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Indication-based use of antibiotic in the treatment of patients attending at the primary health care facility

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Abstract
Antibiotics are one of the most effective and frequently used medications in clinical settings. A cross-sectional study was conducted to determine the antibiotic Use in the Treatment of Patients Attending at the Primary Health Care Facility. The study was taken at the outpatient department in Upzilla Health Complex Ramgoti; Lakshmipur. A face to face interview was performed to collect data by using semi-structured questionnaire and prescription slip. The study was conducted from August through November 2013. A total 200 respondents, the mean age of the respondents was (41.03 12.26) years ranging from 35-50 years and the majority of the respondents are agriculture (50.4%) and home maker (39.1%). Among the respondents majority of the antibiotics prescribed by the patients were females (55.5%) compared to male patients (44.5%). The proportion of the patients treated with anti-microbial drugs (56.0%).Generally, the mean number of anti-microbial drugs being prescribed per patients were 2.8(± 0.9). From this study majority of the patients was suffering from viral fever (36.0%) and respiratory tract infection (30.0%). The highest prescribed antibiotic was penicillin group (42.5%) followed by Cephalosporin group (35.0%), and Tetracycline (32.5%). However (82.0%) of the drugs were prescribed using generic names. The majority of the patients (77.5%) received two or more antimicrobials in combination for their treatments. Among them (16.1%) patients receiving Penicillin and fluoroquinolone drugs followed by Cephalosporin and Metronidazole drugs (14.2%) and (9.0%) patients also receiving Penicillin, Fluoroquinolone and Cotrimoxazole drugs. The evident of high percentages of patients received antimicrobial treatment in oral route (77.0%) and the intravenous route was also the preferred route of administration (11.0%). From this study, Antibiotic prescribed for the major disease groups where Penicillin, Cephalosporin, Macrolide and tetracycline most frequently prescribed in viral fever (21.0%) & Penicillin, Macrolide and Tetracycline are frequently prescribed in COPD disease (17.5%) and also Metronidazole and cephalosporin were most frequently prescribed in the treatment of Dysentery (9.0%). However the study also reveals that (62.5%) patients received their antibiotic from hospital at free of cost. On the basis of key findings of the study, Periodic monitoring and intervention to improve antimicrobial use in the hospital and further research with large sample size was strongly recommended.

Keywords: Antibiotics; rational use of antibiotics; drug prescribing; drug dispensing; drug use research

1. Introduction
Antibiotics are one of the most commonly prescribed drugs today. The 1 inappropriate use of antibiotics has often been identified as a problem in effective health care delivery. High levels of antibiotics use, often clinically unnecessary, have led to a steady increase in drug resistance [1]. In Bangladesh huge quantities of antibiotics are used annually. But a very large portion of this is used unfortunately under conditions of inadequate or no medical supervision and in most cases without prior tests on identification of the disease-causing organism and determination of its sensitivity to the antibiotic prescribed [2].

Rational use of antibiotics is a serious issue in the context of Bangladesh. Inappropriate prescribing practices in many health care settings include: Overuse of antibiotics, wrong selection of antibiotics and inappropriate duration or dose of antibiotics, multiple drug prescriptions, and the use of unnecessarily expensive drugs prescriptions. That can be associated with increased side-effects, excessive expense and, ultimately emergence of resistant organisms 3. Whereas patients in rural areas they are illiterate, economically unstable, and lack of awareness for taking their medication like as- not completing a course of antibiotics as prescribed, skipping doses of antibiotics, not taking antibiotics at regular intervals, saving antibiotic for later that can also cause by antimicrobial resistance.

Surveys to determine the reasons for antibiotic use at the primary level have been carried out in many countries; Hong Kong [4], Thailand [5], Pakistan [6], Malaysia [7]. But in our country

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there have not enough data on antibiotic use at the primary health care level.

So, the aim of this project to find out the scenario of the antibiotic use at the primary health care level to ascertain the pattern of antimicrobial use, to analyze the core prescribing indicators of antimicrobials and to find out the factors influencing antibiotic prescribing.

Methodology
This Cross-sectional research study was conducted in Upzilla Health Complex Ramgoti, Lakshmipur. The Study was conducted for the duration of four months from August 2013 to November 2013. A purposive sampling technique was adopted to select study area in the proposed study. Where Patients were selected randomly during the hospital visit from the outpatient department. The sample size for the study was determined by 200 patients who received the antibiotic treatment. Data Collection was accomplish by Face to face interview and Prescription slip was done as data collection technique. Which contain patient's details such as age, gender, and specific issues related to antimicrobial use such as name of antimicrobials, their dosage schedule, route of administration, generic name, and related laboratory investigations. The Data were compiled and analyzed by using SPSS 16 and EXCEL.

