PRESCRIBING PATTERN OF ANTIMICROBIALS USED IN UNDER FIVE YEARS CHILDREN IN COUGH OR COLD AND PNEUMONIA IN OUTDOOR SETTINGS OF TWO TERTIARY LEVEL HOSPITAL

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ABSTRACT

This descriptive type of cross-sectional study was conducted in MMCH and CBMCB during the period from 1st July/2005 to 30th Jun/2006.The aim of the study was to find out the prescribing pattern of antimicrobials in cough or cold and pneumonia in under five years children. Prescriptions were collected from the out-patient pediatric department by using structured questionnaire. The structured questionnaires were made according to WHO/ INRUD drug use indicator. In case of cough or cold, the main findings on drug use were (a) Average number of drugs per prescription were 3.21 in MMCH and 3.85 in CBMCB respectively, (b) Percentage of prescriptions with an antibiotic prescribed was 100% in MMCH and CBMCB, (c) Percentage of drugs prescribed in generic name were 57.69% in MMCH and it was nil in CBMCB, (d) Cotrimoxazole, Amoxicillin and Cephalosporin were used frequently in MMCH and Cephalosporin and Erythromycin mostly were used in CBMCB, and (e) Route of administration were appropriate in both the institutes. In case of pneumonia, (a) Average number of drugs per prescription were 3.77, (b) Percentage of prescription with an antibiotic was 100%, (c) Percentage of drug prescribed in generic name was 27.5%, (d) Cephalosporin were used mostly (45.5%) for the treatment of pneumonia. Trend of poly pharmacy was found in both the institutes.

Keywords: *Antimicrobials, cough or cold, pneumonia*

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INTRODUCTION

The golden age of antimicrobial therapy began with the production of penicillin in 1941. Since that time, antibiotics have multiplied.[1] Currently, antimicrobials are the largest, most frequently prescribed class of drug. Children can be protected from resistant microorganism through the judicious use of antimicrobial agents by their health care providers.[2] Antibacterial agents account for a large proportion of pharmaceutical consumption in the world, particularly in the developing countries.[3,4,5] Antibiotics are our most powerful weapons against bacterial infections. It is important to remember that not all fevers are due to infections nor all infections are caused by bacteria. The majority of infections seen in general practices are of viral origin and antibiotics can neither treat viral infections nor prevent secondary bacterial infections in these patients. Even where a bacterial aetiology is established, an antibiotic may not be always necessary. Many bacterial infections resolve spontaneously.[6] Antibiotics do not eradicate viruses nor does it shorten the course of viral illness. In fact, when antibiotics are given for viral infections, the result may be subsequent infection with resistant bacteria, since previous antibiotic exposure may provide a selective advantage for resistant bacteria. Furthermore, antibiotic use can affect others, fostering the carriage of resistant organisms among children in day care and to other family members. Viral illness is frequently self-limiting, lasting 2 to 7 days.[7] The colds, URTIs and bronchitis represent a set of infections that have a viral etiology in the vast majority (>90%) of cases, so it is not surprising that antibiotics have little or no clinical impact on their resolution.[8] Every year more than10million children in low to middle-income countries die before they reach their fifth birth day. Seven in 10 of these deaths are due to ARIs (mostly pneumonia), diarrhea, measles, malaria or malnutrition and often to a combination of these conditions.[9] Pneumonia is defined

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as an acute inflammation of lower respiratory tract (lung parenchyma) associated with recently developed radiological pulmonary shadowing.

