unconscious/mentally retarded and who were suffering with psychiatric diseases are excluded from the study, Pregnant and Lactating women are excluded from the study. The data sources include patient case sheets, prescriptions issued and discharge medication sheet, WHO guidance on essential drugs and by interacting with physicians and patients.* ***Results and Conclusions:*** *The antibiotic usage is higher in Non-governmental hospitals in the departments of General Medicine (47.44%), and Pulmonary (33.33%) when compared to the Governmental hospitals, 43% in General Medicine and 20.8% in pulmonary department. In the department of Trauma the antibiotic usage is more in Governmental hospital (12.5%) than in Non-governmental hospital (3.8%). The antibiotic usage is more in the age group 41-60 years in both Governmental (38.8%) and Non-governmental (43.59%) hospital. A total of 26 Antibiotic drugs are prescribed either alone or in combination in both Governmental and Non-governmental hospitals. Out of 44 WHO essential drugs only 13 drugs (29.5%) are in usage in government as well as non- government hospitals. About 18.7% and 40.9% of antibiotics used respectively in Government and Non-government hospitals are other than WHO suggested drugs. Non Steroidal Anti inflammatory drugs, Antacids and Multivitamins are most frequently prescribed along with antibiotics in about 90-100% prescriptions. It is suggested that the WHO prescribed antibiotic drugs are only to be used in the doses prescribed to avoid possible Drug interactions and Adverse Drug Reactions.*

Key words: *Prospective observational study, Prescription patters, Drug utilization, Prescription audit, Antibiotic drugs.*

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INTRODUCTION:

The remarkable discovery of penicillin by Sir Alexander Fleming in 1928 was the beginning of the antibiotic revolution, which changed the course of modern medicine [1]. Antibiotics have effectively prolonged the life expectancy. Antibiotics are currently the most commonly prescribed drugs in hospitals, worldwide [2]. But, excessive and inappropriate use of antibiotics renders increased drug resistance [3]. The rational use of antibiotics is a major health need.

In a developing country like India, the cost of health care is a key factor of concern. The practitioners should be made aware of the importance of combination therapy in the treatment of certain infections, so that the chance of resistance development can be ameliorated to the most possible extent. Many studies have implicated that the antibiotics are among the major group of drugs, which cause adverse drug reactions (ADRs) [4]. Prevention of ADRs is possible by proper monitoring, which fortified the national directive to institutionalize a pharmacovigilance center in every teaching hospital in the country [5,6].

Although 70% of the 1028 million people living in India live in rural areas, about 80% of doctors, 75% of dispensaries and 60% of hospitals are located in urban areas. [7,8]. Healthcare is through both public and private sector facilities. The public sector, regulated by state government, provides medical care either free or with nominal charges, and is obliged to follow national prescribing guidelines. In the private sector, patients generally pay for clinical and medical services. In India, studies on the use of antibiotics have mainly been conducted in public sector facilities, rather than private settings [9-12], where prescribing guidelines are often not implemented [13]. About 80% of the healthcare in India is provided by the private sector, and 93% of hospitals are private.

The objective of the study is to evaluate prescription pattern, utilization & audit of antibiotic drugs in Governmental and Non-governmental hospitals in Rajahmundry, AP.

METHODOLOGY:

The study design is a prospective observational study. A total of 150 cases related to antibiotic treatment were investigated in Governmental and Non-governmental hospitals in Rajahmundry, AP. The study is conducted during January 2017 to April 2017.

Inclusion and Exclusion Criteria:

1. Patients who were hospitalized due to infections and were on antibiotic treatment were enrolled in the study.
2. Patients in all age groups of both men and women are included.
3. Patients who are unconscious/mentally retarded and who were suffering with psychiatric diseases are excluded from the study.
4. Pregnant and Lactating women are excluded from the study.

Sources of Data:

The data sources include patient case sheets, prescriptions issued and discharge medication sheet, WHO guidance on essential drugs and by interacting with physicians and patients. The study protocol is approved by Institutional Ethics Committee (IEC).

