Quality of Antibiotics in the Treatment of UTI at A Tertiary Care Teaching Hospital Karachi

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Abstract: **The quality of health care system are effected by irrationalize use of drug especially the antibiotic resistance increased globally and become a threat to the entire world. In this study,400 patients were scrutinized for Urinary tract infection to assess the most prevalent group of infected individual with identified isolateduro-pathogensthus also perform assessmentof prescribed antibiotics, compared frequent prescribing pattern with correlation to antimicrobial sensitive strain.**

Keywords: **Quality of prescription, Identified Uropathogens, Antibiotics, antimicrobial sensitivity.**

I. INTRODUCTION

The quality of health care system encompass specifically rationalize consumption of drugs, depends on wide range of activities which includes; correct diagnosis, prescribing drugs with proper indication, checking of drug utilization with proper dose, frequency, route of administration, duration of therapy, drug allergy, drug-drug interaction, contraindications, precautionary measureswith drugs and its monitoring. The rationalize use of drugs aid in the treatment and prevention of disease and its ailments while the impact of irrationalize use of drugs such as reduction in the quality of drug therapy, increase risk of adverse reaction ,emergency of drug resistanceleadingto increase economic burden on health,it could be dangerous and alarming threat to the entire world. The effective quality system promotes links between the health care provider to work in a cross functional team, encourage culture of continuous education, training and effective reporting system prevent medication errors [1,2].

Antibiotics possess bacteriostatic and bactericidal activity and use for the prevention and treatment of bacterial infection.According to the World Health Organization resistance of antimicrobial burdenincrease globally and effect human health. Antimicrobial resistance defined as ability of a microbes to resist the effects of antibiotics.The improper utilization of antibacterial agent and its overuse/misuse are the main contributing factor to increase the crisis of antibacterial resistance. The antimicrobial resistance is an increasingly serious threat to the world public health that requires action across all public and private health sectors. The appropriate treatment with antimicrobial agent reduce the prevalence of resistances[3,4].

The purpose of drug utilization review is to ensure drugs are used appropriately, safely, and effectively to improve patient health status. The use of drugs in appropriate, safe, and effective manner would decrease the treatment cost for the patients. Drug utilization review is an authorized and structured ongoing review of practitioner prescribing, pharmacist dispensing, and patient use of medications .[6].

Drug utilization program always plays an important role in helping the health-care team to improve the prescribing, administration, and use of medications. Pharmacists can then, in collaboration with prescribers and other members of the health-care team, initiate action to improve drug therapy for patients [7].

UTI is defined as an infection caused by accumulation of microorganism in the urinary system which result in invasion of tissues specifically urinary system which include kidneys, ureters, bladder and urethra, most common site for bacterial infection are bladder and urethra. [5,8].

The women are more significantly prone to UTI than men, most infected area of women urinary system are bladder and urethra. Cystitis is inflammation of the bladder usually caused by bladder infection and urethritis is inflammation of urethra commonly due to bacterial infection. In addition to this, Female urethra is adjacent to Vagina, sexually transmitted infections, such as herpes, gonorrhea, chlamydia, and mycoplasma, Escherichia coli (E. coli) can cause urethritis [9,10].

The numerous risk factor aligned with UTIs are due to birth control, menopause,urinary tract abnormalities, blockages in the urinary systems, catheter use, urinary procedure [11].There is no substantial evidence to prevent UTIs but only possible measure to improve sanitary hygiene will reduce the occurrence of diseases which includes wipe or wash from front and back (not back to front) after bowel movements, use tampons for periods, empty the bladder regularly especially after intercourse, drink plenty of fluid or water[12]. Subsequent approaches aid in the treatment of UTIs which include culture sensitivity tests, wisely use of antibiogram rather than start of empiric treatment. The study was designed to identify the gaps between prescribing pattern and usage of drug in UTIs in a tertiary care hospital Karachi.