Pneumonia can be caused by both bacteria and viruses. There are different types of pneumonia.[10]. Streptococcus pneumonia is one of the principle causal agents of ARI in children and its resistance to antibiotics has increased worldwide. One third of such cases are resistant to many antibiotics.[11,12] Every year in developing countries, some 4.5 million persons, most of them less than 5 years of age, die of ARI. Most ARI episodes are caused by viral agents and are self-limiting, but the bacterial pneumonias, which occur less frequently, carry a much higher risk of complications and death. To cover the possibility of undiagnosed pneumococcal pneumonia, WHO guidelines for the management of ARI include empirical use of antimicrobial agents such as procaine Penicillin, Ampicillin and Cotromoxazole.[11] For treatment of pneumonia, appropriate antibiotic should be given for 5 days. The choice of antibiotic is based on the fact that most childhood pneumonia of bacterial origin is due to *streptococcus pneumoniae* or *haemophilus influenzae.* The treatment of non-severe pneumonia can utilize a 5 day course of either oral Co-trimoxazole or Amoxicillin. These two oral antibiotics are usually effective treatment for these two bacteria, both are relatively inexpensive, widely available, and are on the essential drug list of most countries.[13] Wide spread use of broad spectrum antibiotics contributes to increasing rates of bacterial resistance to antibiotics.[14]. Cough or cold and pneumonia are very common diseases in Bangladesh. Antibiotics are improperly used in both developed and developing countries. So this study was conducted to find out the pattern of antimicrobials use in under five years children in cough or cold in out-patient pediatric departments of Mymensingh Medical College Hospital (referred to as MMCH hereafter) and Community Based Medical College, Bangladesh hospital (referred to as CBMCBH hereafter) and pneumonia in MMCH to justify the above hypothesis on antimicrobials use in cough or cold and pneumonia in Bangladesh.

METHODS

The study was carried out in the pediatric out-patient department of MMCH and CBMCB during the period from 1st July 2005 to 30th June 2006. The study was a descriptive cross-sectional one. In this study, 260 prescriptions of cough or cold were collected from pediatric out-patient department of MMCH and 40 prescriptions were collected from CBMCB. 40 prescriptions of pneumonia were collected from MMCH. Non probability sampling technique was followed in the collection of samples. Sample is collected purposely. In this study to identify the magnitude of rational prescribing of antibiotics for the treatment of cough or cold and pneumonia in under five years children, structured questionnaires were used.

These structured questionnaires were written according to selected WHO/INRUD drug use indicators for primary health care facilities.[15] These questionnaires were filled up from prescriptions which were prescribed by graduate medical officers. Prescriptions were collected from outdoor patients attending the pediatric out-patient departments of both hospitals. These prescriptions were collected from doctors' consultation rooms in hospitals. In the light of selection of WHO/INRUD drug use indicators for primary health care facilities[15], the following parameters were studied.

1) Average number of medicine prescribed per prescription
2) Percentage of prescription with an antibiotic prescribed
3) Percentage of prescription with an antibiotic prescribed.
4) Percentage of prescription with an injection prescribed.

OBSERVATIONS AND RESULTS

In Cough or cold

It was observed that in MMCH for cough & cold, maximum drugs used per prescription & average no. of drugs per prescription was 6 & 3.21 respectively. Where as in CBMCB the values were 5 & 3.85 respectively (Table I).

It was also observed that different antimicrobials were used frequently in Cough & Cold in both the institutes. In MMCH the anti-microbial Amoxicillin was used very often (32.30% cases) whereas in CBMCB the most frequently used anti-microbial was Cephalosporin (62.5% cases)

(Table II, Figure 1) It was further observed that in 57.69 % cases the drugs were prescribed in generic name & in the remainder cases (42.31%) drugs were prescribed in their trade names in MMCH.

But in contrast, in all the cases the drugs were written in their trade names in CBMCB (Table III, Figure 2). As regards the duration of treatment, it was mentioned in 100% cases in CBMCB, while it was mentioned only in 37.3% cases .in MMCH (Table IV). The maximum number of drugs used for pneumonia was 6 in MMCH. The average number of drugs prescribed for pneumonia was 3.77 & at least an antibiotic was prescribed for all the pneumonia cases (Table V & VI).

Among the different antibiotic used in pneumonia, cephalosporin was used in most of the cases (47.5% cases) & in the vast majority of cases they were given orally (Table VII).

