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**ANTIBIOTICS PRESCRIBING TRENDS IN DIFFERENT HOSPITALS OF
KHAIRPUR, SINDH, PAKISTAN**

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ABSTRACT

There is substantial evidence linking antibiotic misuse to bacterial resistance. **Objectives:** This study describes antibiotic prescribing trends in different hospitals of district Khairpur for rational antibiotic prescribing; determine costs associated with antibiotic use for decreasing unnecessary expenditure and improving pharmaceutical care with minimum resources and challenges faced while developing such surveillance systems in lower-middle-income countries (LMIC). **Methods:** A total of 428 antibiotics containing prescriptions, which were written out in the primary health care facilities (PHC-Fs), public hospitals (PC-Hs), university hospital (UT-H) and private hospitals (PRT-Hs) were collected for photocopy from patients during visit of nearby pharmacies of mentioned hospitals. The World Health Organization (WHO) Anatomic Therapeutic Clinical classification (ATC) methodology facilitates meaningful comparisons of antibiotic prescribing trends across hospitals. **Results:** In significant number of prescriptions 296 (69.2%), diagnosis was not mentioned and this poses a serious challenge for monitoring rational medicine use (RMU) in order to develop strategies for decreasing antimicrobial resistance (AMR) and expenditure. Among diagnosis mentioned prescriptions (30.8%), Acute Pharyngitis (25%), Acute Tonsillitis (15.2%) were top infections. Quinolone antibacterial (35.0%) was the most frequently prescribed antibiotic group in all health care facilities. Ciprofloxacin (14.9%) was the most prescribed antibiotic in

all health care facilities. Cost of antibiotic medicine per prescription was highest in PRT-Hs.

Conclusion: Physicians are strongly recommended to follow proper protocol of rational antibiotic prescribing and maintain the complete records in prescriptions including diagnosis for evaluating proscriptions properly for rational prescribing and for establishing better strategies for decreasing (AMR) and expenditure.

Keywords: Antibiotics, Khairpur, Prescribing trends, Trends of antibiotic prescribing

INTRODUCTION

Antibiotics are among the most frequently prescribed, dispensed and sold medicines to inpatients and out patients. The platforms which are planned to inspire suitable antibiotic prescriptions trends in health care institutions play key roles in the maintaining of the quality of care, infection control and cost effective control.

^[1]Irrational use of medicine is more common in antibiotics as compare to other class of drugs. ^[2]The research on the prescribing trends seeks to evaluate and propose alterations in the practitioners' prescribing trends, so as to make medical and pharmaceutical care more rational and cost effective. Research on antibiotic prescribing trends is necessary to make a productive approach to the difficulties those results from availability of the numerous antibiotics. ^[3]The rational prescribing and consumption of antimicrobial agents is increasingly being recognized as an important contribution to control the worldwide emergence of antimicrobial resistance to minimize the side effects and to reduce the cost of the

necessary treatment. ^[4, 5]A data on how antimicrobial agents are being prescribed and used is fundamental to obtain a rational use of antibiotics. The available data on the past performance of the prescribers and patients is the pillar in the auditing systems. ^[6]The rational prescribing trends of antibiotics make economic sense but there is also a clear causal relationship between the antibiotic consumption and the antibiotic resistance. ^[7]Monitoring of the prescriptions trends and drug utilization studies could recognize the related problems and provide sufficient response to the prescribers. ^[3]There are many reports available in literature on self-medication of antimicrobial drugs. However, an inappropriate or over consumption of antimicrobial drugs has the potential to lead to the development and the spread of resistant strains of microorganisms. ^[8]