II. METHODS

The study was designed as a prospective observational basis; study was conducted on 400 patients in a public sector tertiary care teaching hospital situated in Karachi. The inclusion criteria of study was patients of both gender male and female age from 18-80 years with UTIs, patients admitted Medical ICU, Surgical ICU and patient without UTI prescribed medication excluded from the study. Admitted patient data was collected and screen from the hospital medical records. During this study no harm to human or animal, all the compiled data is based on observation.

III. RESULTS

Socio Demogaphic study on UTIs infected patient (n=400):

The socio demographicstudy depict the percentage of UTI infected patient are higher in young individual in comparison to the elderly patient (Table 1)(Figure1a), as per ethnic group the UTIs are common in local population of Sindhis, Pashtuns,& Baloochis which was between (24 to 21%) while the percentage were seems to be lower in Muhajirs & Punjabis which was almost between 16 to 19%.(Table 1) (Figure 1b).

TABLE I: SOCIO DEMORAPHIC PERCENTAGE DISTRIBUTION

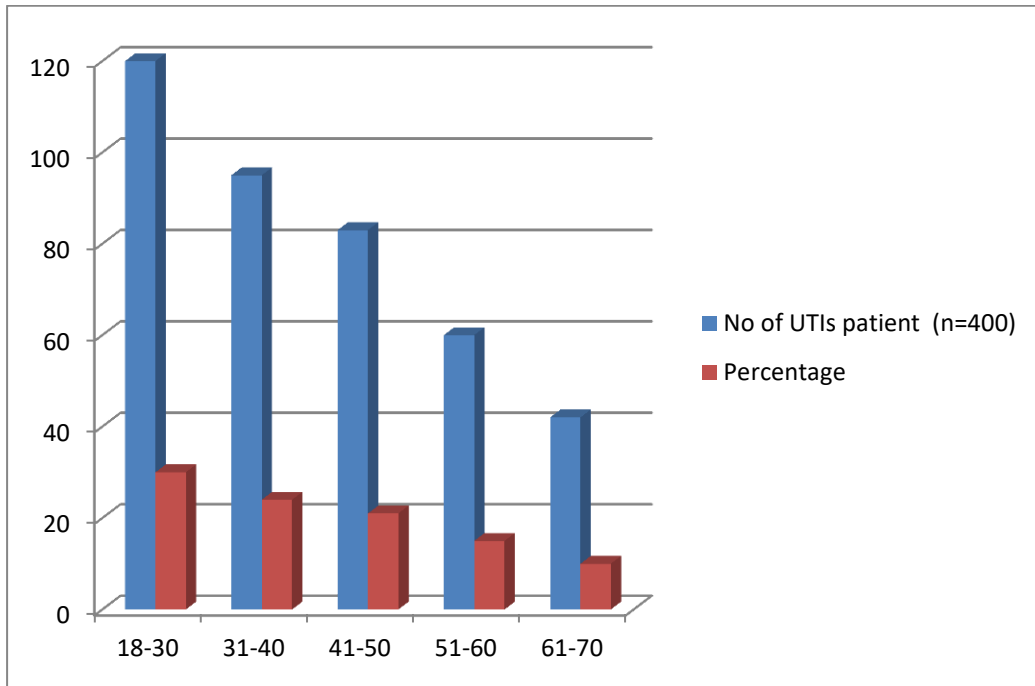| Socio Demogaphic study on UTIs infected patient (n=400)		
Age	**No of UTIs patient(n=400)**	**Percentage**
18-30	120	30
31-40	95	24
41-50	83	21
51-60	60	15
61-70	42	10
Ethnicity		
Ethinic group	**No of UTIs patient(n=400)**	**percentage**
Muhajirs	62	16
Punjabis	76	19
Sindhis	94	24
Baloochis	82	21
Pashtuns	86	22