RESULTS AND DISCUSSION:

The objective of the observational study is to evaluate the prescription pattern, drug utilization and audit of antibiotic drugs usage in Governmental and Non-governmental hospitals in Rajahmundry, Andhra Pradesh. Audit is a review and the evaluation of the healthcare procedures and documentation for the purpose of comparing the quality of care which is provided with the accepted standards. Prescription audit consists of monitoring, evaluating and if necessary, suggesting modifications in the prescribing practices of medical practitioners.[14]

Data on prescription pattern and drug utilization of 150 patients are collected in governmental (72 patients) and non-governmental (78 patients) hospitals in Rajahmundry**.** The results are given in Tables 1- 3. In both Governmental and Non-governmental hospitals the antibiotic usage (% prescriptions) is more in the departments of General Medicine, Pulmonary and Trauma. The antibiotic usage is higher in Non-governmental hospitals in the departments of General Medicine (47.44%), and Pulmonary (33.33%) when compared to the Governmental hospitals, 43% in General Medicine and 20.8% in pulmonary department. Whereas in the department of Trauma the antibiotic usage is more in Governmental hospital (12.5%) than in non-governmental hospital (3.8%). With regard to age the antibiotic usage is more in the age group 41-60 years in both Governmental (38.8%) and Non-governmental (43.59%). In this age group the antibiotic usage is more in non-governmental hospitals than in Governmental hospitals.

Table 1: Antibiotic Usage in Various Departments of Governmental and Non Governmental Hospitals

Sl no	Department	Sex	Percentage prescriptions (%)	
			Govt. Hospital	Non-Govt. Hospital
1	General medicine	M	18 (25%)	24 (30.77%)
		F	13 (18.05%)	13 (16.67%)
2	Pulmonary	M	13 (18.05%)	14 (17.95%)
		F	2 (2.78%)	12 (15.38%)
3	Trauma	M	8 (11.11%)	2 (2.56%)
		F	1 (1.39%)	1 (1.28%)
4	ENT	M	3 (4.17%)	1 (1.28%)
		F	5 (6.94%)	4 (5.12%)
5	Gynaec	F	6 (8.33%)	3 (3.85%)
6	Cardiac	M	1 (1.39%)	2 (2.56%)
		F	2 (2.78%)	3 (3.85%)

Table 2: Demographic Details of the Patients on Antibiotic Treatment

Sl No	Items	Percentage prescriptions (%)	
		Govt. Hospital	Non-Govt. Hospital
Age			
1	<20	8 (11.11%)	4 (5.13%)
2	21-40	23 (31.94%)	24 (30.77%)
3	41-60	28 (38.89%)	34 (43.59%)
4	>60	13 (18.06%)	16 (20.51%)
Social History			
5	Smoking	3 (4.17%)	8(10.26%)
6	Alcohol	10 (13.89%)	3 (3.85%)
7	Smoking+alcohol	10 (13.89%)	10 (12.82%)

Table 3: Antibiotics Prescribed in Government and Non Government Hospitals

Sl No	Name Of The Antibiotic	Number of Prescriptions (%)	
		Govt. Hospital	Non-Govt. Hospital
1	Azithromycin	1 (1.39%)	4 (5.13%)
2	Amoxacillin	3 (4.17%)	6 (7.69%)
3	**Amikacin**	9 (12.5%)	**23 (29.49%)**
4	Doxycycline	3 (4.17%)	4 (5.13%)
5	**Ceftriaxone**	**40 (55.56%)**	14 (17.95%)
6	Cefotaxime	35 (48.61%)	6 (7.69%)
7	Cefixime	24 (33.33%)	7 (8.97%)
8	Cefuroxime	1 (1.39%)	3 (3.85%)
9	Metronidazole	17 (23.61%)	9 (11.54%)
10	Ciprofloxacin	7 (9.72%)	14 (17.95%)
11	Levofloxacin	2 (2.78%)	13 (16.67%)
12	Ofloxacin	2 (2.78%)	11 (14.10%)
13	Gatifloxacin	1 (1.39%)	--
14	Streptomycin	1 (1.39%)	--
15	Amipicillin	2 (2.78%)	--
16	Amoxicillin+clavulanic acid	1 (1.39%)	--
17	Norfloxacin	--	1 (1.28%)
18	Moxifloxacin	--	1 (1.28%)
19	Cefpodoxime	--	2 (2.56%)
20	Rifaximin	--	1 (1.28%)
21	Gentamicin	--	1 (1.28%)
22	Amoxicillin+dicloxacillin	--	1 (1.28%)
23	piperacillin + tazobactam	--	20 (25.64%)
24	Cefoperazone+sulbactum	--	15 (19.23%)
25	Cefpodxime+clavulanic acid	--	1 (1.28%)
26	Ofloxacin+lignocaine+ cotrimoxazole+beclomethasone	--	1 (1.28%)

