

# Pattern of Antibiotic Use in Different Departments of Dhaka Medical College Hospital

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## Abstract:

**Background:** Antibiotics are available as non-prescription drugs in pharmacies and irrational use is not uncommon. Diagnosis and treatment of most of the bacterial diseases are empirical. Microbial sensitivity patterns of common infections like respiratory tract infection, urinary tract infection, enteric fever, wound infection are not routinely available for decision making in drug selection. Lack of hospital restrictions on antibiotic use and inappropriate usage for prophylaxis are the main reasons for inappropriate therapy.

**Objective:** To determine the pattern of antibiotic use in hospitalized patients of different departments of Dhaka Medical College Hospital.

**Materials & Methods:** In this observational study, hospital records of total 400 patients were surveyed on 2 separate days of December 2013. Patients of both sexes from different departments receiving antibiotics were included in the study. Data was collected in a predesigned data collection sheet.

**Results:** Of the total 400 patients 53.5% were male & 46.5% were female. 21% patients were of paediatric age group (upto 12 years) and 79% were adults. In maximum number of patients empirical antibiotic therapy was started. Culture and sensitivity tests were done before or during the course of treatment in only 48 patients (12%). Most commonly used antibiotic was ceftriaxone (49.75%) followed by metronidazole (17.5%) and ciprofloxacin (12.75%), while 7 patients (1.75%) received anti tubercular regimen. Combined antibiotics were used in 162 patients (40.5%).

**Conclusion:** Most of the patients received empirical antibiotic therapy. Culture and sensitivity tests should be more practiced and emphasized before starting treatment. Energetic measures to stop inappropriate use of antibiotics should be taken to slow down the emergence and spread of antimicrobial resistance.

**Keywords:** Antibiotic, Pattern of antibiotic use.

## Antibiotic:

Any of various chemical substances, produced by various microorganisms, esp. fungi, or made synthetically and capable of destroying or inhibiting the growth of microorganism.<sup>1</sup> Throughout history there has been a continual battle between human beings and multitude of micro-organisms that cause infection and disease. In his 1945 Nobel Prize lecture, Fleming himself warned of the danger of resistance.

Regarding the global scenario about 4,40,000 new cases of MDR-TB are emerging annually whereas XDR-TB cases are reported in 64 countries to date. Falciparum malaria is resistant to earlier generation antimalarials already and resistance to

artemisinin emerging in South-East Asia. Hospital-acquired infections by highly resistant MRSA and vancomycin-resistant enterococci are increasing day by day. Resistance of Shigellosis to ciprofloxacin, resistance of Gonorrhoea to cephalosporins & resistance against HIV infection are progressively emerging. NDM-1 (*New Delhi metallo-beta-lactamase-1*) is resistant to almost all powerful antibiotics.<sup>2</sup>

In Bangladesh MDR-TB cases are around 3,500 (according to latest survey in 2012).<sup>3</sup> Falciparum malaria is resistant to chloroquine (40-70%) and sulphadoxine-pyrimethamine. *Pseudomonas aeruginosa* is resistant to >50% commonly-used antibiotics. *Shigella dysenteriae* – 95% resistant to ampicillin, cotrimoxazole and nalidixic acid and 14%-40% were resistant to methicillin, found in a survey in 1996. In most of the cases of *Klebsiella*, *Acinetobacter*, *E. coli*, coagulase negative staphylococci and *Staphylococcus aureus* infection maximum sensitive drugs are only imipenem, ciprofloxacin, gentamycin and cotrimoxazole.<sup>4</sup> Ciprofloxacin is no more a drug for empirical therapy for the treatment of enteric fever in almost all countries of the world unless complete ciprofloxacin susceptibility is proved.<sup>5</sup>

Antibiotics are available as non-prescription drugs in pharmacies and irrational use is not uncommon.<sup>6</sup> Despite the improved trend of health care in Bangladesh, infectious

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diseases remain priority public health problem, where widespread use of different antimicrobials against bacterial, fungal, viral and parasitic infections is required. Most antimicrobials are prescribed, with the decision to apply based on best-guess empiric therapy. A majority of the prescribers in Bangladesh diagnose infection by clinical assessment and suspect a microbial aetiology.<sup>7</sup>Diagnosis and treatment of most of the bacterial diseases are “empirical”. Microbial sensitivity patterns of common infections like RTI, UTI, enteric fever, wound infection are not routinely available for decision making in drug selection.

