Assessment of the use of Antimicrobial Antibiotics in the in-patients Admitted to Hospital in Tripura

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Abstract

Today antimicrobial antibiotic resistance has become main concern for the physicians, healthcare professionals as reported by World Health Organization. The guidelines have been prescribed for the correct usage of the antibiotics or drugs but still the frequency of the resistance is increasing and hospitals are playing major role. The present study was carried out with an objective of to determine rational antibiotics prescription as per guidelines and to visualize the drugs per counter are as per guidelines. The study was conducted in the hospital in Tripura on 250 patients admitted in medicine department. The information was noted from the prescription of the patients admitted in the hospital in pharmacology department of the medicine. The data was written related to average number of drugs per encounter including AMAs and AMAs as per NELM along with information of FDC. For the statistical analysis data was added in the Excel sheet. The different statistical tools were employed to calculate various frequencies, variance, Regression, ANOVA analysis etc. The demographic profile exhibited male and female with age variation from 18-85 years. The results predicted no. of drugs prescribed varies as per age as shown in the bar and pie diagram maximum percentage of drugs is 8.924 % i.e. no. of drugs is 10-15. The results exhibit age variation is directly related to no. of AMA in per counter. The present study emphasises on assessment of use of antibiotics as per guidelines in the hospital environment in order to determine the development of resistance. The study reports out of 250 patients 240 were prescribed with antibiotics and age factor also play an important role in encounter of AMAs. Antibiotic use for patients with diseases of the digestive system needs to be further investigated. The earlier and present investigation visualizes more cross-sectional and in-depth studies are needed in order to control the irrational use of AMAs and to determine the use of AMAs as per guidelines of the healthcare world.

Keywords: *Antimicrobial antibiotic resistance, antimicrobial therapy, World Health Organisation, Fixed Dose Combination, National List of Essential Medicines (NLEM)*

Introduction

World Health Organization (WHO) in 1999 raised the concern of increase of deaths due to infectious especially in developing countries (1). Rubin M.A. and Samore M.H. in 2002 delineated those vaccinations and antibiotic in combination resulted in decrease in bacterial infection along with the decreased mortality rate (2). The main challenge in the treatment is the development of the antibiotic resistance among the patients and the high cost (3). The reasons for the antibiotic resistance are hospitals, healthcare facilities and settings, medicines etc. as stated by WHO. In 1992 and 1993 Neu, H. and Kunin, C. 1993 respectively said that increased rate antibiotic resistance is creating serious issues all over the world and the major role is played by the hospitals (4, 5). Later on, the various scientists proposed the guidelines for antimicrobial therapy (AMT) i.e. the restricted antimicrobial usage thus to control resistant microbes spread which means guided AMT as per Gyssens, I. C. 2005, Peetermans, W. E., and D. Ramaekers 2002 and Stobberingh, E., R. Janknegt and G. Wijnands 1993 (6-8).

The major bottleneck to control the resistance apart from the implementation of the guidelines is to investigate the actual prescription and the selling of antimicrobial medicines from the pharmacy stores in large amounts results in variation between hospitals or countries as reported by Goossens. et.al., 2005 (9). Bhavesh K.L. et.al.2012 described the reasons for the improper use of drugs as self- medication, medicines non-availability or absence of drug information (10). As per World Health Records and reported by Vanitha R.N. et.al. 2011 that most of the medicines are sold, prescribed or dispensed inappropriately thus the procurement by the patients is incorrect or not as per guidelines (11). The Action Program on Essential Drugs was formulated and initiated in 1981 with an objective of appropriate use of drugs for all the countries and 2013 India formed the DSPRUD (Delhi Society for Promotion of Rational Use of Drugs) as per Sharma NBM et.al., 2014 (12,13).

WHO and The International Network for Rational Use of Drugs (INRUD) jointly published a standard methodology and core use of drugs indicators in order to measure the drugs prescription in the primary health care systems (14). An innovative model was created and introduced i.e. Antibiotics Smart Use (ASU) in 2007 in order to avoid the irrational use of medicines and to avoid the antimicrobial resistance.

The standard methodologies and guidelines have designed for the rational use of antibiotics but still it is most common and debated issue in the medical and clinical world as studied byHanmant A. and Priyadarshini K et al., 2011 (15). The studies conducted by different researchers like Bbosa G.S. et.al. 2014 or Igbiks T. and Joseph O.F. at al., 2017 depicted that the increased rate of resistance to the bacterial infections drugs or antibiotics and has resulted major reason for adverse drug reactions, hospitalization prolonged etc (16, 17). thus suggested to promote the medicines rational use for the better human health and also said to conduct more studies in clinics or hospitals related to treatment and prescription of drugs.On the basis of earlier we carried out the study on the patients admitted in medicine in the hospital in Tripura with an objective to determine rational antibiotics prescription as per guidelines and to visualize the drugs per counter are as per guidelines.

Materials and Methods

All the data were collected from individual prescription of patients who are admitted in medicine wards in Tripura Medical College & Dr. BRAM Teaching Hospital. The study Design was an observational study along with Study setting of Medicine inpatient department (IPD) & department of Pharmacology.

Study population: Patients admitted in Medicine inpatient department (IPD) and patients admitted in the department and procuring antimicrobial antibiotics (AMAs) were included in the study. The sample size of the research is 250 and study tools for prescription of drugs and indicators were as proposed by WHO and following information was noted

- Average number of drugs per encounter

- Average number of AMAs prescribed per encounter.
- Percentage of encounters with an injection of AMAs prescribed
- Percentage of AMAs prescribed by generic names
- Percentage of encounter with AMAs prescribed from National List of Essential Medicine, India (NLEM 2015)
- Percentage of encounter with fixed – dose combination (FDC) of AMAs prescribed
- Percentage of encounter with fixed – dose combination (FDC) of AMAs prescribed from National List of Essential Medicine, India (NLEM 2015)

Statistical Analysis

The Excel sheet No.1 exhibits data collected as per WHO prescribing indicators to assess the prescription pattern as per objectives and the abbreviations or different columns in the data depicts as:

- Average number of drugs per encounter = total no of drugs in a prescription as 1
- Average number of AMAs prescribed per encounter = no of antimicrobial agent (drug) in a prescription 2
- Percentage of encounters with an injection of AMAs prescribed = injectable antimicrobial agent (drug) 3
- No of injectable antimicrobial agent (drug) in a prescription 4
- Y = present of injectable drug, N = no injectable drug 5a
- Then the % of injectable drugs in relation with total 5b
- No. of Fixed Dose Combination (FDC) as 6a and 6b Encounter with FDC of AMAs prescribed (Y/N).
- No of FDCs from NLEM as 7a and Encounter with FDC prescribed from NLEM (Y/N) as 7b

The statistical analysis was performed by using online tools to calculate the frequency, t-test, correlation and regression of various parameters in order to predict relationship and statistical significance of the data.