Worldwide it is estimated that more than 50% of all antibiotic drugs are prescribed, dispensed or sold inappropriately, while 50% of patients fail to take them in an appropriate way. ^[9]Irrational and

inappropriate use of antibiotics cause appearance and propagation of resistant micro-organisms, substantial adverse effects such as an increase in the mortality and morbidity rate, increases in hospitalization duration, increase the risk of drug adverse effects and more importantly, affect the cost factor, enhance the problem of drug resistance and a number of various other alarming health related concerns. ^[10, 11]Educational techniques directed at patients and physicians can raise patients' knowledge about the ever-growing AMR problem plaguing our health care system and can also decrease the regularity of irrational antibiotic prescriptions by health care physicians'. ^[11]Several studies have been stated that patients' beliefs or doctor's perceptions of those beliefs affect the doctor's prescribing behavior. ^[12]In fact, prescribing techniques for antibiotics do not always confirm the criteria for rational antibiotics usage and can be classified as inappropriate or irrational prescribing. Irrational prescribing may be regarded as "pathological" prescribing, where the aforementioned criteria are not fulfilled. ^[13]The other important element for irrational antibiotic use is the sale of antibiotics without prescription. While on the other hand, rational use of drugs necessitate that patients receive medications to their clinical needs, in doses

that meet their own individual requirements for an adequate period of time and the lowest cost to them and their community. The needs for appropriate medications will be fulfilled if the practice of prescribing is properly followed. This will regularly help in eradicating in crucial patient's trouble (or diagnosis); in defining effective and safe and sound treatments (drugs and non-drugs); in selecting appropriate antibiotic, its dosage and duration, in writing a prescription, in giving patients adequate data, and in scheduling to assess treatment responses. ^[13]Antibiotics are frequently used medicines to treat both life threatening and trivial infections. Their indiscriminate use increases the risk of bacterial drug resistance. ^[14,15]High incidences of infectious diseases, high usage of antibiotics and bacterial resistance are reported from low and middle income countries. Resistant bacteria spread promptly in these countries due to setting specific factors, such as overcrowding, poor sanitation, warm-humid climate and most importantly due to the lack of proper awareness about directions and contraindications of antibiotic consumption. Rising rates of bacterial resistance is increasingly seen as a global issue. ^[16]

The Main goal of this study is to compare and analyze antibiotic prescribing trends in

different hospitals of Khairpur district for rational prescribing in order to develop strategies for decreasing antimicrobial resistance (AMR) and to compare and determine unnecessary costs associated with antibiotic use for decreasing unnecessary expenditure and improving pharmaceutical care with minimum resources.

MATERIAL AND METHODS

Methodology

A comparative study of antibiotic prescribing trends in different hospitals of district Khairpur Sindh Pakistan was carried out. Prescriptions were written out in OPD Section of various health care facilities including primary health care facilities (PHC-Fs), public hospitals (PC-Hs), university hospital (UT-H) and private hospitals (PRT-Hs) in district Khairpur were collected for photocopy from patients during visit of nearby pharmacies of above mentioned hospitals. While selecting the cities and hospitals, healthcare facilities of i.e. Khairpur city, Kumb, Ranipur, and Gambat (Cities of district Khairpur) were selected due to most of population of peripheries were using same cities for the purpose of health related issues. In addition to that, cities and hospitals were selected in order to avoid any bias and utmost significance was attached to selecting cities and hospitals where no pilot study was

conducted before for the purpose of rational use, decreasing AMR and comparative study of prescribing trends of antibiotics. The availability and use of the World health Organization (WHO) Anatomic Therapeutic Clinical classification and defined daily dose (ATC/DDD) methodology facilitate meaningful comparisons of antibiotic consumption across hospitals and also between countries.^[17] Examining the comparison of the cost, prices of drugs were calculated as standard price values were established by ministry of health Pakistan at date of data collection and in this study prices of drugs are shown in Pak rupees (Rs).

Sampling: The Selection Criteria of the Patients

Inclusion Criteria: All the outpatients who were prescribed antibiotics for sign and symptoms of any infection of either gender included pregnant/lactating mothers.

Exclusion Criteria: The prescriptions of inpatients that were admitted / discharged against medical advice were excluded from the study. Patients who were referred to higher centers and all pediatric patients were also amongst the excluded.

