

**Original Research Article****IRRATIONAL USE OF CEPHALOSPORIN AND QUINOLONES IN PUBLIC AND PRIVATE SECTORS HOSPITALS OF KARACHI****Safila Naveed\* ,Ghulam Sarwar , Raazia Hassan , Sehrish Khan , Saima Afzal , Seeme Naz , Rabia Ghulam Nabi and Sara Yasmeen***Jinnah University for Women, Karachi. Pakistan74600***ABSTRACT**

Irrational use of cephalosporin and quinolones is a key factor behind rapidly increasing antimicrobial resistance in human. This study is undertaken in order to determine misuse of both of these drugs in private and public sectors hospitals. The aim of this study is to analyze the irrational use of cephalosporin and quinolones in private and public sectors hospitals in Karachi. This study is survey based which is conducted in public and private hospitals to determine maximum irrationality of cephalosporin and quinolones. Total 70 (100%) prescriptions taken from different patient having different infectious diseases. 40 prescriptions shows irrationality (57.14%) while 30 of the prescription shows rationality (42.85%). By our study it shows that maximum irrationality of cephalosporin and quinolones is in public sectors due to irrational prescribing of cephalosporin and quinolones to patient and it is the alarming condition for the population.

**Keywords:** irrational; prescribing; resistance; infectious; quinolones; cephalosporin

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**INTRODUCTION:**

Cephalosporins are beta-lactam compounds in which the beta-lactam ring is fused to a 6-membered dihydrothiazine ring, thus forming the cephem nucleus[1].It mechanism of action is it prevents cell wall synthesis by binding to enzymes called penicillin binding proteins (PBPs). These enzymes are essential for the synthesis of the bacterial cell wall [2].Pharmacokinetics generally distributes well into the lungs, kidney, urine, synovial, pleural and pericardial fluids. Cephalosporin can be broadly categorized into four generations. First generation Cephalosporin commonly active against Escherichia coli, Proteus mirabilis, and Klebsiella pneumonia and these are used in uncomplicated community-acquired infections of the skin and soft tissue and urinary tract(UTI). Also useful for respiratory tract infections caused by penicillin-sensitive Streptococcus Specific agents: Cefazolin, Cephpirin and Cephalexin second generation cephalosporins active for Hemophilus influenzae, Moraxella catarrhalis, Neisseria meningitidis and some Enterobacteriaceae. Third generation cephalosporins Improved activity against enterobacteriaceae associated hospital-acquired infections cefotaxime, ceftriaxone and ceftizoxime. Fourth generation cephalosporin has the excellent activity against enterobacteriaceae and pseudomonas aeruginosa.

Quinolones Research on 4-quinolone-3-carboxylates had led to the discovery of a family of 6-fluoro-7-piperazinyl-4-quinolones active against bacteria *in vitro* as well as intracellular pathogens and trimethoprim resistant microbes [3]. Collectively these compounds were called fluoroquinolones [4] They are bactericidal antibacterial agents with broad-spectrum activity. They inhibit the enzyme topoisomerase II, a DNA gyrase that is necessary for the replication of the microorganism. Topoisomerase II enzyme produces a negative supercoil on DNA, permitting transcription or replication so by inhibiting this enzyme DNA replication and

transcription is blocked. Its pharmacophore is on 4-quinolone-3-carboxylates. [5] Side effects are nausea, vomiting and diarrhea, which occur in 3 to 6 percent of recipients. Other more serious but less common side effects are headache, confusion and dizziness. Broadened antimicrobial activity *S. pneumoniae*, *S. aureus* and *Enterococcus* species, as well as good activity against *Mycoplasma* and *Chlamydia* species. First generation include cinoxacin and nalidixic acid, which are these agents are not recommended for use in patients with poor renal function because of significantly decreased urine concentrations. Second generation include ciprofloxacin, enoxacin, lomefloxacin, norfloxacin and ofloxacin. Ciprofloxacin is the most potent fluoroquinolone against *P. aeruginosa*. Third generation include levofloxacin, gatifloxacin, moxifloxacin and sparfloxacin. Fourth generation Trovafloxacin, currently the only member of the fourth-generation class, adds significant antimicrobial activity against anaerobes while maintaining the gram-positive and gram-negative activity of the third-generation quinolones. The drug used in this article are ciprofloxacin Oral: 500 mg orally every 12 hours and levofloxacin 250, 500 and 750 mg. [6]