Results and Discussion

Asper the demographic profile of patients consisted of both male and female along with age variation 18 years to 85 years and high percentage of 40-65 years i.e., 60 % approximately patients. The frequencies distribution was calculated between the age of the patients and different parameters as per objectives

- Average no of drugs per encounter and No. of AMAs prescribed per encounter (Table-1)
- No of injectable AMAs and Encounter with an injection of AMAs prescribed (Y/N) (Table-2)

Table 1: Frequency of Age and Average no of drugs per encounter and No. of AMAs prescribed per encounter

z for 95% CI= 1.96

Frequency table				
Label	**Value**	**Freq**	**%**	**Sum%**
1	1	1	0.131	0.131
2	2	1	0.131	0.262
1	1	68	8.924	9.186
10	10	24	3.15	12.336

11	11	34	4.462	16.798
12	12	18	2.362	19.16
13	13	9	1.181	20.341
14	14	1	0.131	20.472
15	15	6	0.787	21.26
16	16	9	1.181	22.441
17	17	10	1.312	23.753
18	18	7	0.919	24.672
19	19	16	2.1	26.772
2	2	107	14.042	40.814
21	21	2	0.262	41.076
23	23	7	0.919	41.995
27	27	4	0.525	42.52
3	3	48	6.299	48.819
33	33	8	1.05	49.869
35	35	13	1.706	51.575
37	37	8	1.05	52.625
38	38	8	1.05	53.675
39	39	8	1.05	54.724
4	4	26	3.412	58.136
41	41	8	1.05	59.186
42	42	18	2.362	61.549
45	45	5	0.656	62.205
46	46	1	0.131	62.336
48	48	35	4.593	66.929
49	49	8	1.05	67.979
5	5	24	3.15	71.129
53	53	17	2.231	73.36
56	56	6	0.787	74.147
58	58	1	0.131	74.278
6	6	7	0.919	75.197
62	62	1	0.131	75.328
63	63	7	0.919	76.247
64	64	8	1.05	77.297
65	65	16	2.1	79.396
67	67	2	0.262	79.659
68	68	3	0.394	80.052

69	69	1	0.131	80.184
7	7	10	1.312	81.496
70	70	10	1.312	82.808
75	75	11	1.444	84.252
76	76	8	1.05	85.302
8	8	58	7.612	92.913
84	84	4	0.525	93.438
9	9	37	4.856	98.294
AMAs	AMAs	1	0.131	98.425
Age	Age	1	0.131	98.556
Average	Average	1	0.131	98.688
No	No	1	0.131	98.819
Drugs	drugs	1	0.131	98.95
encounter	Encounter	2	0.262	99.213
No	no	1	0.131	99.344
Of	of	2	0.262	99.606
Per	per	2	0.262	99.869
Prescribed	prescribed	1	0.131	100
59 categories		762 cases	100%	

- No of AMAs prescribed by generic names, No of AMAs prescribed from NLEM and Encounter with AMAs prescribed from NLEM (Table-3)

- No of FDCs with name, Encounter with FDC of AMAs prescribed (Y/N), No of FDCs from NLEM and Encounter with FDC prescribed from NLEM (Y/N) (Table-4 and 6).

- The results predicted no. of drugs prescribed varies as per age as shown in the bar and pie diagram maximum percentage of drugs is 8.924 % i.e. no. of drugs is 10-15. The results exhibits age variation is directly related to no. of AMA in per counter. The correlation scatter plot along with regression analysis confirms the relationship between the prescription of drugs and significant t-test values t (0.025) for 95% Confidence Interval= 1.996, mean1 53.5 (variance1= 246.015) (Standard Error= 2.69), mean2 16.702 (variance2= 409.819) (Standard Error= 1.1) . The statistical test analysis performed like ANOVA etc. that with increase of age no. of encounter of AMAs increases leading injections of AMAs for better and faster treatment in order to reduce the side effects.

Further the results predict that the age and injectable AMAs then encounter with an injection of AMAs prescribed are more common and the validity of the results is as per the statistical significant values of ANOVA, t-test and Regression analysis. The graphs exhibit that the encounter of AMAs injection is more preferred for the treatment as shown in the Table-2 and graphs. The study shows the prescription is as per the NLEM. The frequency for the drug in combination is more i.e. Cefotaxime+Sulbactam, Amoxicillin+clarithromycin+Espmeprazole or Piperacillin values are shown in Table-9 and graphs.

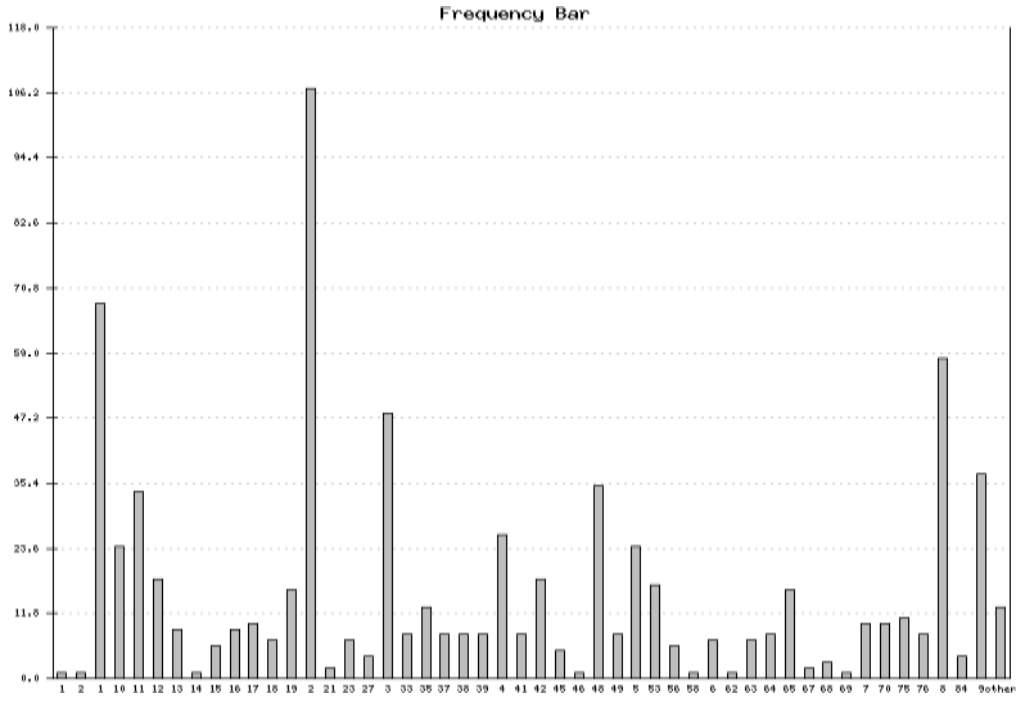

Figure 1: Bar Diagram of Frequency of Age and Average no of drugs per encounter and No of AMAs prescribed per encounter

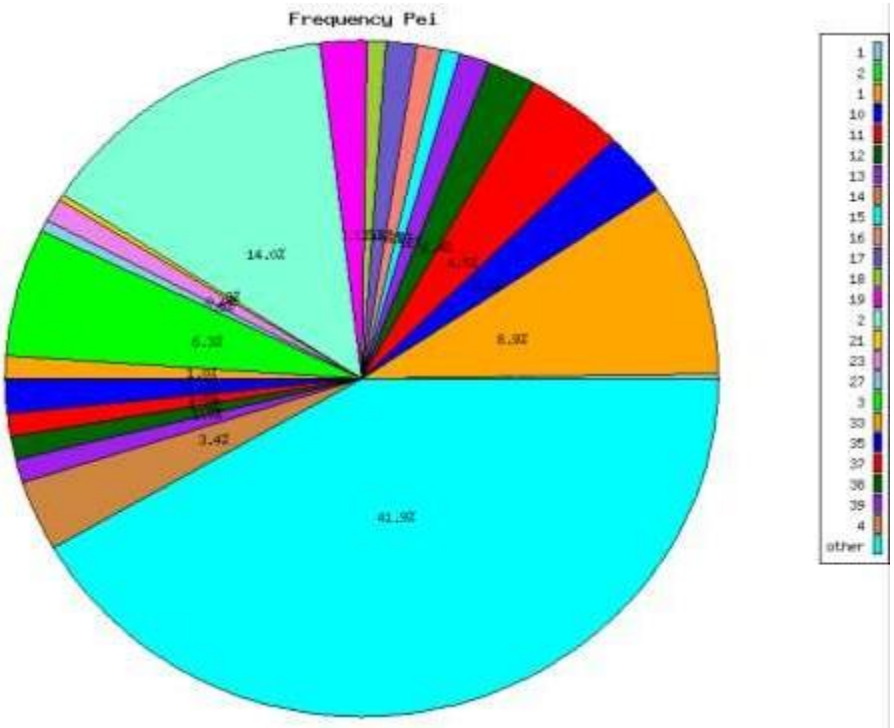

Figure 2: Pie Diagram of Frequency of Age and Average no of drugs per encounter and no of AMAs prescribed per encounter