Statistical data analysis

The prescriptions were computerized into the databases that were specifically developed with the Excel and Statistical Package for Social Service (SPSS).

Prescriptions were assessed for number of medicines per prescription (NMPP), average cost per prescription (CPP), average number of antibiotic medicines per prescription (NAPP) and average cost of antibiotics per prescription (ACPP), most commonly prescribed groups of antibiotics and most commonly prescribed antibiotics drugs. The Quantitative and qualitative methods were employed to evaluate trends of antibiotic use and these can answer different questions relating to determination of the trends as well as the reasons behind these trends. The Quantitative data was collected, counted numerically and used to identify the prescribing trends within the four healthcare facilities.

RESULTS

A total of 428 antibiotic containing prescriptions were collected and analyzed retrospectively. Of the 428 prescriptions, 166 (38.8%) were written out in PHC-Fs, 108 (25.2%) in PC-Hs, 99 (23.2%) in UT-H and 55 (12.8%) in PRT-Hs. Among the 428 patients, male patients (n = 254) were more in number than female patients (n = 174), results in male patients were prescribed more antibiotics as compare to females in individual and all healthcare facilities. (Table 1).

Prescriptions containing antibiotics were mostly written out by General Practitioners (67.1%) followed by General Surgeons

(13.3%) in all health care facilities. (Table 2).

When distribution of diagnosis in all healthcare facilities was examined, it was found that in 296 (69.2%) prescriptions out of total 428, diagnosis was not mentioned, results in serious challenge in order to evaluate prescriptions properly for rational prescribing and establishing strategies for decreasing (AMR) and more alarming was that only in (30.8%) of prescriptions diagnosis was mentioned and diagnosis mentioned prescriptions were further examined in order to evaluate top cases of infectious diseases in healthcare facilities. Among diagnosis mentioned prescriptions, Acute Pharyngitis (25%), Acute Tonsillitis (15.2%) and Acute Bronchitis (10.6%) were respectively on top infections in all healthcare facilities. (Table 3).

The total number of medicines which were prescribed to the patients was 1485. Average number of medicines per prescription (NMPP) was (3.47) and it was highest in PRT-Hs (3.93) and lowest in PC-Hs (3.17). Number of antibiotics medicines per prescription (NAPP) was (1.02), being highest in PC-Hs (1.08) and equal in all remaining three health care facilities (1.00). The total cost of all prescribed medicines was approximately (143670) Pak Rupees (Rs) at all healthcare sites. Cost per prescription (CPP) was (335.68) Rs, being

highest in PC-Hs (696.84) and lowest in PHC-Fs (144.0) Rs. The total antibiotic cost was approximately (84925) Rs, Average antibiotic cost per prescription (ACPP) was (198.42) Rs, being highest in PRT-Hs (405.89) Rs and lowest in PHC-Fs (71.21) Rs. (Table 4).

Examining the factors associated with considerable difference in cost per prescription and cost of antibiotic medicine per prescription in each healthcare facility, all drugs of prescriptions were examined in terms of original brand and generic drugs prescribing. A total of 1485 drugs were prescribed, out of 1485 drugs (59.5%) were generic drugs prescribed and (40.5%) original research brands were prescribed, in PC-Hs and PRT-Hs, original research brands prescribing were 54.1% and 50.9% respectively as compare to generic brands 45.9% and 49.1% respectively, while in PHC-Fs and UT-H, generic brands were 69.7% and 61.7% respectively more prescribed as compare to research brands 30.3% and 38.3% prescribed respectively (Table 5). Cost of Antibiotic drugs in prescriptions, in terms of original research brand prescribing versus generic brand prescribing was also examined, total number of antibiotics was 437 in 428 prescriptions, among 437, (60.4%) were generic antibiotics prescribed as compare to original research brands (39.6%)