**Irrational use of drugs** requires that patients receive medications inappropriate to their clinical needs, in doses that do not meet their own individual requirements for an adequate period of time. The use of quinolones and cephalosporins have significantly brought down mortality and morbidity from communicable diseases. At the same time, irrational use of antibiotics is wide spread all over the world. Even for viral aetiology an increasing trend is noticed for use of combinations, broad spectrum and newer generation antimicrobials [7-9].

## MATERIAL AND METHOD

### Study design

This prospective, observational, study is hospital-based and is conducted in Karachi by students of pharmacy (5th prof) Parameters studied include irrationality of antibiotics such as cephalosporin and quinolones because of its irrationality resistance was usually developed in human being.

### Data collection

Information was collected about patient disease and the drug especially cephalosporin and quinolones given to patient. Total 70 prescriptions collected from different patient having different infectious diseases.

### Ethical considerations

Participation in the study was voluntary and confidentiality of the information was assured both during and after data collection. The respondents were informed about their right either not to participate, not to answer any question or all of the questions. All protocols followed were in line with the ethics requirements

## RESULT AND DISCUSSION

The irrationality of the two groups of drugs that is cephalosporin and quinolones has been studied in two sectors that is private and public hospitals and while conducting surveys we have found that the proportion of irrationality is more in public sector as compare to private sector. The results of the study also pointed towards irrational prescribing practices prevalent in Karachi.

Information was collected about patient disease and the drug which is given to the patient. The data of rational and irrational use of drug is given in figure 2.

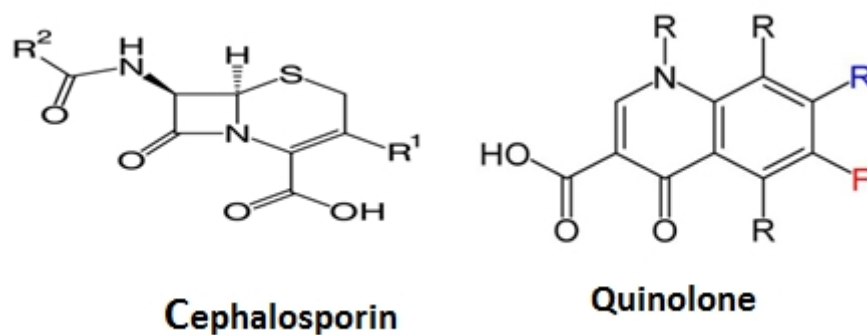


Figure 1: Structure of cephalosporin and quinolone

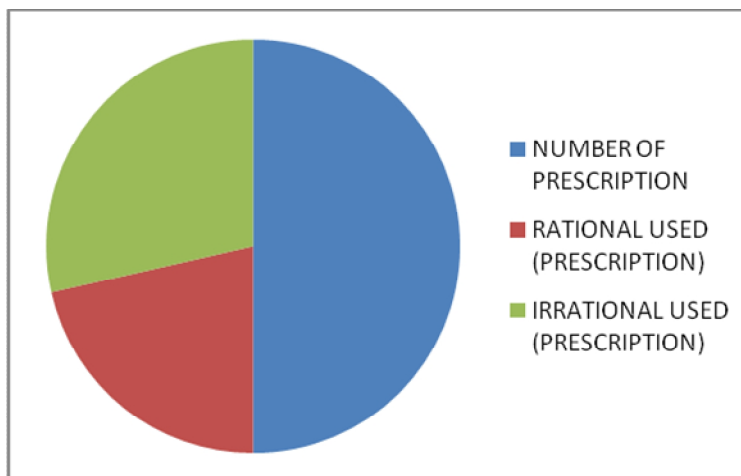


Figure 2: Rational and irrational use of cephalosporin and quinolone

Table 1. Comparison of age, patient disease, drug used and reasons of irrationality.