Correlation/Regression

z for 95% CI= 1.96
Invalid: 8
Cases-N: 373
r (var1.var2)= -0.4055

Regression Table for E(var2)				
	B	s.e.	t	p
var1	-0.409	0.048	-8.5433	-0
Intercept	28.19			

Anova table				
Source	**Σ of Sq.**	**%**	**Mean Σ-sq**	**df**
Explained	30985	16.44	30985	1
Unexplained	157495	83.56	424.52	371
Total	188480	100%		372
F-value: 72.988; p-value: 0				
Residual standard error: 396.86				

Descriptives for var1

Mean: 19.9115; Sum: 7427; Variance: 499.102 Standard Variance sd: 22.3406;
Standard Error: 1.15675 ; 95% CI: 17.64 >19.9> 22.18

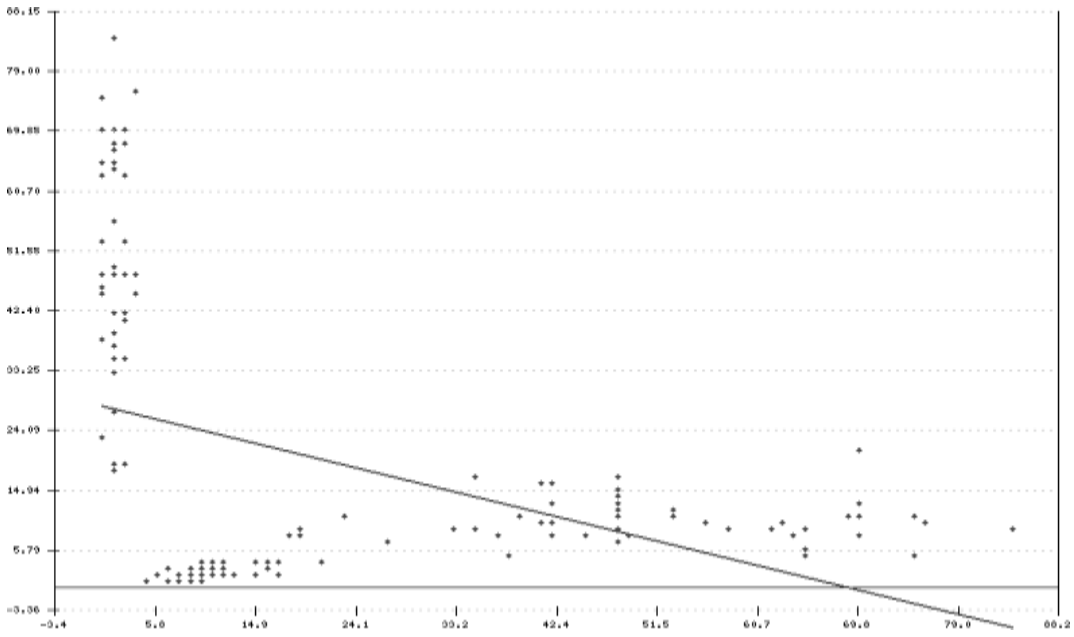

Figure 3: Scatter Plot of Correlation

T-Test

Mean 1: 53.5; Mean 2: 16.7021 ;N1: 34; N2: 339; Standard Deviation 1 Std Dev.1: 15.6849

Standard Deviation.2: 20.244; t (0.025) for 95% CI= 1.996; mean1 eq: 53.5 (var1= 246.015) (se= 2.69)

mean2eq: 16.702 (var2= 409.819) (se= 1.1); Probability that var1<var2

p=0.96174 (left: 0.0383; double: 0.0766)

Table 2: Frequency of Age and No of injectable AMAs along with the Encounter with an injection of AMAs prescribed (Y/N)

z for 95% CI= 1.96

Frequency table				
Label	**Value**	**Freq**	**%**	**Sum%**
3a	3a	1	0.133	0.133
3b	3b	1	0.133	0.265
(Y/N)	(Y/N)	1	0.133	0.398
0	0	9	1.194	1.592
1	1	110	14.589	16.18
18	18	7	0.928	17.109
19	19	16	2.122	19.231
2	2	85	11.273	30.504
23	23	7	0.928	31.432
27	27	4	0.531	31.963
3	3	30	3.979	35.942
33	33	8	1.061	37.003
35	35	13	1.724	38.727
37	37	8	1.061	39.788
38	38	8	1.061	40.849
39	39	8	1.061	41.91
4	4	8	1.061	42.971
41	41	7	0.928	43.899
42	42	18	2.387	46.286
45	45	5	0.663	46.95
46	46	1	0.133	47.082
48	48	35	4.642	51.724

49	49	8	1.061	52.785
53	53	17	2.255	55.04
56	56	6	0.796	55.836
58	58	1	0.133	55.968
62	62	1	0.133	56.101
63	63	7	0.928	57.029
64	64	8	1.061	58.09
65	65	16	2.122	60.212
67	67	2	0.265	60.477
68	68	3	0.398	60.875
69	69	1	0.133	61.008
70	70	10	1.326	62.334
75	75	11	1.459	63.793
76	76	8	1.061	64.854
84	84	4	0.531	65.385
AMAs	AMAs	1	0.133	65.517
AMAs	AMAs	1	0.133	65.65
Age	Age	1	0.133	65.782
Encounter	Encounter	1	0.133	65.915
N	N	8	1.061	66.976
No	No	1	0.133	67.109
Y	Y	241	31.963	99.072
an	An	1	0.133	99.204
injectable	injectable	1	0.133	99.337
injection	injection	1	0.133	99.469
of	Of	2	0.265	99.735
prescribed	prescribed	1	0.133	99.867
with	With	1	0.133	100
50 categories		754 cases	100%	

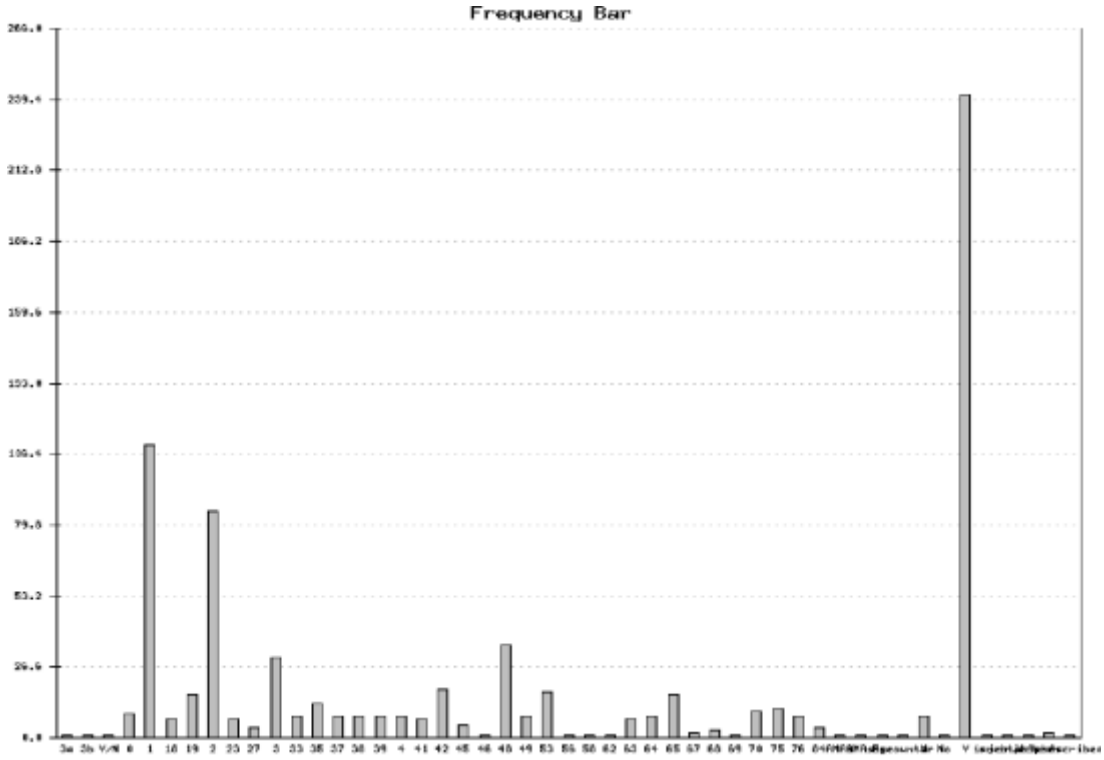

Figure 4: Bar Diagram of Frequency of Age and No of injectable AMAs along with the Encounter with an injection of AMAs prescribed (Y/N)