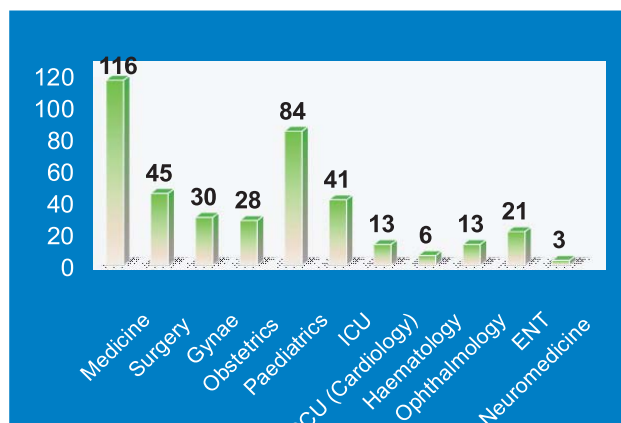
**Materials & Methods:**

This was an observational study done in Dhaka Medical College Hospital during December 2013. Study population included any patient receiving antibiotic during hospital stay. Hospital records of total 400 patients were surveyed on 2 separate days. Patients of both sexes from different departments receiving antibiotics were included in the study. Name of the antibiotic(s) received by the patient was collected from the record. Again records were surveyed for whether culture was done/advised or not. Data was collected in a predesigned data collection sheet.

**Results:**

Out of 400 patients most patients were from dept. of Medicine (116) followed by Paediatrics(84). Table – I shows distribution of patients in different departments of DMCH.

21% (84) patients were from the paediatric age group (≤12 years) and 79% (316) were from the adult age group (>12 years). 53.5% (214) patients were male whereas 46.5% (186) were female. Highest number of patients receiving antibiotics was from dept. of Medicine where 22.4% were cerebrovascular disease (CVD) followed by malignancy (11.2%) & Diabetes Mellitus (DM) with hypertension (HTN)with chronic kidney disease (CKD) (11.2%). Culture



**Fig-1:** Distribution of patients in different departments of DMCH

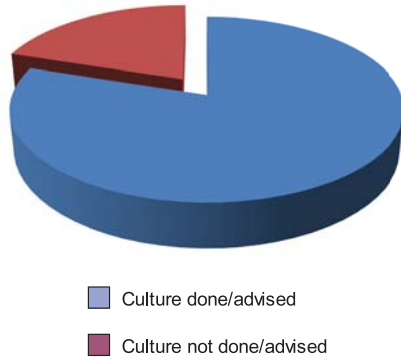
was done or advised in only 15 patients (12.93%). Mostly used antibiotic was Ceftriaxone (62.9%) followed by Metronidazole (17.2%) & Ciprofloxacin (9.5%). Combined antibiotic was used in 27 (23.3%) patients. In dept. of Surgery out of 45 patients culture was done or advised in only 3 patients. Ceftriaxone (53.3%) and Metronidazole (43.2%) was the leading antibiotic used. Combined antibiotic was used in 24 (53.3%) patients. In Gynae department out of 30 patients Metronidazole & Ciprofloxacin was the commonly prescribed antibiotic. In Obstetrics department all 28 patients were post Caesarian section and almost all (96.4%) patients received Ceftriaxone. In Paediatrics department among 84 patients most cases receiving antibiotic were suffering from neonatal & LBW complication (28.6%) followed by nephrotic syndrome/ GN (13.1%). In 21 patients (25%) culture was done or advised. Highest used antibiotic was Ceftriaxone (44%) followed by Amikacin/ Gentamicin (30.1%). In ICU out of 41 patients with life support 19 were due to head injury & RTA and 10 were due to CVD. Culture was done or advised in only 5 patients. Mostly used antibiotic was Ceftriaxone (46.3%) & Amikacin/ Gentamicin (31.7%).