Total prescription	Rational case	Irrational case
70 (100%)	30 (42.85%)	40 (57.14%)

Case No.	Age	Patient disease	Drug used	Reasons of irrationality
1	21	Throat infection	Ciprofloxacin 500mg q12hrs	Chances of resistance increase because cephalosporin , azithromycin, clindamycin are first drug of choice
2	40	Shortness of breath	Ceftriaxone 1gm bid and sulbutamol	Ceftriaxone given to patient without any known reasons of infection
3	50	Dirrhoea	Zantac , flagyl, ciprofloxacin 400mg q12h for 3 days	The dose of cipro in dirrhoea is 500mg q12h for 5 days

4	14 months 8.4kg	hydrocephalus e VP shunt	Inj. ceftriaxone 400mg x B.D Inj.calpol 1tsp 120mg x tid Inj. Phenytoin 170mg in 20 cc Inj.mannitol 40ml x B.D	Ceftriaxone:-Child dose :- 20- 50mg/kg daily OD infusion 420 mg daily OD So, it is very much higher than normal dose
5	8months	metabolic fits	Inj. ceftriaxone 400mg x B.D Syp.panadol 1½ tsp x B.D Syp.ca.gluconate 1½ tsp x B.D Inj.cefotaxime 400 mg x O.D	3 <sup>rd</sup> generation cephalosporin is used without any report of infection
6	35	severe, vomiting, abdominal pain	IV. Drotaverine 40mg Q8h IM. Dimenhydrinate 50mg Q4h IV ciprofloxacin 400mg x B.D	Ciprofloxacin is given without any reason and culture report
7	20	throat infection	Levofloxacin 500mg Od Syp.Banadrel Paracetamol	levofloxacin is not the drug of choice for throat infection
8	18	Appendicitis (appendectomy has done)	Cephadrine 500mg q6h, metronidazole, paracetamol domperidone	Cephadrine is a drug of choice for pre operation it is given prophylactically and after surgery aminoglycoside is drug of choice.
9	52	Gastric perforation	Metronidazole omeprazole, ceftriaxone 1gm TID	The dose of ceftriaxone is 1 to 2 gm OD
10	2 month (5.2kg)	Gastroenteritis	Cefotaxime 225mg amikacin paracetamol	The dose of Cefotaxime is 260mg/5.2kg/day
11	6 month (4kg)	Gastroenteritis	Metronidazole zinc sulphate Ceftriaxone 200mg bid	The dose of Ceftriaxone is 200mg OD
12	3 month (5.4kg)	Meningitis	Ceftriaxone 500mg bid amikacin vancomycin ventolin	The dose of Ceftriaxone in Meningitis is 100mg/kg/day for 7days
13	25	Back pain	Levofloxacin 250 mg tid,nalbuphine	Levofloxacin given to patient without any known reasons of infection.
14	38	Throat infection	Cephalexin 500mg bid for 10 days lab report shows patient allergic to cephalosporin	Instead allergy patient receiving Cephalexin
15	40	ESRD	Ceftazidime 1gm bd aspirin calcium supplement orodolmoxifloxaci n and dyclo	Moxifloxacin and dyclo has a drug interaction
16	2	Otitis media	Ceftriaxone 100mg/kg/day	The dose of Ceftriaxone in Otitis media is 50mg/kg/day
17	40	UTI (complicated)	Ciprofloxacin 250 mg q12h for 7 day and omperazole	In complicated uti the dose of Ciprofloxacin is 500mg q12h