Result
This cross sectional study conducted in the Department of school of health science, State University Of Bangladesh for a period of four months starting from August to November 2013.

The study was planned to investigate 200 patients' records to increase the precision of the parameters. The records studied were for patients attended to at the outpatient department of the hospital.

Table 1: Distribution of the respondents by antibiotic used by the gender.

Sex	N	Percent (%)
Male	89	44.5
Female	111	55.5
Total	200	100.0

Table -1 shows that the majority of the patients were females (55.5%) compared to male patients (44.5%). where the female patients receive more antibiotic drugs for their treatment.

Table 2: Distribution of the respondent by age group

Age group (years)	Number of patients (n=200)	Percent (%)
< 5	38	19.0
5 – 20	20	10.0
20 – 35	26	13.0
35 – 50	65	32.5
50 – 65	32	16.0
65 >	19	9.5
Total	200	100.0
Mean 41.03 ± 12.26		

Table -2 shows that the amount of antibiotics prescribed at various age groups, here majority 32.5% patients (n=65) were most commonly prescribed in antibiotics between the ages of 35-50 years, followed by the 20-35 years 13.0%

19.0% patients in the age group less than 5 years old and

9.5% patients were in the age group 65 years and above. And 16% of the age between 50-65 years and the mean age of the patients was 41.03 ± 12.26.

Table 3: Distribution of the respondent by Education (N=200).

Disease	N	Percent (%)
Bronchitis	34	17.0
Peptic ulcer	42	21.0
Asthma	34	17.0
Influenza fever	28	14.0
Ascariasis	22	11.0
Eczema	30	15.0
Scabies	28	14.0
Common cold or Viral fever	72	36.0
Viral flu	24	12.0
Pneumonia	52	26.0
Respiratory tract infection (RTI)	60	30.0
Urinary tract infection (UTI)	42	21.0
Abdominal pain	24	12.0
Enteric fever	36	18.0
Anemia	26	13.0
Cough	44	22.0
Diabetic	28	14.0
Hypertension	42	21.0
Migraine	16	8.0
Loose motion	32	16.0
Dysentery	36	18.0
Acute tonsillitis	40	20.0
Leucorria	30	15.0
Sinusitis	32	16.0
Arthritis	34	17.0
General disability (GD)	76	38.0

Table-3 shows that education of the respondents, here the total respondents 24.0% were primary level, 17.0% were secondary level, 10.0% were graduate level, 5.0% were masters level, and 44.0% were illiterate, and the literacy rate of the total respondent were 56.0%.

Table 4: Distribution of antibiotics (as prescribed) by pattern of group.

Groups of antibiotics	Frequency	% of prescribed
Penicillin	85	42.5
Cephalosporin	70	35.0
fluoroquinolone	60	30.0
Tetracycline	65	32.5
Chloramphenicol	36	18.0
Cotrimoxazole	60	30.0
Metronidazole	65	32.5
Macrolides	40	20.0
Aminoglycoside	35	17.5
Sulfonamide	26	13.0
Rifampin	18	9.0

Table-4 shows that the Groups of antibiotic prescribing by the physician,

During this survey 42.5% prescribed penicillin group is the highest in percentage compared to 35.0% of cephalosporin and tetracycline 32.5% and also macrolides 20.0%, Cotrimoxazole 30.0%, Aminoglycoside 17.5%, and Rifampin 9.0% that is the lowest percentage of prescribe antibiotic. "Multiple response"

Table 5: Distribution of the respondent by prescribe number of antibiotic

Single/Multiple	Frequency (n)	Percentage
Single antibiotic	45	22.5
Multiple Antibiotic	155	77.5
Total	200	100

Table-5 shows that the majority of the patients received multiple antibiotic 77.5% and the single antibiotic received 22.5%.