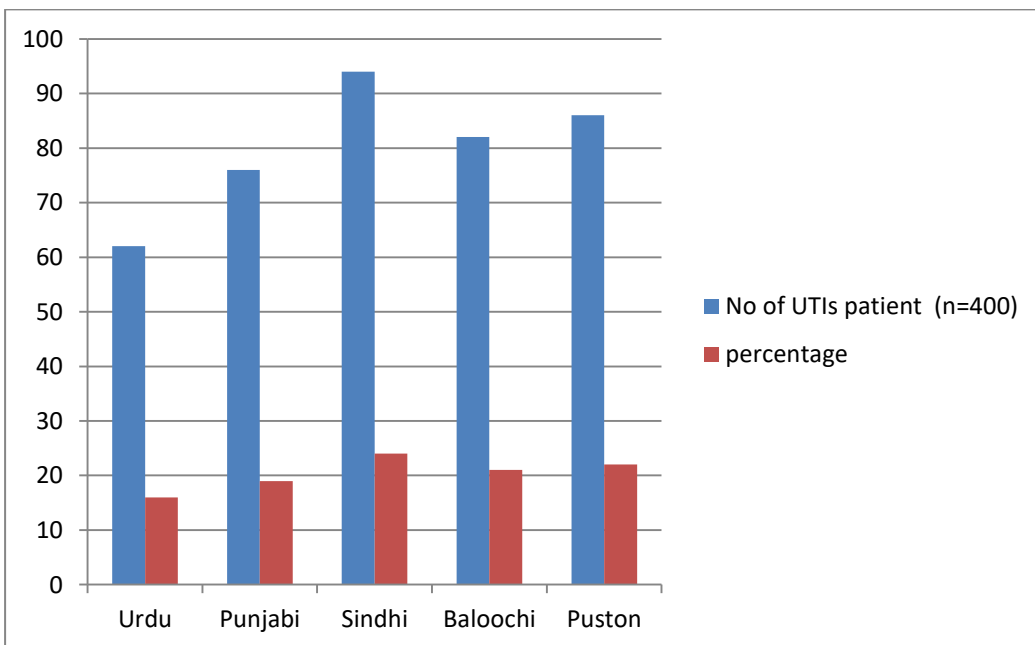**Figure 1a: Percentage variation with age group**

Figure 1b: Percentage variation with ethnic group

Gander wise distribution of infected UTIs patient:

Gander wise screening of 400 UTIs patient in which the percetage of infected males was 42.5% while the percentage of female was 57.5% which demostrate the likely hood of infection are common in females. (Table 2)(figure 2).

TABLE II: PERCENTAGE DISTRIBUTION GANDER WISE

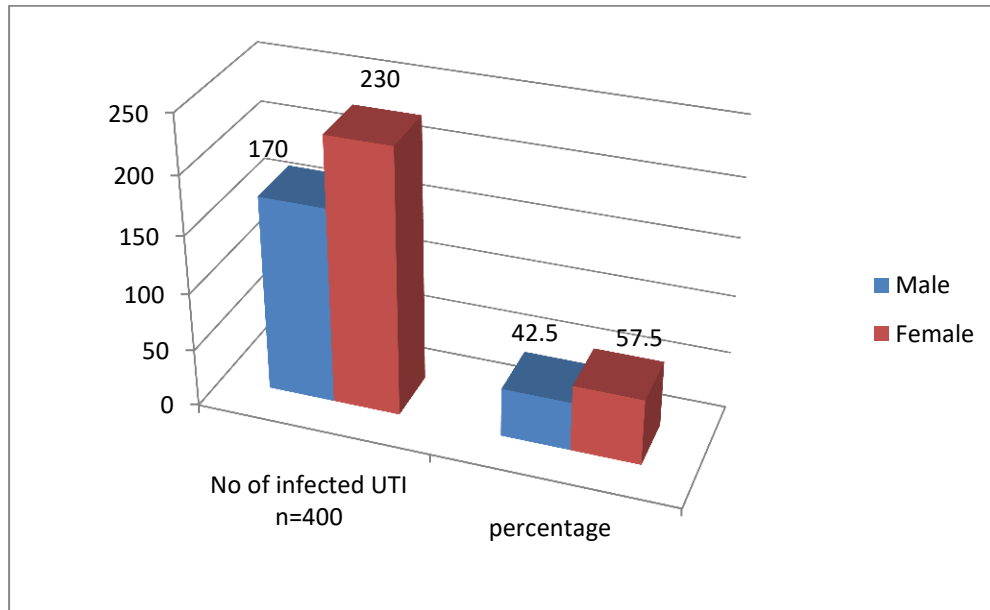| Gender	No of infected UTI n=400	percentage
Male	170	42.5
Female	230	57.5