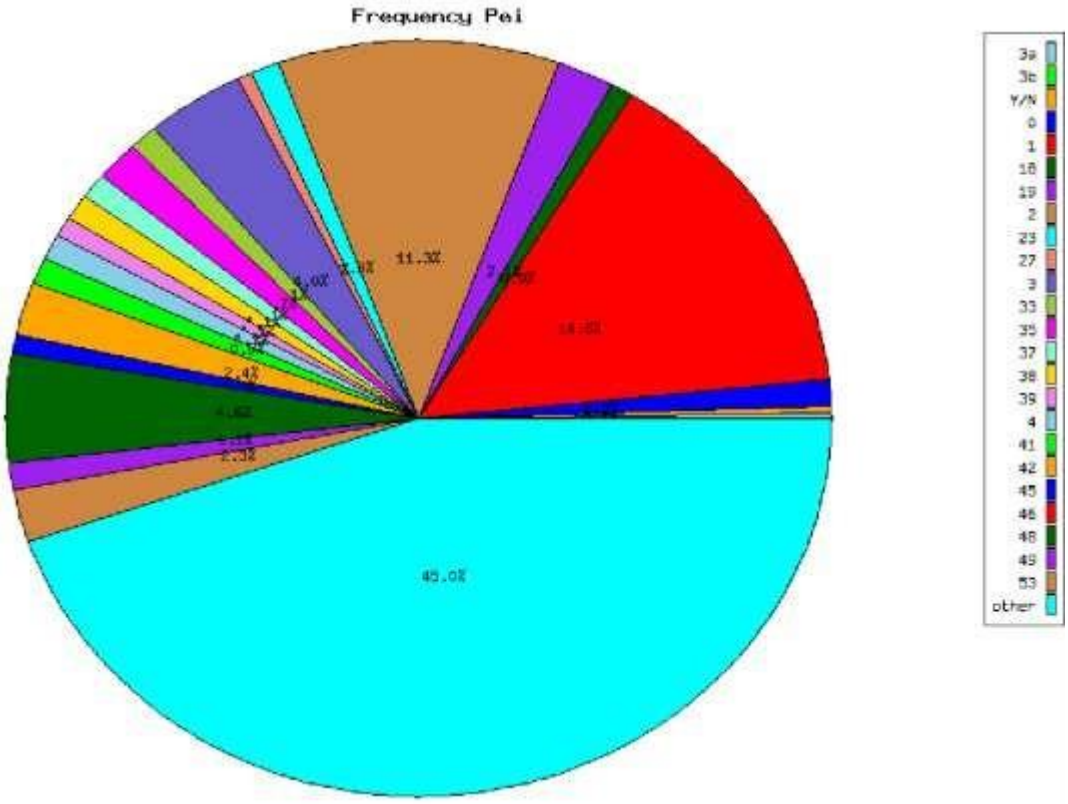

Figure 5: Pie Diagram of Frequency of Age and No of injectable AMAs along with the Encounter with an injection of AMAs prescribed (Y/N)

Correlation and Regression

z for 95% C.I= 1.96; Invalid: 257 ;Cases-N: 120 ;r (var1.var2)= -0.1458 ;p= 0.944 more

Regression Table for E(var2)				
	B	**s.e.**	**t**	**p**
var1	-0.007	0.005	-1.6008	0.1121
Intercept	2.011			

Anova table				
Source	**Σ of Sq.**	**%**	**Mean Σ-sq**	**df**
Explained	1.8981	2.13	1.8981	1
Unexplained	87.402	97.87	0.7407	118
Total	89.3	100%		119
F-value: 2.5627; **p-value:** 0.11209				
Residual standard error: 9.3489				

Descriptive for var1

Mean: 48.175, Sum: 5781; Variance: 284.835; Standard Deviation sd: 16.877, se: 1.54066

95% CI: 45.16 >48.2> 51.19 (Standard Error)

Descriptive for var2

Mean: 1.65, Sum: 198, Variance: 0.75042; sd: 0.86627, se: 0.07908; 95% CI: 1.495 >1.65> 1.805

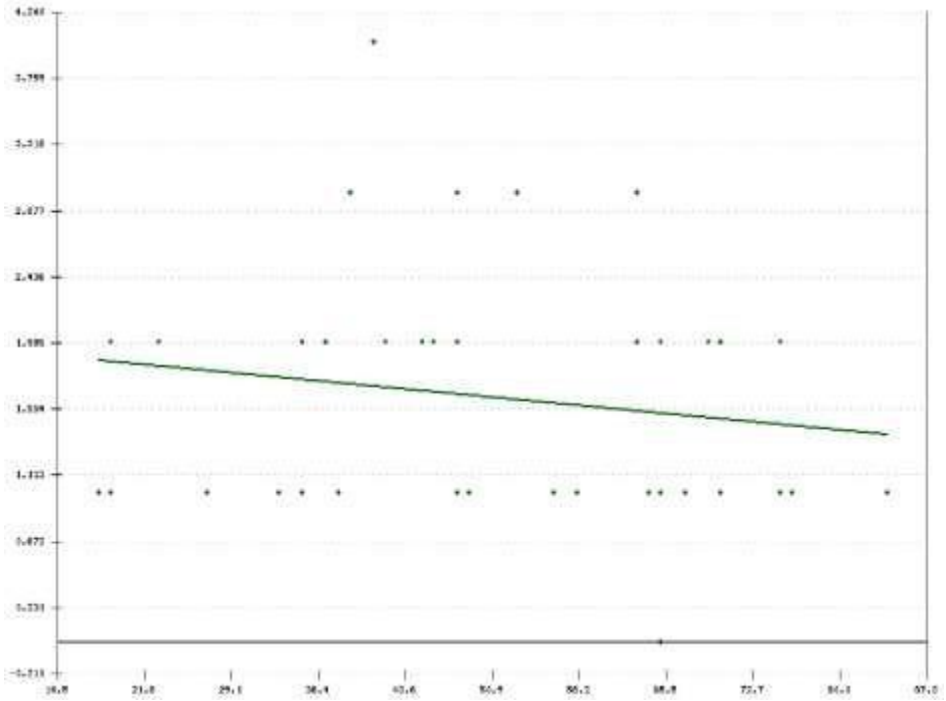

Figure 6: Scatter Plot of Age and No of injectable AMAs along with the Encounter with an injection of AMAs prescribed (Y/N) Correlation.