Table 6: Distribution of the respondent by pattern of multiple antibiotics prescribed

Types of Antibiotic Drugs	Number Of patients (n)	Prevalence (%)
Penicillin + Fluoroquinolone	25	16.1
Cephalosporin + Metronidazole	22	14.2
Penicillin + Macrolides	20	12.9
Cotrimoxazole + Penicillin	18	11.6
Aminoglycoside+ Cotrimoxazole	10	6.5
Chloramphenicol+ Metronidazole	15	9.7
Tetracycline+ Macrolides	10	6.5
Penicillin + Fluoroquinolone+ Cotrimoxazole	14	9.0
Cephalosporin + Tetracycline+ Macrolides	13	8.4
Metronidazole + Fluoroquinolone + Aminoglycoside	8	5.2
Total	155	100.0

Table - 6 shows that the majority of the patients (77.5%) received two or more antimicrobials in combination for their treatments. Among them 16.1% patients receiving Penicillin+ Fluoroquinolone drugs followed by Cephalosporin+ Metronidazole drugs 14.2% and 9.0% patients also receiving Penicillin+ Fluoroquinolone + Cotrimoxazole drugs. 8.4% patients were also receiving Cephalosporin + Tetracycline + Macrolides and 5.2% also received Metronidazole + Fluoroquinolone + Aminoglycoside drugs.

Table 7: Distribution of Antibiotics by dose form: (n=200)

Drugs		Dosage Form	Frequency (n)	Percentage (%)	
	Ampicillin	Cap	11	5.5	
	Amoxicillin	Cap.	15	7.5	
	Cloxacillin	Cap.	9	4.5	
	Tetracycline	Cap	12	6.0	
	Flucloxacillin	Cap.	11	5.5	(77.0%)
	Penicillin V	Tab.	10	5.0	
	Doxycycline	Tab.	10	5.0	
Oral form	Cotrimoxazole	Tab.	12	6.0	
	Rifampin	Tab.	8	4.0	
	Paracetamol.	Tab.	15	7.5	
	Ciprofloxacin	tab /cap	12	6.0	
	Azithromycin	tab /cap	10	5.0	
	Levofloxacin	tab /cap	10	5.0	
	Clarithromycin	tab/ cap.	9	4.5	
Oral + Injecti	Metronidazole	tab/inj.	12	6.0	(12.0%)
On form	Cephalosporin	tab/inj.	12	6.0	
Injecti	Levofloxacin	Inj.	8	4.0	(11.0%)
On form	Benzyl penicillin	Inj.	8	4.0	
	Amoxicillin	Inj.	6	3.0	

Table -7 shows antibiotics that are used from the respondent by Dosage form where an average 82% of the drugs were prescribed using generic names. Here, Penicillin V, Ampicillin, Amoxicillin, Tetracycline, Cloxacillin, Azithromycin, Levofloxacin, Cotrimoxazole group were also prescribed by oral form that is (77.0%). And metronidazole and cephalosporin were also prescribed by tablet and injection form (12.0%). Whereas Salbutamol, Benzyl penicillin were also prescribed by injection form that is (11.0%).

"Multiple response"

Table 8: Distribution of antibiotic by illness pattern

Disease	Group of microbial agent	N	Percent (%)
Bronchitis	Penicillin + Cephalosporin + Macrolide	22	11.0
Influenza fever	Fluoroquinolone + Cotrimoxazole + sulfonamide	14	7.0
Eczema	Macrolides	25	12.5
Scabies	Penicillin	18	9.0
Common cold or Viral fever	Penicillin + Cephalosporin+ Macrolide + tetracycline	42	21.0
Pneumonia	Cephalosporin + Macrolide	30	15.0
COPD	Penicillin + Macrolide + tetracycline	35	17.5
Urinary tract infection	Macrolides + cephalosporin	21	10.5
Dental abscess	Penicillin + Metronidazole	12	6.0
Enteric fever	Cotrimoxazole + tetracycline	18	9.0
Respiratory tract infection	Penicillin + cephalosporin+ Fluoroquinolone + Cotrimoxazole	41	20.5

Cough	Penicillin + sulfonamide	35	17.5
Loose motion	Tetracycline	16	8.0
Dysentery	Metronidazole + Cephalosporin	18	9.0
Acute tonsillitis	Penicillin + cephalosporin	20	10
Leucorria	Metronidazole	15	7.5
Sinusitis	Penicillin + cephalosporin	24	12.0
Pelvic inflammatory	Tetracycline + Cephalosporin+	19	9.5
disease	Metronidazole		
Arthritis	Penicillin + Macrolide + Rifampin	24	12.0