Table I

Showing distribution of drugs per prescription / Average no. of drugs per prescription & percentage of prescription with an antibiotic

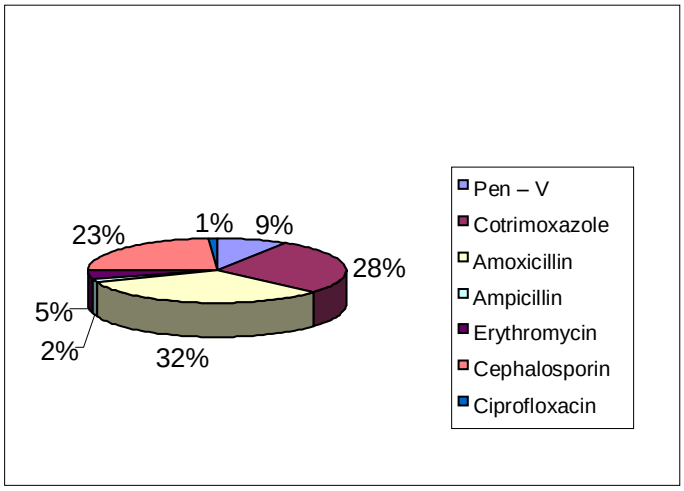
No. of drugs per prescription	MMCH			CBMCB		
	No. of prescription	Average no. of drugs per prescription	% of prescription with an antibiotic	No. of prescription	Average no. of drugs per prescription	% of prescription with an antibiotic
01	Nil			Nil		
02	37			Nil		
03	162			13		
04	39	3.21	100%	20	3.85	100%
05	13			07		
06	09			Nil		
Total	**260**			**40**		

Table II

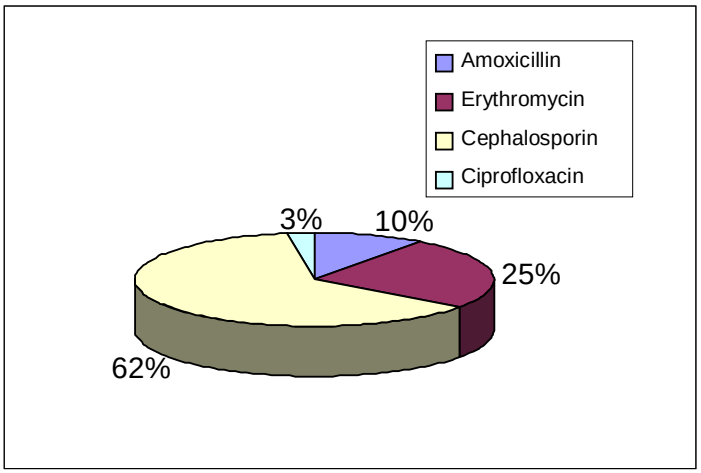
Showing the % of specific antimicrobials used & their routes of administration in Cough & Cold in MMCH & CBMCB.

Name of Antimicrobials	***MMCH***				**CBMCB**			
	No. of prescription containing specific antimicrobials	% prescription containing specific antimicrobials	Route of administration		No. of prescription containing specific antimicrobials	% prescription containing specific antimicrobials	Route of administration	
			Oral	Par-enteral			Oral	Par-enteral
			No. of prescription	No. of prescription			No. of prescription	No. of prescription
Phenoxymethyl penicillin	23	8.84	23	Nil	--	--	--	--
Cotrimoxa-zole	72	27.69	72	Nil	--	--	--	--
Amoxicillin	84	32.30	84	Nil	04	10	04	Nil
Ampicillin	05	1.92	05	Nil	--	--		
Erythromycin	12	4.61	12	Nil	10	25	10	Nil
Cephalosporin	61	23.46	61	Nil	25	62.5	25	Nil
Ciprofloxacin	03	1.15	03	Nil	01	2.5	01	Nil
Total	260	100	260		40	100	40	

Figure: 1: Shows the antimicrobials drugs used in prescriptions in two teaching hospitals.



IN MMCH



IN CBMCB

Table III

Shows generic versus trade name of drugs used in cough & cold in MMCH & CBMCB.