Table 3: Frequency of Age and No of AMAs prescribed by generic names, No of AMAs prescribed from NLEM and Encounter with AMAs prescribed from NLEM (Y/N).

z for 95% CI= 1.96

Frequency table				
Label	**Value**	**Freq**	**%**	**Sum%**
4	4	1	0.098	0.098
5a	5a	1	0.098	0.196
5b	5b	1	0.098	0.294
(Y/N)	(Y/N)	1	0.098	0.392
0	0	285	27.941	28.333
1	1	103	10.098	38.431
18	18	7	0.686	39.118
19	19	16	1.569	40.686
2	2	83	8.137	48.824
23	23	7	0.686	49.51
27	27	4	0.392	49.902
3	3	20	1.961	51.863
33	33	8	0.784	52.647
35	35	13	1.275	53.922
37	37	8	0.784	54.706
38	38	8	0.784	55.49
39	39	8	0.784	56.275
4	4	7	0.686	56.961
41	41	8	0.784	57.745
42	42	18	1.765	59.51
45	45	5	0.49	60
46	46	1	0.098	60.098
48	48	35	3.431	63.529
49	49	8	0.784	64.314
53	53	17	1.667	65.98
56	56	6	0.588	66.569
58	58	1	0.098	66.667
62	62	1	0.098	66.765
63	63	7	0.686	67.451
64	64	8	0.784	68.235
65	65	16	1.569	69.804
67	67	2	0.196	70
68	68	3	0.294	70.294
69	69	1	0.098	70.392
70	70	10	0.98	71.373
75	75	11	1.078	72.451
76	76	8	0.784	73.235

84	84	4	0.392	73.627
AMAs	AMAs	3	0.294	73.922
Age	Age	1	0.098	74.02
Encounter	Encounter	1	0.098	74.118
N	N	51	5	79.118
NLEM	NLEM	1	0.098	79.216
NLEM	NLEM	1	0.098	79.314
No	No	2	0.196	79.51
Y	Y	198	19.412	98.922
By	By	1	0.098	99.02
From	From	2	0.196	99.216
generic	generic	1	0.098	99.314
names	Names	1	0.098	99.412
Of	Of	2	0.196	99.608
prescribed	prescribed	3	0.294	99.902
With	With	1	0.098	100
53 categories		1020 cases	100%	

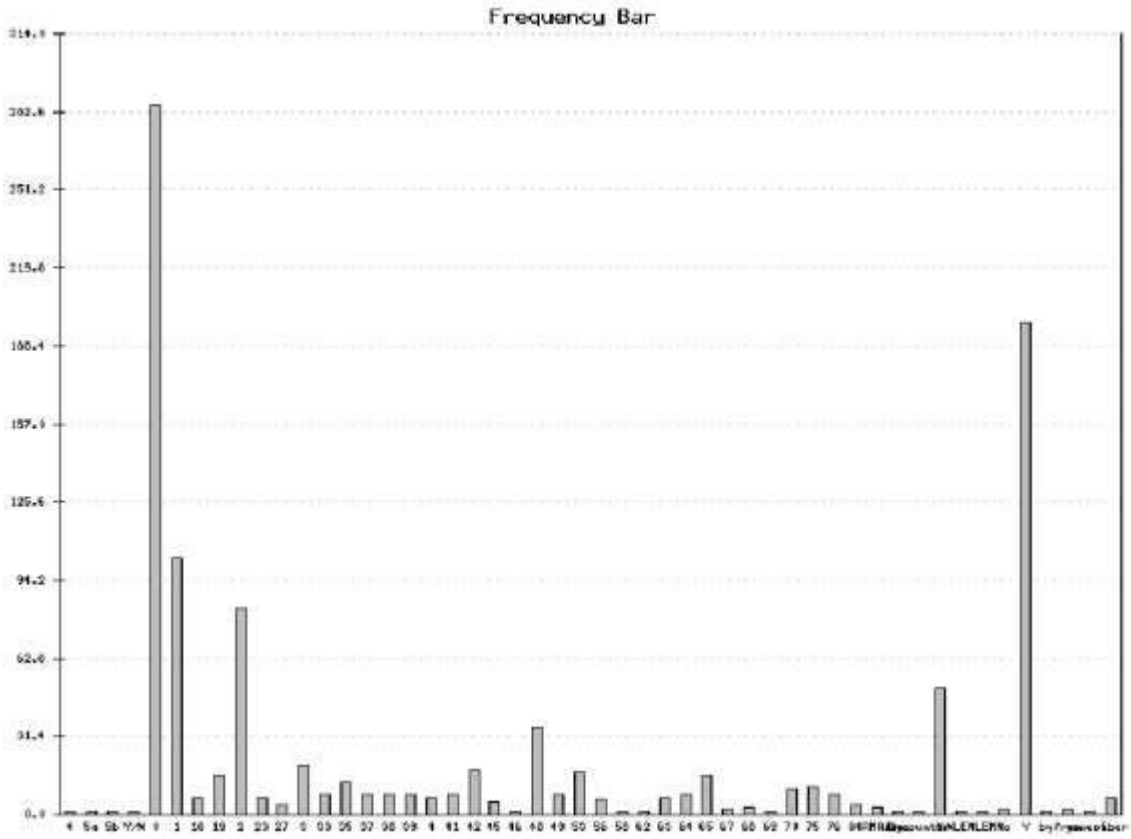

Figure7: Bar Diagram of Frequency of Age and No of AMAs prescribed by generic names, No of AMAs prescribed from NLEM and Encounter with AMAs prescribed from NLEM (Y/N)

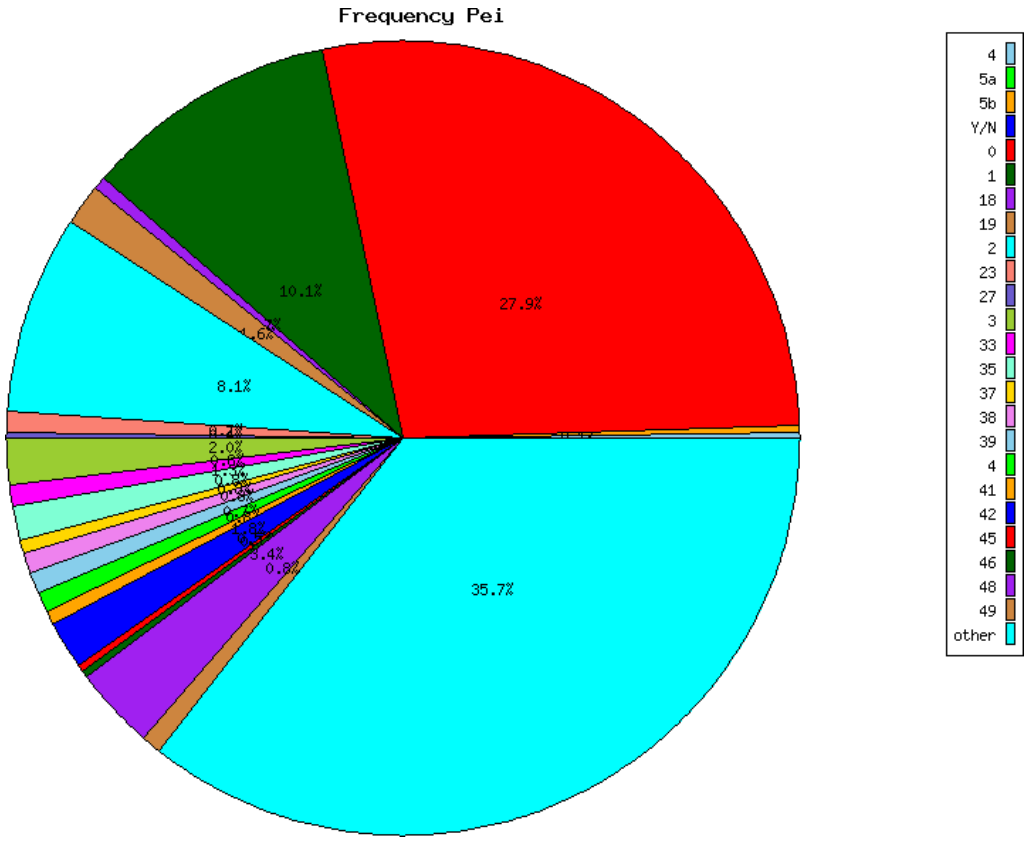

Figure 8: Pie Diagram of Frequency of Age and No of AMAs prescribed by generic names, No of AMAs prescribed from NLEM and Encounter with AMAs prescribed from NLEM (Y/N)

Table 4: Means Table of Age and No of AMAs prescribed by generic names, No of AMAs prescribed from NLEM and Encounter with AMAs prescribed from NLEM (Y/N).