**Table – II**

*Antibiotics used and diagnosis in dept. of Medicine*

<b>Total patients</b>	<b>116 (100%)</b>			
<b>Culture done/ advised</b>	<b>15 (12.93%)</b>			
<b>Antibiotic used (No. of patients)</b>	Ceftriaxone	73 (62.9%)	Vancomycin	2
	Metronidazole	20 (17.2%)	Flucloxacillin	3
	Ciprofloxacin	11 (9.5%)	Co-amoxiclav	7
	Cefuroxime	6	Clarithromycin	3
	Levofloxacin	2	Meropenem	1
	Amikacin/ Gentamicin	4	Anti - TB	4
	<b>Combined Antibiotic - 27 (23.3%)</b>			
<b>Diagnosis</b>	CVD	26 (22.4%)	COPD	7
	Malignancy	13 (11.2%)	TB	7
	DM + HTN + CKD	13 (11.2%)	UTI	5
	CLD	11	Enteric fever	4
	Meningo-encephalitis	9	Others	13
	Pneumonia	8		

So, culture was done or advised in only 48 (12%) patients out of 400 patients and 352 (88%) patients received empirical antibiotic therapy. Ceftriaxone was the mostly used antibiotic (49.75%) followed by Metronidazole (17.5%) and Ciprofloxacin (12.75%). 162 (40.5%) patients received combination of antibiotics.



**Fig-3:** Culture done/advised status

**Table – III**

*Pattern of antibiotics used in different departments of DMCH*

Ceftriaxone	199 (49.75%)	Vancomycin	10 (2.5%)
Metronidazole	71 (17.5%)	Cefixime	10 (2.5%)
Ciprofloxacin	51 (12.75%)	Co-amoxiclav	9 (2.25%)
Amikacin / Gentamicin	46 (11.5%)	Clarithromycin	3 (0.75%)
Penicillin	24 (6%)	Cefotaxime	4 (1%)
Levofloxacin	16 (4%)	Clindamycin	1 (0.25%)
Flucloxacillin	15 (3.75%)	Azithromycin	2 (0.5%)
Meropenem	14 (3.5%)	Cotrimoxazole	1 (0.25%)
Cefuroxime	12 (3%)	Anti TB	7 (1.75%)
Combined antibiotic - 162 (40.5%)			

**Discussion:**

In this study most of the patients were from department of Medicine (29%) & Paediatrics (21%) followed by Surgery, ICU, Gynae & Obstetrics. 53.5% were male and 46.5% were female. 79% patients were from the adult age group whereas 21% were from the paediatric age group. Ceftriaxone was the highest used antibiotic (49.75%) followed by Metronidazole (17.5%), Ciprofloxacin (12.75%), Amikacin/Gentamicin (11.5%). Anti TB was used in only 7 (1.75%) patients. Combined antibiotics were used in 162 (40.5%) patients. Antibiotics were mostly used in medicine wards for CVD, malignancy and DM with hypertension with CKD, in paediatrics department for neonatal & low birth weight complications and nephrotic syndrome & glomerulonephritis. In ICU patients receiving antibiotic most were of head injury, road traffic accident and CVD.