Figure 2: Percentage variation with gander

Distribution of pathogens according to Culture sensitivity test:

Culture sensitive microbiologically isolated strain in which the percentage of E.coli was almost 57.5% whereas the lowest percentage of identified pathogen was Pseudomonas that was 10.8% one hundred and twenty microbiological report were evaluated toidentify the most causative pathogens in UTIs. (Table 3)(Figure 3)

TABLE III: PERCENTAGE DISTRIBUTION ON BASIS OF CULTURE SENSITIVITY

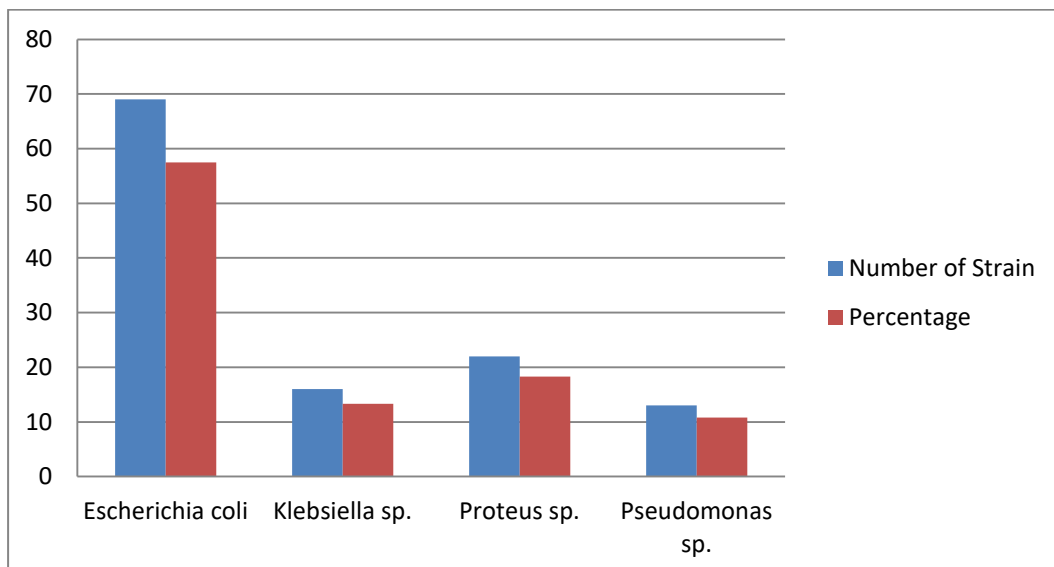| Pathogens	Number of Strain	Percentage
Escherichia coli	69	57.5
Klebsiella sp.	16	13.3
Proteus sp.	22	18.3
Pseudomonas sp.	13	10.8

Figure 3: Percentage variation according to isolates uropathogens

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Percentage distribution of routinely physician ordered antibiotics:

In our study,790 physician ordered antibiotic prescription were analyzed and observed thehighest percentage of prescribing antibiotic was ciprofloxacin (24%) and the lowest percentage was ceftriaxone(14%), where as the rest of antibiotics percentages includes amikacin (17.75%), cefazolin (22.25%) and combination of trimethoprime+sulpha methoxazolewas 22.5%. (Figure 4)