Means table										
	Label	**Mean**	**Stddev**	**Variance**	**StdErr**	**95% z-C.I.**		**Freq**	**%**	**++%**
r1:	18	0	0	0	0	0	0	7	2.81	2.81
r2:	19	0	0	0	0	0	0	16	6.43	9.24
r3:	23	0	0	0	0	0	0	7	2.81	12.05
r4:	27	0	0	0	0	0	0	4	1.61	13.65
r5:	33	0	0	0	0	0	0	8	3.21	16.87
r6:	35	0	0	0	0	0	0	13	5.22	22.09
r7:	37	0	0	0	0	0	0	8	3.21	25.3
r8:	38	0	0	0	0	0	0	8	3.21	28.51
r9:	39	0	0	0	0	0	0	8	3.21	31.73
r10:	41	0	0	0	0	0	0	8	3.21	34.94
r11:	42	0.444444	0.855585	0.732026	0.201663	0.049191	0.839698	18	7.23	42.17
r12:	45	0.2	0.447214	0.2	0.2	-0.191994	0.591994	5	2.01	44.18
r13:	46	0	0	0	0	0	0	1	0.4	44.58
r14:	48	0.4	0.694516	0.482353	0.117395	0.16991	0.63009	35	14.06	58.63

r15:	49	0	0	0	0	0	0	8	3.21	61.85
r16:	53	0	0	0	0	0	0	17	6.83	68.67
r17:	56	0	0	0	0	0	0	6	2.41	71.08
r18:	58	0	0	0	0	0	0	1	0.4	71.49
r19:	62	0	0	0	0	0	0	1	0.4	71.89
r20:	63	0	0	0	0	0	0	7	2.81	74.7
r21:	64	0	0	0	0	0	0	8	3.21	77.91
r22:	65	0	0	0	0	0	0	16	6.43	84.34
r23:	67	0	0	0	0	0	0	2	0.8	85.14
r24:	68	0	0	0	0	0	0	3	1.2	86.35
r25:	69	0	0	0	0	0	0	1	0.4	86.75
r26:	70	0	0	0	0	0	0	10	4.02	90.76
r27:	75	0	0	0	0	0	0	11	4.42	95.18
r28:	76	0	0	0	0	0	0	8	3.21	98.39
r29:	84	0	0	0	0	0	0	4	1.61	100
All		0.092369	0.385605	0.148692	0.024437	0.044474	0.140265	249	100%	100%

Table 5: Skewness and Kurtosis Age and No of AMAs prescribed by generic names, No of AMAs prescribed from NLEM and Encounter with AMAs prescribed from NLEM (Y/N)

Skewness/Kurtosis table								
	Label	**Mean**	**Skewness**			**Kurtosis**		
			Sample	Population	s.e.	Sample	Population	s.e.
r1:	18	0	0	0	0.7937	-3	-5.4	1.5875
r2:	19	0	0	0	0.5643	-3	-3.70879	1.0908
r3:	23	0	0	0	0.7937	-3	-5.4	1.5875
r4:	27	0	0	0	1.0142	-3	-13.5	2.6186
r5:	33	0	0	0	0.7521	-3	-4.9	1.4809
r6:	35	0	0	0	0.6163	-3	-3.92727	1.1909
r7:	37	0	0	0	0.7521	-3	-4.9	1.4809
r8:	38	0	0	0	0.7521	-3	-4.9	1.4809
r9:	39	0	0	0	0.7521	-3	-4.9	1.4809
r10:	41	0	0	0	0.7521	-3	-4.9	1.4809
r11:	42	0.444444	1.336	1.461	0.5363	-0.214	0.13661	1.0378
r12:	45	0.2	1.5	2.236	0.9129	0.25	5	2
r13:	46	0	0	0	0	-3	0	0
r14:	48	0.4	1.432	1.497	0.3977	0.596	0.88374	0.7778
r15:	49	0	0	0	0.7521	-3	-4.9	1.4809
r16:	53	0	0	0	0.5497	-3	-3.65714	1.0632
r17:	56	0	0	0	0.8452	-3	-6.25	1.7408
r18:	58	0	0	0	0	-3	0	0
r19:	62	0	0	0	0	-3	0	0
r20:	63	0	0	0	0.7937	-3	-5.4	1.5875

r21:	64	0	0	0	0.7521	-3	-4.9	1.4809
r22:	65	0	0	0	0.5643	-3	-3.70879	1.0908
r23:	67	0	0	0	0	-3	0	0
r24:	68	0	0	0	1.2247	-3	0	0
r25:	69	0	0	0	0	-3	0	0
r26:	70	0	0	0	0.687	-3	-4.33929	1.3342
r27:	75	0	0	0	0.6607	-3	-4.16667	1.2794
r28:	76	0	0	0	0.7521	-3	-4.9	1.4809
r29:	84	0	0	0	1.0142	-3	-13.5	2.6186
All		0.092369	4.269	4.295	0.1543	17.27	17.6489	0.3074

Regression Correlation between Age and No of AMAs prescribed by generic names, No of AMAs prescribed from NLEM and Encounter with AMAs prescribed from NLEM (Y/N)

Regression Table for E(var2)				
	B	**s.e.**	**t**	**p**
var1	-0.001	0.001	-0.5293	0.597
Intercept	0.13			

Anova table				
Source	Σ of Sq.	%	Mean Σ-sq	df
Explained	0.0418	0.11	0.0418	1
Unexplained	36.834	99.89	0.1491	247
Total	36.876	100%		248
F-value: 0.2802; **p-value**: 0.59704				
Residual standard error: 6.0691				

Descriptive for var1
Mean: 48.1245, Sum: 11983; Variance: 279.964,:Standard Deviation 16.7321
Standard Error : 1.06036;95% CI: 46.05 >48.1> 50.2

Descriptive for var2
Mean: 0.09237; Sum: 23; Variance: 0.14869; Standard Deviation: 0.38561; Standard Error: 0.02444; 95% CI: 0.044 >0.09> 0.14

Table 6: Frequency of Age and No of FDCs with name, Encounter with FDC of AMAs prescribed (Y/N), No of FDCs from NLEM and Encounter with FDC prescribed from NLEM (Y/N)

Frequency table				
Label	**Value**	**Freq**	**%**	**Sum%**
1(Amoxicillin clarithromycin	1(Amoxicillin clarithromycin	3	0.216	0.216
6a	6a	1	0.072	0.288
6b	6b	1	0.072	0.36
7a	7a	1	0.072	0.432

7b	7b	1	0.072	0.504
(Y/N)	(Y/N)	2	0.144	0.648
Espmeprazole)	Espmeprazole)	3	0.216	0.865
0	0	293	21.11	21.974
1	1	59	4.251	26.225
1(CefoperazoneSalbactum)	1(CefoperazoneSalbactum)	29	2.089	28.314
1(CefotaximeSulbactam)	1(CefotaximeSulbactam)	9	0.648	28.963
1(Ceftriaxone	1(Ceftriaxone	20	1.441	30.403
1(Doxycycline	1(Doxycycline	16	1.153	31.556
1(Piperacillin	1(Piperacillin	55	3.963	35.519
1(Sulfamethoxazole Trimethoprim)	1(Sulfamethoxazole Trimethoprim)	4	0.288	35.807
1(Ticarcillin	1(Ticarcillin	10	0.72	36.527
18	18	7	0.504	37.032
19	19	16	1.153	38.184
23	23	7	0.504	38.689
27	27	4	0.288	38.977
33	33	8	0.576	39.553
35	35	13	0.937	40.49
37	37	8	0.576	41.066
38	38	8	0.576	41.643
39	39	8	0.576	42.219
41	41	8	0.576	42.795
42	42	18	1.297	44.092
45	45	5	0.36	44.452
46	46	1	0.072	44.524
48	48	35	2.522	47.046
49	49	8	0.576	47.622
53	53	17	1.225	48.847
56	56	6	0.432	49.28
58	58	1	0.072	49.352
62	62	1	0.072	49.424
63	63	7	0.504	49.928
64	64	8	0.576	50.504
65	65	16	1.153	51.657
67	67	2	0.144	51.801
68	68	3	0.216	52.017
69	69	1	0.072	52.089
70	70	10	0.72	52.81
75	75	11	0.793	53.602
76	76	8	0.576	54.179
84	84	4	0.288	54.467
AMAs	AMAs	1	0.072	54.539