In a study involving the analysis of treatment records for 150 in-patients at a Primary Health Complex in Bangladesh in 2009 the highest prescribed antibiotic was Ceftriaxone (30.19%) followed by Cefixime (18.87%), and Amoxicillin (16.98%). Antibiotics were most frequently prescribed for physical assault, general weakness, acute watery diarrhea, acute trauma, gastrointestinal symptoms and respiratory diseases.<sup>4</sup>

A study was conducted to assess the rate of antibiotic prescription in six divisions of Bangladesh. It was done in urban, rural, public or government and private medical institutions of few districts of each division during 2009. Among all antibiotic groups, macrolide (28.41%) acquired the top prescribing antibiotic and the next were quinolone (26.15%), second generation cephalosporin (13.17%), penicillin (8.78%), third generation cephalosporin (3.62%) etc.<sup>8</sup> This varies from our study due to difference of antibiotic pattern between inpatient and outpatient department. In hospitals injectable antibiotics are more used due to morbid condition of the patients.

In 1975, results of a survey of antibiotic therapy on a surgical, a gynecologic and a medical ward of St. Joseph’s Hospital, Hamilton, a teaching hospital affiliated with McMaster University showed that Gentamicin, cloxacillin, ampicillin and cephalothin were prescribed for 31.1, 18.3, 47.9 and 21.9% respectively of 219 patients.<sup>9</sup>

Inappropriate use of antibiotics may play a major role in the development and spread of antibiotics resistant bacteria. Against this background, questionnaires were administered for utilization of antibiotic usage among some Nigerians in Benin. The commonly prescribed antibiotics were ampicillin, chloramphenicol, streptomycin, and tetracycline. The least prescribed were cefotaxime, pefloxacin and ciprofloxacin while methicillin and vancomycin were not prescribed at all.<sup>10</sup> Again this variation of antibiotic pattern may be due to variation in types of organisms & diseases.

In our study it was found that in only 48 (12%) patients culture for sensitivity was done or advised and in 352 (88%) patients neither culture was done nor advised and received empirical antibiotic therapy. A survey project was designed to conduct nationwide to explore the pattern of antibiotics use at the primary health care level in Bangladesh. In the first phase of this effort, 20 Upazila Health Complexes and the Union Health Centres thereunder each of Dhaka and Chittagong division were randomly surveyed. From physician survey it was evident that 55.57 % of the doctors prescribe antibiotics in suspected infection while only 33.46 % of them prescribe antibiotics in confirmed cases. In case of empirical therapy, cephalosporin was found to be on the top of choice (26.9 %) of doctors.<sup>11</sup>

Again in a study of 122 patients attending L'Archet Hospital in Nice, France prospectively audit of antibiotic prescriptions showed that 90 (74%) antibiotic treatments suggested by the requesting physician were empiric and 32 (26%) were documented.<sup>12</sup>

In this study it is evident that Ceftriaxone was preferred in almost all departments over other narrower spectrum antibiotics. Due to adequate supply in hospitals, tendency to prescribe 3<sup>rd</sup> generation cephalosporin, Ceftriaxone was highest, for broad spectrum coverage. Again most of the time ceftriaxone was 1<sup>st</sup> choice of the doctors considering the morbid condition of the patient for adequate anti-bacterial coverage. For identifying the organism practice of culture sensitivity was very low. It might be due to some factors like lack of adequate lab facilities, financial constraints of the patients, no chance of time delay to wait for the culture sensitivity result considering the deteriorating conditions of the patients.

#### **Conclusion:**

Lack of consciousness on the use of medicine especially antibiotic is the major cause of inappropriate use. It is now essential to monitor strictly the ethical antibiotic prescription habit of all level of physicians. In future more study can be done periodically in finding antibiotics using rate and choice of physician to prescribe these drugs either rationally or irrationally. Practice of identification of the organism by culture and sensitivity should be increased. A good, representative database on the current status of antibiotic resistance among common and important pathogens is essential for the proper treatment of infectious diseases in the country. Energetic measures to slow down the emergence and spread of antimicrobial resistance should include programmes on surveillance, education and research on antimicrobial resistance, and regulation of use of antimicrobials in hospitals as well as in the community.

**Conflict of Interest :** None

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