TABLE IV: PERCENTAGE DISTRIBUTION ON BASIS OF PRESCRIBED ANTIBIOTICS

Prescription Antibiotics	No of Prescription	Percentage
Amikacin	142	17.75
Ciprofloxacin	188	23.5
Ceftriazxone	112	14
Cefazolin	178	22.25
Triemethoprime+ Sulphamethoxazole	170	22.5
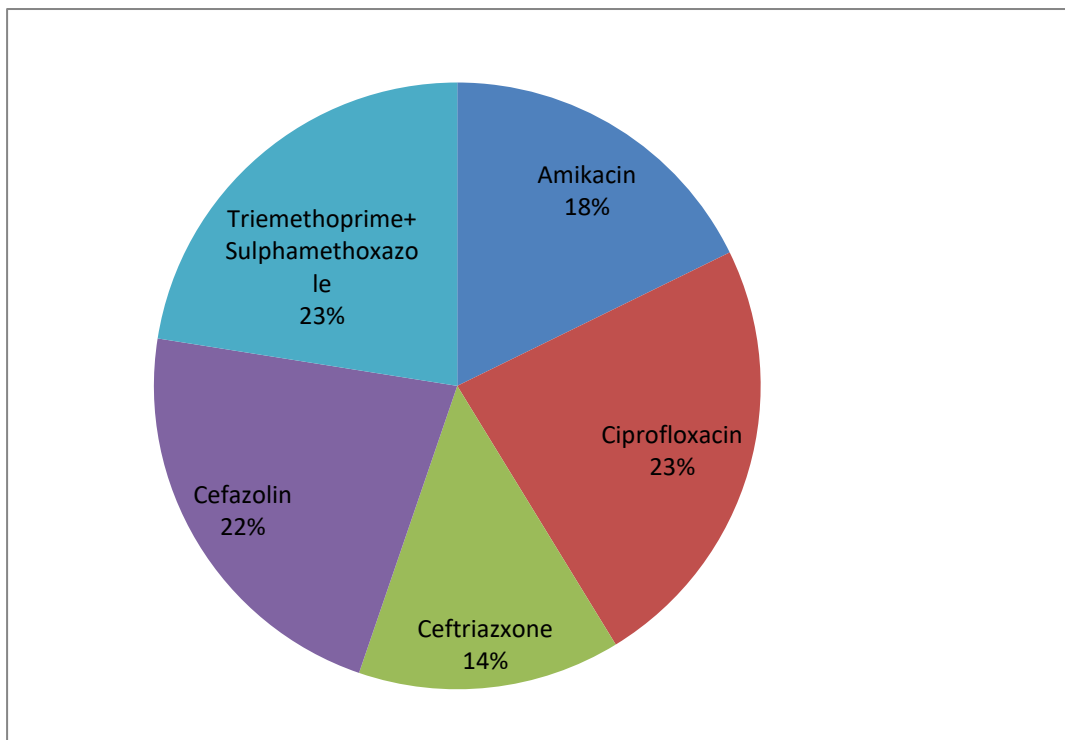
Figure 4: Percentage variation according to prescribed antibiotics

Percentage distribution of antibiotics activity against UTIs Identified Pathogens:

In our study reveals, Ceftriaxone possess higher activity instead of Trimethoprime& Sulphamethoxazole in three pathogens such as E.coli., Proteus sp., Klabseila sp.,Amikacin shows higher activity against E.coli., Proteus sp., Klabseila Sp. Whereas slight difference obsereve in the effectiviness of Gentamicin, on the other side amikacin and gentamicin reveal same activity against Pseudomonas sp., Cefepime & Ceftazidime are almost similar and shows highest activity in pseudomonas sp., Colistin possess significantly higher activity for Pseudomonas sp. specifically, on the other hand Levofloxacin was insignificant. Tazocin possess highest activity against all the four strain of UTI pathogens, but comparatively lower than meropenum and imipenum.Colistin shows Highest activity for Pseudomonas sp. Among the all the tabulated list of antibiotics while the lowest activity was observed in Levofloxacin on the other way colistin & levofloxacin shows no antibacterial activity against the E.coli., Proteus sp., Klabseila Sp. (Table V) (Figure 5).