Table 4: A Comparison of WHO Essential Drugs and Drugs Prescribed in Government and Non Government Hospital

Sl no	WHO Drug and Dose	Govt. Hospital		Non-Govt. Hospital	
		Drug	Dose and route	Drug	Dose and route
1	Amoxicillin: oral tablet ;250 mg;500mg.	Amoxicillin	500mg , oral tablet.	Amoxicillin	250mg-500mg , oral tablet.
2	Ampicillin: 500 mg; 1g in vial, iv.	Ampicillin	500mg, IV	-	
3	benzylpenicillin	-		-	
4	Cefalexin	-		-	
5	cefazolin	-		-	
6	cefixime Capsule: 400 mg. tablet: 200mg	Cefixime:	200mg,oral tablet	Cefixime:	200mg,oral tablet
7	Ceftriaxone: 250 mg to 1g in vial.	Ceftriaxone:	1g, IV	Ceftriaxone:	1g, IV
8	Cloxacillin	-		-	
9	Phenoxymethylpenicillin	-		-	
10	procaine benzylpenicillin	-		-	
11	Cefotaxime 250-1g mg per vial	Cefotaxime:	1g, IV	Cefotaxime:	1g, IV
12	Ceftazidime	-		--	
13	Azithromycin: Oral tablet:250-500mg	Azithromycin:	500mg,PO	Azithromycin:	500mg,PO
14	Chloramphenicol	-		-	
15	Ciprofloxacin Solution for IV infusion: 2 mg/ mL. Tablet: 250 mg to 500mg.	Ciprofloxacin:	500mg IV 200-500mg, oral tablet	Ciprofloxacin:	500mg IV 200-500mg, oral tablet
16	Clarithromycin	-		--	
17	Doxycycline: Solid oral dosage form: 50 mg; 100 mg	Doxycycline:	100mg oral tablet	Doxycycline:	100mg oral tablet
18	Erythromycin	-		-	
19	gentamicin : injection:40 mg/mL in 2 mL vial.	-		Gentamycin:	80mg/2ml, IM
20	Metronidazole 500 mg in 100 mL vial. Tablets:200 mg to 500 mg.	Metronidazole :	500mg in 100ml vial;200mg oral tablet.	Metronidazole	500mg in 100ml vial;
21	Nitrofurantoin	-		-	
22	spectinomycin	-		-	
23	trimethoprim	-		-	
24	Clindamycin	-		-	
25	vancomycin	-		-	
26	levofloxacin Tablet: 250mg; 500 mg; 750 mg.	Levofloxacin:	500mg oral tablet, 500mg IV.	Levofloxacin:	500mg oral tablet, 500mg IV.
27	moxifloxacin : Tablet:400 mg.	-		Moxifloxacin:	400mg oral tablet
28	Streptomycin: 1 g in vial.	Streptomycin :	1gm IV	-	
29	Amikacin: 100 mg to 1 g in vial.	Amikacin :	500mg IV	Amikacin :	500mg IV
30	sulfamethoxazole + trimethoprim	-		-	
31	piperacillin + tazobactam 2g+250mg in vial; 4g+500m in vial	-		piperacillin + tazobactam	4.5g in 100ml NS, iv
32	Amoxicillin+ clavulanic acid: Tablet:500mg+125mg	amoxicillin + clavulanic acid	625mg (500mg+125mg) oral tablet	-	
33	Daptomycin	-		-	
34	Fosfomycin	-		-	
35	Linezolid	-		-	
36	Colistin	-		-	
37	Tigecycline	-		-	