prescribed. in PRT-Hs and PC-Hs, original research brands were (54.5%) and (51.3%) respectively prescribed as compare to generic brands (45.5%) and (48.7%) prescribed. While in PHC-Fs and UT-H, generic brands were (69.3%) and (67.7%) respectively prescribed as compare to research brands (30.7%) and (32.3%) (Table 6). When the ATC distributions of all antibiotics groups were analysed, “Quinolone antibacterials” (ATC code: J01M; 35.0%)” followed by other “beta-lactam antibacterials,” (ATC code: J01D; 30.9%) were the most frequently prescribed antibiotic groups followed by “beta-lactam antibacterials” penicillins (ATC code: J01C; 15.8%), and “macrolides, lincosamides and streptogramins” (ATC code: J01F; 10.5%) in all health care facilities. (Table 7)

In PHC-Fs, PRT-Hs and UT-H, “Quinolone antibacterials” (ATC code: J01M; 35.5%, 47.5% and 58.2%) respectively were the most frequently prescribed antibiotic groups, while in PC-Hs, it was “other beta-lactam antibacterials” (ATC code: J01D; 48.7%), was most frequently prescribed antibiotic group. (Table 7).

When the ATC distributions of all antibiotics were analysed, Ciprofloxacin (ATC code: J01MA02; 14.9%) was the most prescribed antibiotic followed by Cefradine (ATC code: J01GB06; 10.8%)

and Amoxicillin + clavulanic acid (ATC code: J01CR02; 10.5%) respectively in all health care facilities. (Table 8). Cefradine (ATC code: J01GB06; 24.7%), Ceftriaxone (ATC code: J01DD04; 23.9%), Levofloxacin (ATC code: J01MA12; 17.2%) and Ciprofloxacin (ATC code: J01MA02; 36.4%) were found most prescribed antibiotics in PHC-Fs, PC-Hs, UT-H and PRT-Hs respectively. (Table 8).

When the ATC distribution of all medicines were analysed, “Systemic anti-infectives” (ATC code: J; 29.4%) was the most commonly prescribed drug group in prescriptions followed by “respiratory system medicines” (ATC code: R; 26.9%) and “musculo-skeletal system medicines” (ATC code: M; 5.8%) in all healthcare facilities. (Table 9).

Table 1: Gender wise distribution of patients according to prescriptions in different healthcare facilities

Gender	PHC-Fs	PC-Hs	UT-H	PRT-Hs	Total
Males	88	74	58	34	254
Females	78	34	41	21	174
Total	166	108	99	55	428

Table 2: Distribution of Prescriptions specialties wise of physicians

Specialties	PHC-Fs		PC-Hs		UT-H		PRT-Hs		Total	
	n	%	n	%	n	%	n	%	n	%
General Practitioner	156	94.0	43	39.8	56	56.6	32	58.2	287	67.1
General Surgeon	2	1.2	19	17.6	24	24.2	12	21.8	57	13.3
Dermatology	1	0.6	7	6.5	7	7.1	3	5.5	18	4.2
Otolaryngology	3	1.8	20	18.5	5	5.1	4	7.3	32	7.5
Urology	1	0.6	5	4.6	2	2.0	1	1.8	9	2.1
Orthopedics	1	0.6	4	3.7	2	2.0	1	1.8	8	1.9
Others	2	1.2	10	9.3	3	3.0	2	3.6	17	4.0
Total	166	100	108	100	99	100	55	100	428	100

Table 3: Distribution of diagnosis in all healthcare facilities

Disease	PHC-FS		PC-Hs		UT-H		PRT-Hs		TOTAL	
	n	%	n	%	n	%	n	%	n	%
A.Pharyngitis	17	10.2	9	8.3	-	-	7	12.7	33	7.7
A.Tonsillitis	8	4.8	7	6.5	-	-	5	9.1	20	4.7
A.Bronchitis	-	0	5	4.6	-	-	9	16.4	14	3.3
Pneumonia	-	0	3	2.8	-	-	2	3.6	5	1.2
UTI	-	0	-	0	-	-	3	5.5	3	0.7
Cellulites	-	0	-	0	-	-	3	5.5	3	0.7
Animal Bite	-	0	6	5.6	-	-	5	9.1	11	2.6
Typhoid	-	0	-	0	-	-	7	12.7	7	1.6
Diarrhea	8	4.8	-	0	-	-	5	9.1	13	3.0
H. Pylori	-	0	8	7.4	-	-	3	5.4	11	2.6
Others	7	4.2	5	4.6	-	-	-	-	12	2.8
Diagnosis Not Mentioned	126	75.9	65	60.2	99	-	6	10.9	296	69.2
Total	166	100	108	100	99	100	55	100	428	100