TABLE V: PERCENTAGE DISTRIBUTION OF ANTIBIOTIC SENSITIVITY

| Antibiotic	ECOLI	Proteus sp	klabseilasp.	pseudomonas sp.
Ampicillin	27	50	0	0
Cefazolin	50	66	59	0
Ceftriaxone	72	75	74	0
Cefepime	70	85	78	80
Ceftazidime	73	85	76	80
cefuroxime	74	80		
Amikacin	93	93	93	85
Gentamiicin	83	72	82	84
Ciproloxacin	64	72	77	79
levofloxacin				49
Imipenum	99	100	98	79
Meropenum	99	100	98	80
Colistin				97
Nitrofurantoin	93	0	50	0
Tazocin	90	98	80	82
Tigecycline	99	0	62	0
Trimethoprime & Sulphamethoxazole	49	47	73	0
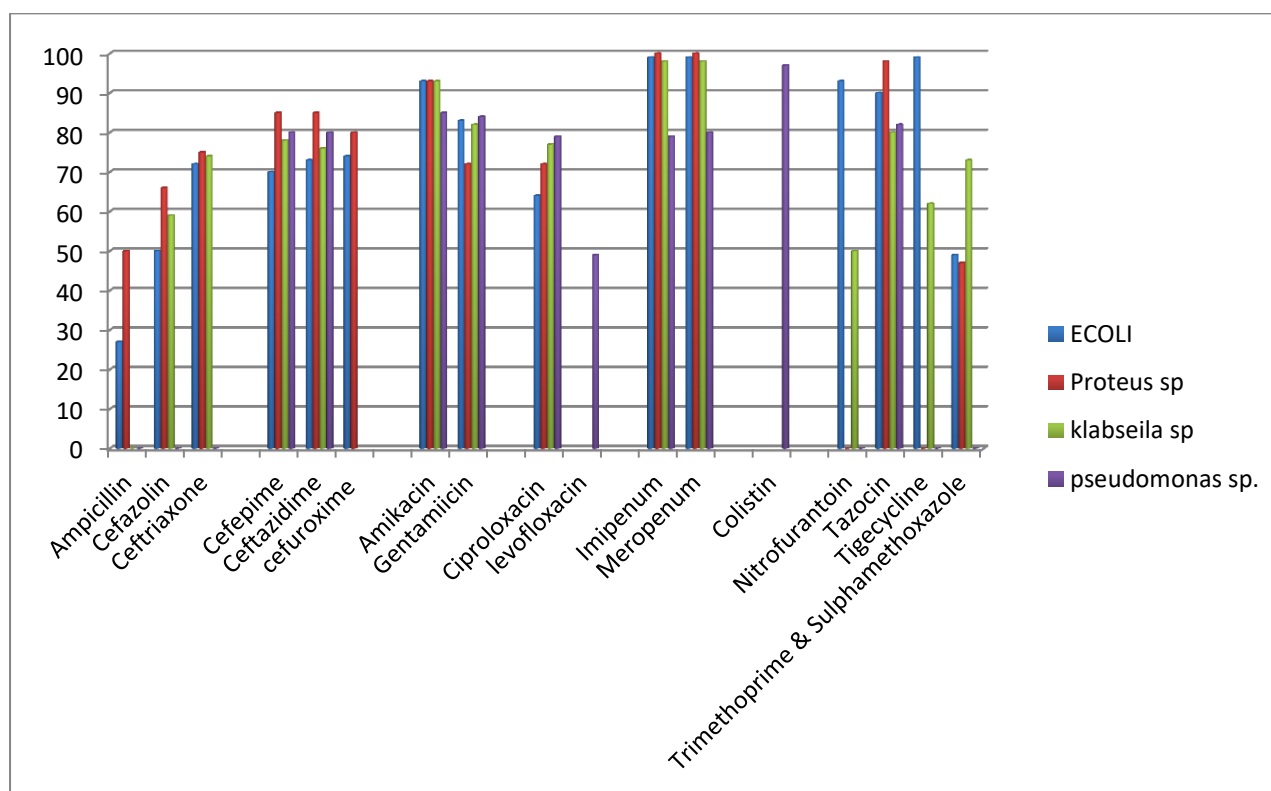
Figure 5: Percentage variation according antibiotics sensitivity

IV. DISCUSSION

The quality of prescription and drug utilization pattern shows significant importance of rationalize use of drugs. WHO developed various strategies and procedure to conduct assessment of rationalized physician ordered medications [13].