Multiple response
Table- 9 shows the disease against prescribe microbial agent. Where among the respondent Penicillin, Cephalosporin, Macrolide, and tetracycline were most frequently prescribed in viral fever that is 21.0%. And the treatment of bronchitis Penicillin, Cephalosporin and Macrolide can also be prescribed that were 11.0% and also the treatment of sinusitis Penicillin and cephalosporin were frequently prescribed that is 12.0%. And the treatment of Dental abscess Penicillin and Metronidazole can also be prescribed that is 6.0%. And the treatment of Urinary tract infection Macrolides and cephalosporin most frequently prescribed that is 10.5%. And the treatment of Respiratory tract infection Penicillin, cephalosporin, Fluoroquinolone and
Cotrimoxazole can also be prescribed 20.5%. And the treatment of Dysentery Metronidazole and cephalosporin most frequently used 9.0%. And the chronic obstructive pulmonary disease (COPD) cases Penicillin, Macrolide, and tetracycline were used in 17.5% and also the Pelvic inflammatory disease cases Tetracycline, Cephalosporin and Metronidazole were most frequently prescribed that is 9.5%.

Discussion
Antibiotics are the greatest contribution of the 20th century to therapeutics. Indiscriminate and inappropriate prescribing of antimicrobials is a widespread problem imposing a substantial economic burden on health care systems. A study of prescribing patterns of antimicrobials is an effective way of reflecting appropriateness of antimicrobial use. [8-10]. A prescription provides an insight into a prescriber's attitude to the disease being treated and the nature of health care delivery system in a community or a country. Both overprescribing and under prescribing of antimicrobials are harmful practices; overprescribing is associated with increased side-effects, excessive expense and, ultimately emergence of resistant organisms whereas under prescribing leads to ineffective treatment [11-14].
This study aimed to examine the use of antibiotic prescribing by primary health care in Upzilla health complex (UHC) of Bangladesh. It aims to examine the primary care doctors' clinical behavior in the use of antibiotics by detailing the type of antibiotics they use and the illnesses that they use them for. In this study a total 200 respondent, among the respondents the mean age of the patients was 41.03 years ranging from 35-50 years. Antibiotics prescription rates in this study was found out to be particularly high in the geriatric and pediatric patients. And found that highest percentages of antibiotic uses were in the age grouped of 35-50 years. In this study analysis among the respondent majority of the antibiotic prescribe by the patients are female (55.5%) compared to male patients (44.5%).
The proportion of the patients treated with anti-microbial drugs (56.0%) was relatively high compared with levels reported in studies conducted in other countries, for ex: 43% in Nepal15, 54% in Malaysia16, 41% in Italy [17]. Generally,

the mean number of anti-microbial drugs being prescribed per patients were 2.8(± 0.9). Average forty-five percent patients were received between 1-3 drugs; thirty-five percent received between 4-6 drugs and twenty percent received 6 or more drugs. These findings similarity with other studies conducted in Bangladesh [18]. Antibiotics Used by the respondent at Primary Healthcare Level there were 21 different antimicrobials used for the treatment of the patients. The study results showed that Amoxicillin, Ampicillin, Flucloxacillin, Penicillin G, Penicillin V were most frequently prescribed in penicillin group. And also Cephradine 1st, Cephalexin 1st, Cefixime 3rd, Cefuroxime 2nd, Ceftriaxone 3rd generation of cephalosporin were also prescribed. Azithromycin, Clarithromycin were most frequently used in macrolide group. Whereas Ciprofloxacin, Levofloxacin were used in Fluoroquinolone group. And also Tetracycline, Chloramphenicol, Cotrimoxazole, Metronidazole most frequently prescribed by the antibiotic treatment.
In the present study it was observed that, majority of the patients was suffering from viral fever (36.0%) comparable with other disease. The results are quite similar to a large study done in the UK [19, 20]. where other cases were Bronchitis (17.0%), sinusitis (16.0%), Peptic ulcer (21.0%), Influenza fever (14.0%), Pneumonia (26.0%), Dysentery (18.0%), Cough (22.0%), Hypertension (21.1%), Leucorria (15.0%), Respiratory tract infection (30.0%), Urinary tract infection (21.0%), Eczema (15.0%), General disability (38.0%).
In the present studied, an average of 82% of the drugs was prescribed using generic names, and 85% were from the essential drugs list. Both of these levels are satisfactory and result from the implementation of the national drug policy, which emphasizes the use of essential drugs in Bangladesh. Drugs belong anti-microbial therapeutically chemical groups where penicillin group was response (multiple response) the highest percentage (42.5%), Cephalosporin (35.0%), Tetracycline (32.5%), and Fluoroquinolone (30.0%), Macrolides (20.0%). Compared with another study done in Italy where Wide-spectrum penicillin's and macrolides ranked first (23%), followed by penicillin's plus beta-lactamase inhibitors (15%), cephalosporin's (15%) and Fluoroquinolone (10%) [21, 22]. The oral route was the most preferred method (77.0%) used to administer the antimicrobials. Whereas intravenous route (23.0%).
Here majority of the antibiotic prescribed by the patients in combination therapy that is (77.5%). Penicillin and Fluoroquinolone were most frequently prescribed (16.1%) followed by the treatment of Cephalosporin and Metronidazole (14.2%). Otherwise Cephalosporin, Tetracycline and Macrolides groups are significantly prescribed in (8.4%) (P< 0.05). A similar study in Scandinavia demonstrated benefit in antibiotic use in Hong Kong [23, 24].
The findings of this study antibiotic prescribed for the major disease groups where Penicillin, Cephalosporin, Macrolide