Table 4: Distribution of the Average number of medicines per prescription (NMPP), average cost per prescription (CPP), average number of antibiotics medicines per prescription (NAPP) and average cost of antibiotic medicine per prescription (ACPP) in healthcare facilities.

* =Average

Healthcare facilities (n = Total number of prescriptions)	NMPP ± SD (n = Total number of medicines)	CPP ± SD (RS)	NAPP (n = Total number of antibiotics)	ACPP ± SD (RS)
PHC-Fs (n = 166)	3.60±1.2 (n = 598)	144.0±156.8	1.00 (n = 166)	71.21±90.07
PC-Hs (n = 108)	3.17±0.96 (n = 342)	696.84±477.9	1.08 (n = 117)	379.72±237.2
UT-H (n = 99)	3.32±0.99 (n = 329)	175.59±123	1.00 (n = 99)	98.69±88.4
PRT-Hs (n = 55)	3.93±1.1 (n = 216)	493.18±186.9	1.00 (n = 55)	405.89±185.9
Total (n = 428)	3.47*±1.1(n = 1485)	335.68*±362.0	1.02*(n = 437)	198.42*±214.23

Table 5: Comparison of original vs generic all drugs prescribing

Type	PHC-Fs		PC-Hs		UT-H		PRT-Hs		Total	
	n	%	n	%	n	%	n	%	n	%
Original	181	30.3	185	54.1	126	38.3	110	50.9	602	40.5
Generic	417	69.7	157	45.9	203	61.7	106	49.1	883	59.5
Total	598	100.0	342	100.0	329	100.0	216	100.0	1485	100.0

Table 6: Comparison of original vs generic antibiotic prescribing

Type	PHC-Fs		PC-Hs		UT-H		PRT-Hs		Total	
	n	%	n	%	n	%	n	%	n	%
Original	51	30.7	60	51.3	32	32.3	30	54.5	173	39.6
Generic	115	69.3	57	48.7	67	67.7	25	45.5	264	60.4
Total	166	100.0	117	100.0	99	100.0	55	100.0	437	100.0

Table 7: ATC distributions of antibiotics groups in all healthcare facilities

ATC distribution	PHC-Fs		PC-Hs		UT-H		PRT-Hs		Total	
	n	%	n	%	n	%	n	%	n	%
Beta-lactam antibacterials, penicillins (J01C)	19	11.4	24	20.5	19	19.2	7	12.7	69	15.8
Other beta-lactam antibacterials (J01D)	56	33.7	57	48.7	14	14.1	8	14.5	135	30.9
Quinolone antibacterials (J01M)	59	35.5	15	12.8	47	47.5	32	58.2	153	35.0
Macrolides, lincosamides and streptogramins (J01F)	24	14.5	8	6.8	12	12.1	2	3.6	46	10.5
Tetracyclines (J01A)	3	1.8	4	3.4	2	2.0	2	3.6	11	2.5
Sulfonamides and trimethoprim (J01E)	3	1.8	3	2.6	2	2.0	2	3.6	10	2.3
Aminoglycoside antibacterials (J01G)	2	1.2	6	5.1	3	3.0	2	3.6	13	3.0
Total	166	100	117	100	99	100	55	100	437	100