				for 7 days
18	30	UTI problem	ciprofloxacin 200 mg lactulose paracetamol citralka and domperidone	pt. sensitivity report show that patient is resistance to cefotaxime , ciprofloxacin and amikacin so meropenum should indicated
19	1	UTI problem	ciprofloxacin 250mg q12hrs and omeprazole	cipro is contraindicated in peads because it damage muscles
20	18	appendicitis	cephadrine 750 mg metronidazole nalbuphine and dimenhydrinate	the dose of cephadrine is too high it usally dose is 500mg
21	37	hernia	cephadrine 500 mg od and paracetamol	the dose of cephadrine is 500 mg tid
22	40 days 5.4kg	severe pneumoniae	cefotaxime amikacin and zinc sulphate	first choice is amoxicillin
23	60	acute coronary syndrome	gravinate ceftriaxone 2gm od omeprazole citralka lasix and rosvastain	Ceftriaxone given to patient without any known reasons of infection
24	52	diarrhoea HTN and UTI	cefotaxime 1gm 8h flagyl omeprazole moxiget lasix and panadol	ciprofloxacin is drug of choice
25	40	pneumoniae	cefotaxime	pt. sensitivity report show that patient is resistance to cefotaxime
26	2 month 4.7 kg	gasroenterities with sepsis	cefotaxime 225mg iv bd panadol calcium gluconate	ceftriaxone should be indicated
27	2	dehydation	ceftriaxone 350 mg IV bid cipro 70 mg IV bd	2 antibiotics are given to pead and no severe infection
28	8.4 kg	respiratory tract infection	cefrixone 200mg bd and optra solution	the dose of cetriaxone in 8.4 kg patient is 420mg od
29	20	vaginal cyst	IV ciprofloxacin 200mg bd ketorolac and dimenhydrinate	in vaginal cyst gentamycin is drug of choice
30	21	appendicitis	ciprofloxacin 500 mg iv metronidazole nalbuphine and dimenhydrinate	the dose of ciprofloxacin iv is 200 or 400 mg
31	6 month	metabolic fits	calcium gluconate ceftriaxone 400 mg bd and pandol	Ceftriaxone given to patient without any known reasons of infection
32	3month 4kg	age with spesis	iv vancomycin 60 mg 8 hrs saline solution and ceftazidime 300 mg bd	drug interction between vancomycin and ceftazidime and neutopenia occur in patient

33	45	diarrhoea dehydration and vomiting	ranitidine metronidazole and ceftriaxone 2gm od	ciprofloxacin is drug of choice
34	50	prostatitis	ceftriaxone 200mg bd and brufen and saline solution	ciprofloxacin is drug of choice
35	23	throat infection	ceftriaxone 1gm od	amoxicillin is drug of choice
36	38	genitourinary tract infection	Ciprofloxacin 500mg q12hrs flagyl metacolon folic acid and voren	ceftriaxone is drug of choice
37	39	dysuria and prulent urthral discharge	Ciprofloxacin 500mg q12hrs	ceftriaxone is drug of choice
38	8.4 kg	Meningitis	Ceftriaxone 500mg bid amikacin vancomycin ventolin	The dose of Ceftriaxone in Meningitis is 100mg/kg/day for 7days so according to patient weight dose is 840 mg /day
39	20	Stomachache	Ceftriaxone 1gm bid	Ceftriaxone given to patient without any known reasons of infection
40	50	HTN and diabetes	gravinate ceftriaxone 2gm od omeprazole citralka lasix rosvastisin and metformin	Ceftriaxone given to patient without any known reasons of infection
CASES OF RATIONALITY				
1	2month 6kg	meningites	ceftriaxone 600mg od	the dose is correct and it is according to patient weight
2	32	cholelithiasis	omeprazole ceftriaxone 2gm od nalbuphine and dimenhydrinate	treatment is correct and rational
3	18	appendicitis	cephadrine metronidazole nalbuphine and dimenhydrinate	treatment is correct and rational
4	37	hernia	cephadrine 500 mg tid and paracetamol	treatment is correct and rational
5	40 days 5.4kg	severe pneumoniae	cefotaxime amikacin and zinc sulphate	treatment is correct and rational because patient is resistance to penicillin
6	60	UTI e BPH	Tab. Terazosin 2gx HS Inj. N/S 1000mlx O.D Inj. Levofloxacin 500mg x O.D	treatment is correct and rational