38	Meropenem	-		-	
39	Benzathine Benzylpenicillin	-		-	
40	Aztreonam	-		-	
41	Ceftaroline	-		-	
42	Cefepime	-		-	
43	Kanamycin	-		-	
44	Capreomycin	-		-	
45	-	-		Cefpodoxime	200mg,PO
46	-	Ofloxacin:	200mg,PO 0.3% ear drops	Ofloxacin:	200mg,PO
47	-	-		Rifaximin;	200mg, oral tablet
48	-	Gatifloxacin	0.3%, eye drops	-	
49	-	-		Norfloxacin:	400mg oral tablet
50	-	Cefuroxime:	250mg oral tablet;1.5gm iv.	Cefuroxime:	250mg oral tablet;1.5gm iv.
51	-	-		Cefoperazone+salbactum:	1.5gm(1g+500mg),IV
52	-	-		Amoxicillin+dicloxacillin:	500mg(250mg+ 250mg), oral tablet
53	-	-		Cefpodxime+clavunalic acid:	325mg(200mg+125mg) oral tablet.
54	-	-		Ofloxacin+lignocaine+clotrimazole+beclomethasone	(0.3%+2%+1%+0.025%)

The antibiotics prescribed in Governmental and Non-governmental hospitals are summarized in Table 3. A total of 26 Antibiotic drugs are prescribed either alone or in combination in both Governmental and Non-governmental hospitals. Majority of the antibiotic drugs are prescribed alone in Government hospital (93.7%) and (77.2%) in Non-government hospital. Two antibiotic drug combinations are prescribed in about 22.7% prescriptions in Non-governmental hospitals. Whereas in Government hospitals two drug combinations are prescribed in 6.2% prescriptions

A comparison of WHO Essential Antibiotic Drugs and drugs prescribed in Government and Non government hospital is given in Table 4. WHO suggested 44 essential antibiotic drugs for treating various infectious diseases? These 44 essential drugs along with dose and route of administration are given in Table 4. Out of 44 WHO essential drugs only 13 drugs (29.5%) are in usage in Government as well as Non- government hospitals. The doses of these 13 drugs used are as prescribed by WHO. In addition 3 other antibiotic drugs namely Oflaxacin (200mg, oral), Gatifloxacin (0.3%,eye drops) and Cefuroxime (250mg, oral) alone are also in usage in Government hospitals. Where as in Non-Government hospitals a large number of other antibiotic drugs are in usage, these include Cefpodoxime (200mg, oral), Ofloxacin (200mg, oral), Rifaximin (200mg, oral), Norfloxacin (400mg, oral), Cefuroxime(250mg, oral) alone and combinations of Cefoperazone (1g) and sulbactum (500mg) IV, Amoxicillin (250mg) and Dicloxacillin (250mg) oral, Cefpodoxime (200mg) and clavunalicacid (125mg) oral and a 4- drug combination consisting of Ofloxacin (0.2%) and lignocain (2%) and clotrimazole (1.0%) and beclomethasone(0.025%), as an eye drop. About 18.7% and 40.9% of antibiotics used respectively in Government and Non-government hospitals are other than WHO suggested drugs. Along with the antibiotics the most frequently prescribed categories of drugs include Non Steroidal Anti inflammatory drugs, Antacids and Multivitamins in both Government and Non- government hospitals. As such it is important to screen all the prescriptions for Drug-Drug Interactions and Adverse Drug Reactions in combined drug therapy using antibiotics and other drug. Further it is suggested that the WHO prescribed antibiotic drugs are only to be used in the doses prescribed to avoid possible Drug interactions and Adverse Drug Reactions.

CONCLUSIONS:

1.The antibiotic usage is higher in Non-governmental hospitals in the departments of General Medicine (47.44%), and Pulmonary (33.33%) when compared to the Governmental hospitals, 43% in General Medicine and 20.8% in pulmonary department.

2. In the department of Trauma the antibiotic usage is more in Governmental hospital(12.5%) than in Non-governmental hospital (3.8%).

3. The antibiotic usage is more in the age group 41-60 years in both Governmental (38.8%) and Non-governmental (43.59%) hospital.

4. A total of 26 Antibiotic drugs are prescribed either alone or in combination in both Governmental and Non-governmental hospitals.
5.Out of 44 WHO essential drugs only 13 drugs(29.5%) are in usage in Government as well as Non- government hospitals.
6.About 18.7% and 40.9% of antibiotics used respectively in Government and Non-government hospitals are other than WHO suggested drugs.
7.Non Steroidal Anti inflammatory drugs, Antacids and Multivitamins are most frequently prescribed along with antibiotics in about 90-100% prescriptions.
8.It is suggested that the WHO prescribed antibiotic drugs are only to be used in the doses prescribed to avoid possible Drug interactions and Adverse Drug Reactions.

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CONFLICT OF INTEREST:
Authors declared there is no conflict of interest.

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