Age	Age	1	0.072	54.611
Clavulanic	Clavulanic	10	0.72	55.331
Encounter	Encounter	2	0.144	55.476
FDC	FDC	2	0.144	55.62
FDCs	FDCs	2	0.144	55.764
Lactobacillus)	Lactobacillus)	16	1.153	56.916
N	N	285	20.533	77.45
NLEM	NLEM	1	0.072	77.522
NLEM	NLEM	1	0.072	77.594
No	No	2	0.144	77.738
Sulbactam)	Sulbactam)	20	1.441	79.179
Tazobactum)	Tazobactum)	55	3.963	83.141
Y	Y	204	14.697	97.839
acid)	acid)	10	0.72	98.559
From	from	1	0.072	98.631
Fronm	fronm	1	0.072	98.703
name	name	1	0.072	98.775
Of	of	3	0.216	98.991
Prescribed	prescribed	2	0.144	99.135
With	with	3	0.216	99.352
Y	y	9	0.648	100
67 categories		1388 cases	100%	

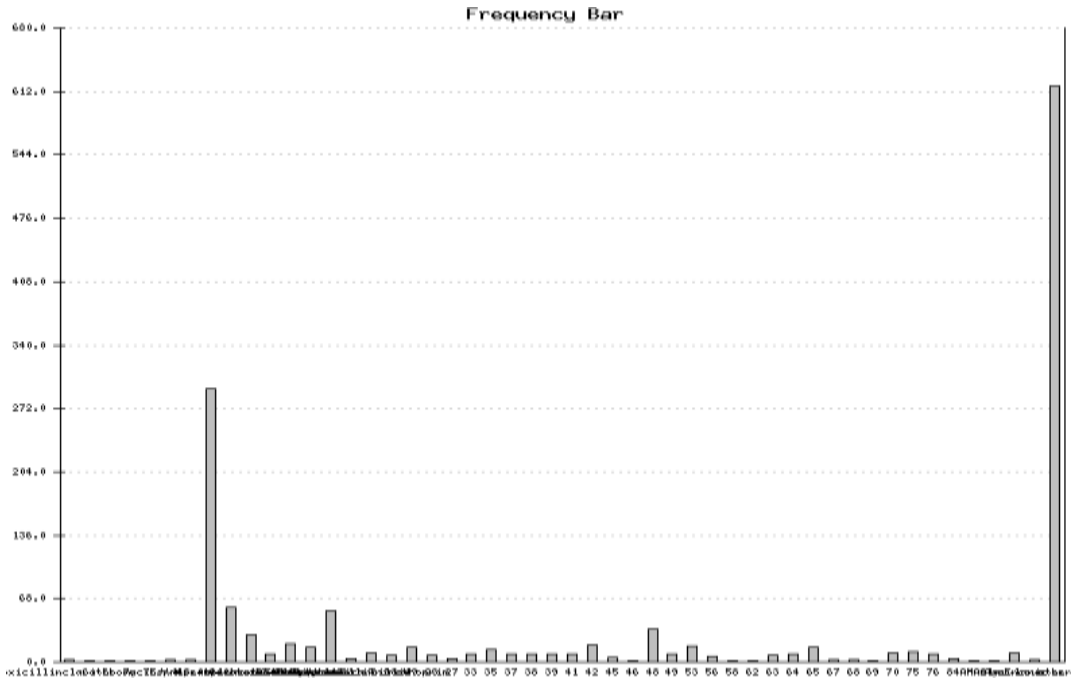

Figure 9: Bar Diagram of Frequency of Age and No of FDCs with name, Encounter with FDC of AMAs prescribed (Y/N), No of FDCs from NLEM and Encounter with FDC prescribed from NLEM (Y/N)

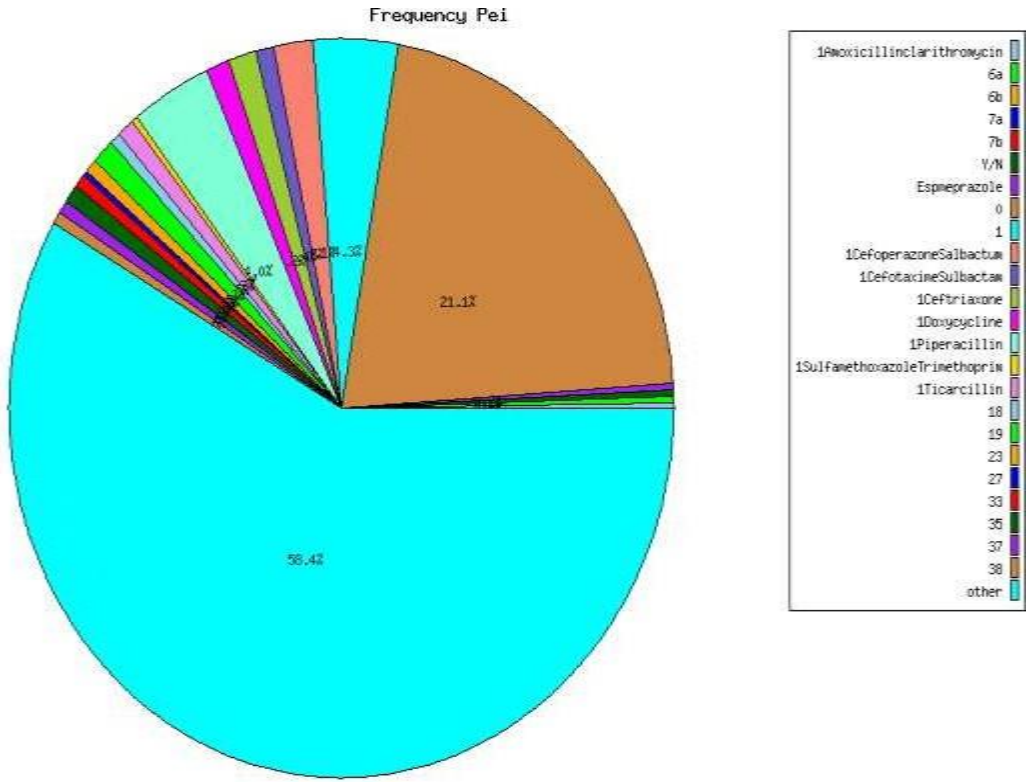

Figure 10: Pie Diagram of Frequency of Age and No of FDCs with name, Encounter with FDC of AMAs prescribed (Y/N), No of FDCs from NLEM and Encounter with FDC prescribed from NLEM (Y/N).