Generic name in MMCH	*Generic name in CBMCB*	*Trade name in MMCH*	**Trade name in CBMCB**
57.69%	Nil	42.30%	100%

Figure: 2: Showing generic versus trade name

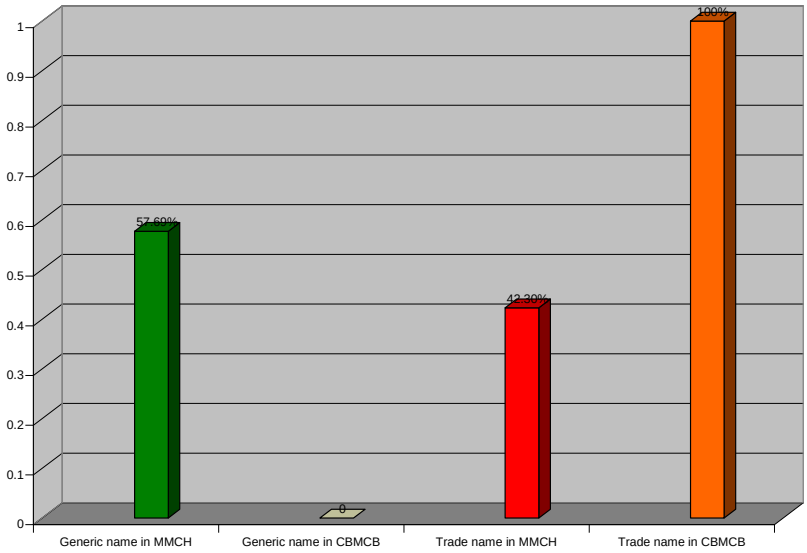


Table IV

Shows the duration of treatment of antibiotic in Cough & Cold in percentage.

Duration of treatment	**In MMCH**	**In CBMCB**
Mentioned	37.30%	100%
Not mentioned	62.69%	Nil
Total	100%	100%

Table V

Shows number of drugs used per prescription in Pneumonia in MMCH.

Number of drugs per prescription	No. of prescription	Total number of drugs in prescriptions
01	Nil	
02	01	
03	16	
04	15	151
05	07	
06	01	
Total number of prescriptions	40	

Table: VI

Shows the average number of drugs used per prescription, percentage of prescription with an antibiotic, generic versus trade name in percentage & duration of treatment in Pneumonia.

Average number of drugs Per prescription	Percentage of prescription with an antibiotic	Generic name (%)	Trade name (%)	Duration of treatment	
				Mentioned (%)	Not mentioned (%)
3.77	100	27.5	72.5	47.5	52.5

Table: VII

Shows the antimicrobial drugs used in prescription, their nomenclature & their routes of administration in pneumonia.

Name of antimicrobial drugs	Total number of antimicrobial drugs	Percentage of antimicrobial drugs	Generic name total number	Trade name total number	Routes of administration	
					Oral total number	Injection total number
Co-trimoxazole	09	22.5%	03	06	09	Nil
Amoxicillin	11	27.5%	08	03	11	Nil
Erythromycin	01	2.5%	Nil	01	01	Nil
Cephalosporin	19	47.5%	Nil	19	18	01
Total number of antimicrobial drugs	40					

DISCUSSION

Antimicrobials are a limited resource which may be seriously depleted by inappropriate prescribing.[16] Several studies in hospitals have shown that more than half of the antibiotic prescriptions were either unnecessary or inappropriate, or the dose was incorrect. More than 90% of these antibiotics were used empirically on clinical grounds alone.[17] Even though the study was carried out only for a short period, the coverage was narrow based only on under 5 years children in cough or cold and pneumonia in pediatric out-patient departments of MMCH and CBMCBH but the study was very important for that age-group in our country. It was interesting to observe that 100% of all children with cough or cold were given antibiotic either willingly or pressured by parents. In cough or cold, maximum number of drugs prescribed per prescription was 6 with an average of 3.21 in MMCH and 3.85 in CBMCB. Percentage of prescription with an antibiotic in MMCH and CBMCB were 100%. In MMCH, Cotrimoxazole, Amoxicillin, and Cephalosporin mostly were prescribed and in CBMCB, Cephalosporin and Erythromycin were mostly prescribed. In MMCH, physicians wrote antibiotics in generic names in 57.69% of prescriptions but in CBMCB, no antibiotic was prescribed in generic name. Inclination towards trade name prescribing was more in the private institute, which indicates prescribing of costly drugs. Generic prescribing is a change of habit and can be inculcated.[18] In case of pneumonia, maximum number of drugs prescribed per prescription was 6 with an average of 3.77. Drugs prescribed in generic names were 27.5%. Broad-spectrum antibiotics were used in the treatment of pneumonia. Physicians prescribed antibiotics through the appropriate routes in both the institutes. It was observed that the average number of drugs used per prescription was not within the optimal value in either of the institutes. Most of the patients in the outdoor departments were poor and illiterate, so these patients could be treated with cheaper broad-spectrum antibiotics that have the same therapeutic value. Use of