It is required to identify the critical areas and blind spots of inappropriate use of antibiotics and educate the threat of antibiotic resistance crisis lead toincreased economicburden to health care system [14,15].

In our study, the most prevalent age groupfor UTIS are between 18 to 30 years in which the percentage was 30% and gradual decrease were observe towards elderly patients. On the other side of demographic study shows the most prone individuals in the group of ethnicity are Sindhis while the less infected population are Muhajirs, due to awareness of health hygiene. In this study it was also observed that the women are predominantly susceptible to uropathogens than men, few in listed reason are shorter urethra and vagina are in close proximity to urethra. Microbiological study was performed to identify uropathogen from urine specimen of total thirty percent of patient over four hundreed patients. (Urine specimen studied microbiologically was only thirty percent of population to identify the uropathogens), most identified pathogens are E.coli (57.5%), klebsila sp. (13.3%), proteussp.(18.3%)& Pseudomonas sp.(10.8%). The study was also designed in a way to identify the gaps between the rational and irrational use of antibiotics prescription, in which 790 prescription were evaluated, data demonstrate the percentage of prescribed ciprofloxacin was almost 24% than trimethoprime+sulphaemthoxazole nearly 23%,cefazolin 22%,amikacin 17.7% & ceftriaxone 14%. On other observational point of our study is to focus the sensitivity of antibiotic against microorganism and best possible treatment approach, as per antibiotic sensitivity against bacterial stain in which the highest activity was observed in Meropenum & imipenum aginst all the causative agent of infection, than amikacin, pipracillin+ Tazobactum, gentamicin also shows higher activity, cefipime& ceftazidime shows comparable the same activity but less effective than cabepanum while ciprofloxacin shows lesser activity. Ceftriaxone and trimethoprime+sulphamethoxazole illustrate activity against three bacterial strain that is Ecoli, Proteus Sp., kalbsila sp., ceftriaxone are superior than trimethoprime+sulphamethoxazole. On the other side Colistin and Levofloxacin reveals activity against pseudomonas sp. Colistin possess higher activity against all the in listed antibiotic for pseudomonas sp while levofloxacin shows less effect ive medication in the identified uropathogen pseudomonas sp. (levofloxacin and colistin both possess activity against pseudomonas sp. On the other hand no activity was observed in Ecoli, Proteus Sp., kalbsila sp.

In our observational study illustrate that the various factors are involve in irrationalize use of drugs which includes inappropriate physician order, unavailability of resources , economic crises, expensive lab testing, lack of pharmacist on drug store nearby hospital, which leads to identify blind spots such as in appropriate review system of prescription from pharmacist, lack of double checking of orders on nursing site, lack of policies and procedure, guidelines for antibiotics therapy which lead to made errors on dispensing of medication such as inappropriate selection of antibiotics, wrong dosing (some antibiotics require dosing with respect to Ideal body weight/ adjusted body weight with reference to the renal or hepatic profile), frequency,route of administration & duration of therapy.

V. CONCLUSION

The study was conducted to evaluate the quality of prescribedantibiotics and to bridge the gaps of physician ordered medication, by assessing the specific need of medication with proper justification and indication no the basis of Laboratory results, independent checking required from pharmacist side on every prescription and best possible treatment recommendation to strengthen physicians and nursing staff which aid in distributing the burden of medical professionals and create opportunity to work all medical professional in a cross functional team which help in reducing the drug resistance and the economic consequences of poor health.

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