Table 8: Means and Frequency Table of FDC

z for 95% CI= 1.96

Frequency table				
Label	Value	Freq	%	Sum%
1(Amoxicillin clarithromycin	1(Amoxicillin clarithromycin	3	0.535	0.535
Espmeprazole)	Espmeprazole)	3	0.535	1.07
1(Sulfamethoxazole Trimethoprim)	1(Sulfamethoxazole Trimethoprim)	4	0.713	1.783
1(CefotaximeSulbactam)	1(CefotaximeSulbactam)	9	1.604	3.387
y	Y	9	1.604	4.991
Clavulanic	Clavulanic	10	1.783	6.774
acid)	acid)	10	1.783	8.556
1(Ticarcillin	1(Ticarcillin	10	1.783	10.339
1(Doxycycline	1(Doxycycline	16	2.852	13.191
Lactobacillus)	Lactobacillus)	16	2.852	16.043

1(Ceftriaxone	1(Ceftriaxone	20	3.565	19.608
Sulbactam)	Sulbactam)	20	3.565	23.173
1(CefoperazoneSalbactum)	1(CefoperazoneSalbactum)	28	4.991	28.164
1(Piperacillin	1(Piperacillin	58	10.339	38.503
Tazobactum)	Tazobactum)	58	10.339	48.841
N	N	78	13.904	62.745
Y	Y	209	37.255	100
17 categories		561 cases	100%	

Age and no of FDCs with name, Encounter with FDC of AMAs prescribed (Y/N), No of FDCs from NLEM and Encounter with FDC prescribed from NLEM (Y/N) T-test Analysis

Expected: 40.329
Observed: 4.2408
N1: 39;
N2: 75
Std Dev.1: 1.0748
Std Dev.2: 7.7942

Difference between means:

16.088 se=4.4506; 95% CI of difference:7.3651<16.088< 24.811 (Wald);t= 3.615; df= 38; p= 0.99957

(left p: 0.0004; two sided: 0.0008) For Sample:SampleSkewness: 0.85332;Est. Population Skew: 0.87083

s.e.Skewness: 0.2774;Sample Kurtosis: -0.6318'Est. Population Kurt: -0.59156;s.e. Kurtosis: 0.5482

Age and No of FDCs with name, Encounter with FDC of AMAs prescribed (Y/N), No of FDCs from NLEM and Encounter with FDC prescribed from NLEM (Y/N) Correlation/ Regression Analysis

z for 95% CI= 1.96

Invalid: 64

Cases-N: 114

r (var1.var2)= 0.0442

p= 0.3203 more

Regression Table for E(var2)				
	B	**s.e.**	**t**	**p**
var1	0.038	0.08	0.4681	0.6406
Intercept	28.79			

Anova table				
Source	Σ of Sq.	%	Mean Σ-sq	df
Explained	196.24	0.2	196.24	1
Unexplained	100306	99.8	895.58	112
Total	100502	100%		113
F-value: 0.2191; **p-value:** 0.64062				
Residual standard error: 316.71				

Descriptives for var1
Mean: 25.4376; Sum: 2899.891; Variance: 1233.41;sd: 35.1199; se: 3.28928;95% CI: 18.99 >25.4> 31.88

Descriptives for var2
Mean: 29.7447;Sum: 3390.895;Variance: 889.396;sd: 29.8227;se: 2.79316;95% CI: 24.27 >29.7> 35.22

Discussion

The present study emphasis on assessment of use of antibiotics as per guidelines in the hospital environment in order to determine the development of resistance. The study reports out of 250 patients 240 were prescribed with antibiotics and age factor also play an important role in encounter of AMAs. The earlier studies reported by Yuan-YuanWang et.al. 2016 reflect pressure from patientswho insist on antibiotic prescription or a loophole in antibiotic management under the current healthcare system and needs to be further addressed by the hospital. is unlikely that a diagnostictest result was obtained to identify pathogenic microorganisms among these patients prior to antibiotic prescription (18). Although antibiotics can be used to treat Helicobacterpylori-associated gastritis and duodenitis a cephalosporin-orquinolone-based regimen was not consistent with the current treatmentguidelines for
H. pylori infection. As many diseases of thedigestive system are caused by viral infections or lifestyle riskfactors, overuse of antibiotics will increase the risk of resistantinfections and cause unexpected harmful consequences [19]. Thus, antibiotic therapy for diseases of the digestive systemmust be weighed against risks and benefits.

The present study is exploratory thus results suggest further microbiological testing of patients the prescription should as per infection. As per guidelines FDC is a better option for the therapy. The encounter are as per NELM but earlier reports and our study reports unnecessary antibiotic use is still common in realworldclinical practice and remains a public health challenge. Thisstudy shows that routine assessment is a useful tool toevaluate antibiotic prescription patterns, to identify possible irrationaluse of antibiotics, and to provide feedback to improve thequality of antibiotics use. Antibiotic use for patients with diseasesof the digestive system needs to be further investigated. The earlier and present investigation visualizes more cross-sectional and in-depth studies are needed in order to control the irrational use of AMAs and determine the use of AMAs as per guidelines in healthcare world.

Conclusion/Future Prospects

At present there is an ardent need of the detailed investigations of the microbial infections and accordingly the antibiotics should be prescribed. The antibiotics dosage should be given on the basis of the age and as per chronicity of the disease. The reasons for the development of the resistance are not clear thus more detailed longitudinal and cross-sectional studies are required in order to decrease the incidence of antibiotic resistance. The present research study predicts that the FDC provides better results but the treatment should be on the basis of NELM guidelines. The research study also shows

that NELM guidelines prescription also result in the antibiotics resistance thus more in-depth studies are needed in order to overcome the problem of antibiotic resistance.

References

1. World Health Organization: WHO infectious diseasereport: leading cause of death. Vol. 2004, 1999.
2. Rubin MA, Samore MH. Antimicrobial use andresistance.Curr Infect Dis Rep. 2002; 4:491-7.
3. Cosgrove SE, Carmeli Y. The impact of antimicrobialresistance on health and economic outcomes.Clin.Infect Dis. 2003; 36:1433-7.
4. Neu, H. 1992. The crisis in antibiotic resistance. Science 257:1064–1073.
5. Kunin, C. 1993. Resistance to antimicrobial drugs. Ann. Int. Med. 118:557–561
6. Gyssens, I. C. 2005. International guidelines for infectious diseases: a practicalguide. Neth. J. Med. 63:291–299.
7. Peetermans, W. E., and D. Ramaekers. 2002. Clinical practice guidelines ininfectious diseases. Neth. J. Med. 60:343–348.
8. Stobberingh, E., R. Janknegt, and G. Wijnands. 1993. Antibiotic guidelinesand antibiotic utilization in Dutch hospitals. J. Antimicrob. Chemother.32:153–161.
9. Goossens, H., M. Ferech, R. Vander Stichele, and M. Elseviers. 2005. Outpatientantibiotic use in Europe and association with resistance: a crossnationaldatabase study. Lancet 365:579– 587.
10. Bhavesh KL, Hiray RS, Ghongane BB. Drug Prescription pattern of Outpatientsin a Tertiary Care Teaching Hospital in Maharashtra. Int J Pharm Bio Sci.2012;3(3):225-9.
11. Vanitha RN, Kannan G, Venkata NM, Vishwakanth D, Nagesh VRD, YogithaM,Venkata SM, Thennarasu P. A Retrospective Study On Blood Stream InfectionsAnd Antibiotic Susceptibility Patterns In A Tertiary Care Teaching Hospital. IntJPharmPharmSci, 2011;4(1):543-8.
12. Essential Drugs. Practical Guidelines, 2013 edition.
13. Sharma NBM, Chaudhary V, Uma A, Jain A, Bansal A.A Prospective Studyof Drug Utilization Pattern in Surgery Department in a Tertiary Care TeachingHospital in Rajasthan.UJP. 2014;3(2):47-50.
14. Rubin MA, Samore MH. Antimicrobial use andresistance.Curr Infect Dis Rep. 2002; 4:491-7.
15. Hanmant A, Priyadarshini K. Prescription analysis to evaluate rationaluse of ntimicrobials. International Journal Of Pharma And Bio Sciences.2011;2(2)314-9.
16. Bbosa GS, Geoff W, Kyegombe DB, Ogwal-Okeng J. Effects of interventionmeasures on irrational antibiotics/antibacterial drug use in developingcountries: A Systematic Review. Health 6. 2014;6(2):171-87.
17. Igbiks T, Joseph OF. Drug Prescription Pattern in a Nigerian Tertiary Hospital.Tropical Journal of Pharmaceutical Research. 2012;11(1):146-52.
18. Wang YY, Du P, Huang F, Li DJ, Gu J, Shen FM, Jiang YY. Antimicrobial prescribing patterns in a large tertiary hospital in Shanghai, China. International journal of antimicrobial agents. 2016 Dec 1;48(6):666-73.