Table 8: ATC Distribution of antibiotics drugs in all healthcare facilities

Antibiotics medicines	PHC-Fs		PC-Hs		UT-H		PRT-Hs		Total	
	n	%	n	%	n	%	n	%	n	%
Amoxicillin + clavulanic acid (J01CR02)	12	7.2	19	16.2	11	11.1	4	7.3	46	10.5
Ofloxacin (J01MA01)	3	1.8	1	0.9	1	1.0	3	5.5	8	1.8
Ciprofloxacin (J01MA02)	27	16.3	4	3.4	14	14.1	20	36.4	65	14.9

Moxifloxacin (J01MA14)	5	3.0	5	4.3	12	12.1	2	3.6	24	5.5
Levofloxacin (J01MA12)	17	10.2	4	3.4	17	17.2	6	10.9	44	10.1
Gemifloxacin (J01MA15)	7	4.2	1	0.9	3	3.0	1	1.8	12	2.7
Clarithromycin (J01FA09)	17	10.2	3	2.6	9	9.1	1	1.8	30	6.9
Azithromycin(J01FA10)	7	4.2	5	4.3	3	3.0	1	1.8	16	3.7
Cefadroxil (J01DB05)	1	0.6	1	0.9	1	1.0	1	1.8	4	0.9
Amoxicillin (J01CA04)	7	4.2	5	4.3	8	8.1	3	5.5	23	5.3
Gentamicin (J01GB13)	1	0.6	1	0.9	2	2.0	1	1.8	5	1.1
Amikacin(J01GB06)	1	0.6	5	4.3	1	1.0	1	1.8	8	1.8
Cefaclor (J01DC04)	5	3.0	1	0.9	1	1.0	1	1.8	8	1.8
Cefotaxime(J0DD01)	2	1.2	3	2.6	1	1.0	2	3.6	8	1.8
Ceftazidime(J0DD02)	1	0.6	1	0.9	1	1.0	1	1.8	4	0.9
Cefixime(J01DD08)	5	3.0	19	16.2	4	4.0	1	1.8	29	6.6
Cefradine(J01GB06)	41	24.7	4	3.4	1	1.0	1	1.8	47	10.8
Ceftriaxone (J01DD04)	1	0.6	28	23.9	5	5.1	1	1.8	35	8.0
Doxycycline(J01AA02)	3	1.8	4	3.4	2	2.0	2	3.6	11	2.5
Sulfamethoxazole and trimethoprim (J01EE01)	3	1.8	3	2.6	2	2.0	2	3.6	10	2.3
Total	166	100	117	100	99	100	55	100	437	100

Table 9: ATC Distribution of all prescribed medicines in healthcare facilities

ATC classification	PHC-Fs		PC-Hs		UT-H		PRT-Hs		Total	
	n	%	n	%	n	%	n	%	n	%
Alimentary tract and metabolism (A)	32	5.4	14	4.09	18	5.5	16	7.4	80	5.4
Blood and blood forming organs (B)	5	0.8	4	1.17	7	2.1	10	4.6	26	1.8
Cardiovascular system (C)	7	1.2	16	4.68	12	3.6	14	6.5	49	3.3
Dermatologicals (D)	71	11.9	22	6.43	47	14.3	14	6.5	154	10.4
Genito urinary system and sex hormones (G)	6	1.0	18	5.26	15	4.6	12	5.6	51	3.4
Systemic hormonal prep. excluding sex hormones (H)	4	0.7	3	0.88	2	0.6	5	2.3	14	0.9
General antiinfectives for systemic use (J)	166	27.8	117	34.21	99	30.1	55	25.5	437	29.4
Antineoplastic and immunomodulating agents (L)	0	0.0	0	0.00	0	0.0	1	0.5	1	0.1
Musculo-skeletal system (M)	47	7.9	15	4.39	16	4.9	25	11.6	103	6.9
Nervous system (N)	26	4.3	23	6.73	27	8.2	14	6.5	90	6.1
Antiparasitic products (P)	23	3.8	12	3.51	14	4.3	4	1.9	53	3.6
Respiratory system (R)	192	32.1	95	27.78	69	21.0	44	20.4	400	26.9
Sensory organs (S)	4	0.7	2	0.58	2	0.6	1	0.5	9	0.6
Various (V)	15	2.5	1	0.29	1	0.3	1	0.5	18	1.2
TOTAL	598	100	342	100	329	100	216	100	1485	100