effective narrow spectrum antibiotics for children should remain a priority.[14]

An interesting feature of this study was duration of antibiotic treatment. In MMCH for the treatment of cough or cold, doctors mentioned 7 days in 37.30% of prescriptions and in CBMCB, they mentioned 7 days in 50% of prescriptions and 10 days in 45% of prescriptions. In MMCH, the duration of treatment was not mentioned in 62.69% of prescriptions. In MMCH, for treatment of pneumonia, physicians mentioned 7 days in 45% of prescriptions; 3 days in 2.5% of prescriptions and duration of treatment was not mentioned in 52.5% of prescription. Duration of treatment is a very important concern, which is related to indiscriminate use of antibiotics. It can be easily overcome by writing the duration of treatment in prescriptions. In CBMCB, specific duration of antibiotic treatment was mentioned in all prescriptions. Except few conditions, the optimum duration of antibiotic treatment is unknown. Many antibiotics are often prescribed for duration of 5–7 days. Nevertheless, it is reasonable to discontinue therapy even after a shorter period if the patient's symptoms have resolved. There are, however, certain infections where prolonged treatment is necessary. Dowell (1997)[19] reported in a study that in any case, although the evidence to support shorter courses of antimicrobials is not optimal, the evidence to support 10 – 14 days of antimicrobials is practically non-existent. According to one pharmacology textbook[2], therapy should be continued until apparent cure has been achieved; most acute infections are treated for 5 to 10 days. There are many exceptions to this, such as typhoid fever; tuberculosis and infective endocarditic, in which drugs are continued for a longer time. Another interesting feature of this study was the dosage of antibiotics. We know that dosages of medicine is very important for children which is related to body weight but dosages were given by apparent measure in outdoors as weights of children were not taken though there were bathroom scales in consultation rooms. So there are so many limitations within the limited scopes and it would be better if prescriptions could be done by weighing the patients but it is difficult to do so in outdoors where overcrowding of patients are rife.

Not only is antibiotic treatment of URTI ineffective but it may also be harmful. Side effects or adverse reactions to the antibiotic may occur.

Antibiotic treatment may select for more resistant strains. Antibiotic resistance has been an enormous problem in developing countries. Treating the common cold with antibiotics is a waste of money. The use of new and more expensive antibiotic rapidly increased every year according to one survey.[21]

Centers for disease control and prevention (CDC) estimates that about 100 million courses of antibiotics are provided by office-based doctors in the United States each year.[22] CDC estimates that over 50 million of these courses are unnecessary which are given mostly for colds and viral infections for which antibiotics offer no benefit.

Dowel (1998)[5] reported a data from the national centre for health statistics in the united states, indicate that in recent years, approximately three fourths of all out patient antibiotics have been prescribed for otitis media, sinusitis, bronchitis, pharyrgitis or nonspecific upper respiratory tract infection Antimicrobial drug use rates are highest for children. Numerous surveys in different countries have demonstrated that antibiotic prescribing in major teaching hospitals is suboptimal from study of Landgren (1988).[23] It is perceived that physicians are influenced by promotional activities and majority of physicians denied being influenced by industry-sponsored information; however, their perception of the pharmacology of several drugs was more congruent with advertising messages than it was with data in the scientific literature.[24] Thus, interest is increasing in the forces that influence doctors' prescribing habits, and research on these influences can be performed in a rigorous manner.