7	55	diabetic foot infection	NPH 30units in morning Mined insulin 70\30 before breakfast Regular human insulin 15units before dinner NPH 20 units at bed IV cephradinelg x 2 twice BD IV NIS 1000ml OD	treatment is correct and rational
8	30	acute cholecystitis	IV ceftriaxone 400mg BD Metronidazole Dimenhydrate Omeprazole	treatment is correct and rational
9	20	throat infection	ceftraixone	treatment correct because ceftriaxone is drug of choice
10	40	UTI	levofloxacin 500mg x OD Tab diclofenac Na	treatment is correct and rational
11	55	liver abscess	IV ceftriaxone 400mg B.D IV D/S 1000 cc Diclofenac sodium	treatment is correct and rational
12	60	foot abscess	Inj. Ringer lactate Inj. Ketorolac Inj. Ciprofloxacin 400mg x B.D Inj gentamycin Tab. diclofenac	treatment is correct and rational
13	60	acute coronary syndrome and broncial cough	gravinate ceftriaxone 2gm od omeprazole citralka lasix and rosvastain	treatment is correct and rational
14	51	cholecystitis HTN and UTI	drotverine cipro 400 mg iv bid insulin ascard qalsan and rosvastain	treatment is correct and rational
15	18	idiopathic arthrities	deltacortil risek folic acid ceftriaxone 1gm od and diclofenac sodium	treatment is correct and rational
16	38	genitourinary tract infection	ceftriaxone 1gm q12 h flagyl metacolon folic acid and voren	treatment is correct and rational
17	70	meningitis	cefotaxime 750mg q6hrs paracetamol	treatment is correct and rational
18	27	hemicolectomy	cipro 400mg q12h metronidazole nalbuphine and gravinate	treatment is correct and rational
19	58	hypertensive emergency	lorartan tranexamic acid ceftriaxone 2gm od serratiopeptidase lactulose pracetamol and bromazepam	treatment is correct and rational
20	15 month	meningits encephalitus	ceftriaxone 400 mg bd phenobarbitone ca.sandoz and calpol	treatment is correct and rational
21	65	hematouria and BPH	terazosin levofloxacin 500mg and tranexamic acid	treatment is correct and rational



22	50	BPH with UTI	levofloxacin 500mg and brufen	treatment is correct and rational
23	21	biliary tract infection	iv ciprofloxacin 400 mg bid	treatment is correct and rational
24	50	prostatitis	iv ciprofloxacin 400 mg bid and brufen	treatment is correct and rational
25	25	community aquired pneumoniae	iv cefuroxime 750 mg q8h iv claritromycin 500 mg q12 h and saulbutamol	treatment is correct and rational
26	45	pyelonephritis	iv ciprofloxacin 400 mg bid and brufen	treatment is correct and rational
27	18	chronic bronchities	iv ciprofloxacin 400 mg bid brufen and dextrose solution	treatment is correct and rational
28	30	epiglottis	cefotaxime 250mg q8h brufen and sancos syrup	treatment is correct and rational
29	39	dysuria and prulent urthral discharge	Ceftriaxone 2gm od	ceftriaxone is drug of choice
30	52	Gastric perforation	Metronidazole omeprazole, ceftriaxone 1gm od	treatment is correct and rational

The reasons of why irrationality is more in public sector consist of following points

1. In public sector lack of trained doctors and nurses are more prominent and if they are trained then also the lack of attention is seen among the doctors and nurses.
2. Sometimes the dosage frequency, drug dose, dosage form are not written properly by the doctors and nurses and they misguide the prescription, even they are not confirmed by the doctors and give their on presumed drug which is not according to indication and then the patient suffers.
3. One major cause of irrationality is bysness (favourablism), the doctor only prescribed the drug of the company to whom he is promoting the drug even though it is not the drug of choice and sometimes it is also costly to the patient.
4. Even in viral diseases where antibiotics is not recommended their also antibiotic are prescribed which disturb the flora of stomach and make the patient condition worst.

## CONCLUSION

Our survey between the two sectors hospitals that is public and private is completed and result is public hospital has more irrationality. So in order to correct the circumstances, there should be proper check and balance and team are formed which keep an eye on prescribing criteria. Pharmacist are given jobs especially clinical pharmacist for rational prescribing and human health is given priority at first. Trained doctors and nurses are given jobs.

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