DISCUSSION

Antibiotic prescribing trends in different hospitals of Khairpur Sindh Pakistan has been compared and analyzed for rational antibiotic prescribing in order to develop

better strategies for decreasing (AMR). It is alarming that, in significant (69.2%) no of prescriptions, diagnosis was not mentioned which suggest that most of the prescriptions were not following rational prescribing

protocols and absence of diagnosis in prescriptions results in serious challenges for evaluation of rational prescribing and establishing better strategies for decreasing (AMR). Shumaila *et al* [18] conducted a study and they reported that in 86% of prescription diagnosis was missing. Nesar *et al* [19] and Ghoto *et al* [20] published two different studies and they found that in 75.9% and 69.58% prescriptions respectively diagnosis was not present.

Resistance of antibiotics is increasing at an alarming rate due to the irrational and inappropriate prescribing trends of physicians leading to an increase in morbidity, mortality and burden of treatment costs.

Case in point, the alarming number of Quinolones prescribed to patients, most notably Ciprofloxacin without mentioning diagnosis (notably in Table 3) is extremely concerning as the drug has many side effects and even bears a black box warning label in most countries for its severe adverse effects. Systemic anti-infectives” (ATC code: J; 29.4%) was the most commonly prescribed drug group in prescriptions of all healthcare facilities. Therefore, the health care professionals need to understand that antibiotics are valuable and finite resources. Polypharmacy may be a concern at the four study healthcare facilities because on

average, 3.47 medicines were prescribed per prescription within the outpatient setting. The aim in decreasing antimicrobial resistance (AMR) should focus heavily on patient awareness of drug risk vs. benefit and medications contraindications to avoid reduced efficacy and the risk of future resistance of microbials. Even though antibiotics drugs account for approximately 29.4% of all prescribed drugs in terms of cost, they account for a much larger share, being responsible for 59.1% of the total expenditure of drugs in all over the four healthcare facilities. Typically, antimicrobials account for 20–40% of the hospitals drugs expenditures. Results of original and generic brand prescribing of all drugs and antibiotic related with cost suggests that more original research brands prescribing may be one of the reasons of highest cost per prescription in PC-Hs and PRT-Hs and vice versa. Therefore, above results concludes that the expenditure associated with antibiotic use at the four healthcare facilities is unacceptably high.

CONCLUSION

Diagnosis was missing in the most of prescriptions (69.2%), and suggesting that significant percentage of prescriptions were not following proper rational antibiotic prescribing protocols. Physicians are strongly recommended to follow rational prescribing protocols and mention

diagnosis in every prescription in order to evaluate rational prescribing of antibiotics which will eventually help in establishing better strategies of decreasing (AMR). While cost associated with antibiotic usage has also compared and analyzed for establishing the strategies of decreasing the unnecessary expenditure and improving the pharmaceutical care with minimum resources, amongst the cost factor burden (notably Table 4), it was found that the total cost per prescription was highest in PC-Hs around 700 Pak Rs, which may be assumed due to high percentage of original research brand prescribing while the least being 144.0 Pak Rs in the PCH-Fs may be assumed due to high percentage of generic drugs prescribing. Cost can be significantly decreased with the implementation of rational antibiotic prescribing guidelines. The remedy of these circumstances requires that training programs on Rational Medicines Use (RMU) and systematic continuous educational awareness programs should be conducted in health care institutions at a regular interval for rational antibiotic prescribing in order to establish the better strategies for decreasing AMR and expenditure. Rational Medicinal Use (RMU) interventions should heavily focus on improving antimicrobial use trends with minimum resources in these healthcare facilities.

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CONFLICTS OF INTEREST

There is no conflict of interest

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