and tetracycline most frequently prescribed in viral fever (21.0%) &Penicillin, Cephalosporin and Macrolide are frequently prescribed in Bronchitis disease (11.0%). Penicillin, Macrolide and Rifampin were most frequently prescribed in the treatment of Arthritis (12.0%) & the treatment of urinary tract infection using Macrolides and cephalosporin prescribed by (10.5%). This is probably a result of aggressive marketing practices on the physicians combined with inadequate knowledge of current treatment guidelines. Compared to the similar findings were also found in the study done in Nepal. Where antibiotics were most frequently prescribed for the treatment of urinary tract infection 21.3% using Macrolides and cephalosporin, skin and respiratory tract infection 31.2% using Penicillin, Macrolide and tetracycline [25].

Hospitals also account for antibiotic misuse worldwide due to non-evidence based practice.26. Here the Rate of Dose management by patients is quit not satisfactory average 55.0% patients do not complete the full course of antibiotic and some of the patient's tendency to take over dose when they miss the antibiotic dose schedule this also contribute to drug resistance.

This study showed that medicines are often prescribed according to the patients which are not available by the hospital. Newer and more expensive antibiotics are frequently prescribed which may be unaffordable to most patients and poor compliance in those who may be able to start a course but are unable to finish, it also tends to promote antibiotic resistance [27]. The evident of high percentages of patients received antimicrobial treatment in combinations reflected the potential of higher proportion of inappropriate treatment of different diseases. One study in a medical college hospital revealed that the total number of patients who received antimicrobials 69.0% were prescribed antibiotics for suspected or proven infection and 31.0% prescribed for patient's satisfaction [28, 29]. The personal choice, limited experience and other influences on hospitals' physicians may lead to inappropriate prescribing of antimicrobials. Several other studies in hospitals both in developed and developing countries have shown that inappropriate prescribing of antimicrobials is widespread [30-33].

Conclusion
This cross-sectional study concludes that respondents mostly visited with the health problems as respiratory infection and viral fever that is the higher percentage seen by the patients. Among the respondent average fifty-six percent respondent advices with antibiotic. And most of the antibiotics were also prescribed by oral route. The finding of the study showed that average forty-five percent patients were received between 1-3 drugs; thirty-five percent received between 4-6 drugs and twenty percent received 6 or more drugs. Among the respondent a higher percentage of patients receiving for penicillin group and also half of the patients are receiving Cephalosporin and Metronidazole combined group of drugs. However sixty percent patients received their antibiotic from hospital at free of cost whereas forty percent patients haven't. These findings are likely to be representative of the pattern of antibiotic use in rural Bangladesh. Which indicate that the overall pictures of Antibiotics were prescribed for many conditions the physician prescribed multiple anti-microbial drugs in different combinations that reflected the pattern of infections in this region requiring a combination of antimicrobials therapy.

Recommendation
The following recommendations can be suggested based on the present study:
1. Periodic monitoring and intervention to improve antimicrobial use in the hospital.
2. Improve training of health care providers.
3. The selection of drugs is based on efficacy, safety, suitability and cost considerations.
4. Patients should be provided with relevant, accurate, and clear information regarding his or her condition and the medication(s) that are prescribed.
5. Additional studies at other primary health care units situated in other parts Bangladesh to make generalizable conclusions for the whole country.

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