Moosa and Pavillerd (1990)[17] mentioned that emerging microbial resistance is likely to be a serious ongoing threat in Saudi Arabia, as it is in most other countries where antimicrobials are frequently prescribed, unless steps are taken to modify prescribing pattern. The fact that 25 – 40% of a hospital pharmacy budget may be spent on antimicrobials, 20 – 64% of which are prescribed inappropriately, is unacceptable. According to a survey for colds, URTIs and bronchitis resulted in approximately 12 million antibiotics prescriptions, accounting for 21% of all antibiotic prescriptions to adults in 1992.[8] A total of 51% of patients diagnosed as having cold, 52% of patients diagnosed as having URTIs and 66% of patients diagnosed as having bronchitis were treated with antibiotics. The majority of antibiotics prescribed to adults in ambulatory practices in the United States are for acute sinusitis, acute pharyngitis, acute bronchitis, and non specific upper respiratory tract infections (including common colds). For each of these conditions especially colds, nonspecific upper respiratory tract infections and acute bronchitis (for which routine antibiotic treatment is not recommended) – a large proportion of the antibiotics prescribed are unlikely to provide clinical benefit to patients.[7]. However, other studies[25] have found that rates of antibiotic prescription for upper respiratory tract infections increases, as patient volume increases suggesting that limited time to discuss non antibiotic treatment alternatives is a factor in busy practices.

A study from twelve developing countries both similarities and differences in drug use patterns can be seen.[26] Of special interest on outlying values-for example, the high average numbers of drugs per encounter in Indonesia and Nigeria (3.3 and 3.8), the highest percentages of prescriptions of one or more

antibiotics in Uganda and Sudan, (56% and 63%) and of injectable drugs in Uganda, Sudan and Nigeria (36 – 48%) and the low availability of essential drugs in Ecuador (38%). In Bangladesh, the average number of drugs per prescription for general outpatient encounters was 1.4 and 78% of drugs were prescribed by generic name in Bangladesh. Physicians report many pressures to prescribe unnecessary antibiotics, but most often cited is the unrealistic expectation for antibiotics on the part of patients or parents. However, most patients do not acknowledge that they pressure their physician for antibiotics.[19] The bad prescribing habit of one clinician can directly affect the patients of their colleagues through selection of, and cross infection by, antibiotic-resistant microorganism.[27] Patients need to understand that antibiotics are not appropriate for the treatment of viral infections. They also must be educated about the need to take antibiotics as directed and for the entire duration prescribed.[7]

Various methods have been used to limit the misuse of antibiotics. In Australia, in order to reduce the use of antibiotics and encourage rational antibiotic prescription, a booklet giving antibiotic guidelines was introduced. A subsequent survey clearly showed improvements in rational prescription of antibiotics. Restrictive and educational guideline for antibiotic use has been advocated. The educational methods include clinical and laboratory consultation, education of undergraduate and postgraduates, and provision of bulleting, booklets and audiovisual aids.[17]

A competent physician can prescribe scientifically, and economically if due emphasis on drug usage, is kept in mind.[18] Pharmacologists in Bangladesh do not play any role in hospital practice, whereas they attend many ward rounds in advanced countries. We strongly feel that a combined round will be a helpful educational programmme for improved use of antibiotics.[17]. Medicals students and intern doctors should also attend this round.

CONCLUSION

Ideally, medical students should be educated in the principles of good prescribing before they enter the hospital. In the wards, these principles should be reinforced with bedside teaching and examinations and proper knowledge about drugs. The quality use of medicines needs to be recognized as an important part of medical education and intern training programs.[28] In conclusion, a broad-based, educational programme for students and doctors, support from diagnostic bacteriology groups and medico-pharmaceutical departments, limited prescribing of the more expensive antibiotics, and cooperation from the pharmaceutical industry will be required in order to achieve appropriate use of antibiotics.[17] We must learn more about the pharmacology of certain antibiotics in order to use these agents better. One must therefore attempt to know the most of some antibiotics rather than knowing much less of all of them.[29]

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