

## ANTIBIOTIC MISUSE IN CHILDREN BY THE PRIMARY CARE PHYSICIANS - AN INDIAN EXPERIENCE

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### ABSTRACT

**Objective:** To determine the misuse of antibiotics in the Pediatric outpatients department' (OPD) of a busy teaching hospital and to ascertain the probable reasons behind it.

**Methods:** Over a 6 months period, new cases primarily treated with antibiotics by Medical Officers (first contact physicians in Peadiatric Medicine and Surgery OPD) were recruited in the study after obtaining written consent from the parents. Various errors of antibiotic usage were noted. All Medical Officers were asked to fill up a preformed questionnaire and the parents/guardians were interviewed on their ideas about antibiotics. Data were analyzed by the statistical software SPSS 10.

**Results:** Antibiotics were prescribed in 2427 (84.9%) new patients. Misuse of antibiotics was documented in 36.8% patients (no indication in 35.3%, improper selection in 17.9% and incorrect dosage in 7.7%). All medical officers were aware that they overuse antibiotics. The various reasons sited were demand of the parents, reluctance to counsel due to patient overload, free supply of medicines from OPD and sympathetic grounds as follow up visits were uncertain. Majority of the parents/attendants belonged to poor socio-economic status and did not have any idea regarding antibiotics. All parents wanted quick relief without hospitalization and only 2.3% were willing to revisit the OPD for the same illness. Both medical officers and parents felt that base line investigations were unnecessary.

**Conclusion:** Antibiotic misuse is quite common in this part of the world. Irrational use was mostly seen in over-prescribing and improper selection of antibiotic. Poor socio-economic status and overcrowding of patients in OPD were the main responsible factors.

**Key words:** Antibiotics, child, physicians

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### INTRODUCTION

Since their initial introduction in the 1940s, antibiotics are hailed as miracle drugs.<sup>1</sup> As if to prove the point, indiscriminate use occurs in almost all corners of medical practice worldwide in varying magnitude. Its use has a confidence boosting effect in the minds of both physicians and patients equally leading to misuse or overuse and is perpetuated by propaganda made by pharmaceutical companies highlighting the fantastic effects these wonder drugs can have. Many such examples can be seen as in viral infections when antibiotics are routinely prescribed, and there is a widespread practice of using broad spectrum antibiotics instead of narrower spectrum.<sup>2</sup> The problem is particularly serious in the developing countries where antibiotics are freely available as over-the-counter drugs. Inappropriate use of these drugs has resulted in an alarming increase in bacterial resistance and Nosocomial infection rate, which in turn has invited higher generation drugs

in the pharmaceutical market along with their higher cost and untoward side effects.<sup>3</sup> It is reasonable to believe that high rate of resistance in community acquired pathogens is the direct result of selective pressure of intensive use of antibiotics in general population. Though it is widely known to be an unjustified practice, it is perplexing why such practice perpetuates. Studies which have attempted to analyze the basis behind this, have yielded different results.<sup>4,5</sup> Probably the reasons behind such practice vary from country to country and among different regions in the same country depending on the availability of health care facilities, social practice of the common man and health burden of the society. The present study attempts to evaluate the irrational use of antibiotics in the Pediatric outpatient-department (OPD) of a busy Government Teaching Hospital, and to assess the probable reasons behind it.

### PATIENTS AND METHOD

A prospective study was done on pediatric outpatients (both Medicine and Surgery) of North

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Bengal Medical College Hospital, Darjeeling, India over a period of 6 months. The primary objective was to study the pattern and rationality of antibiotic use in pediatric patients (1 month to 15 years of age). The secondary objectives were to assess the prescribing practice of the primary care physicians in pediatric out-patient departments and the probable reasons behind it, and also to assess the awareness of the parents/guardians towards the treatment received and towards antibiotic use. The study was approved by the Hospital Ethics Committee.

In our hospital, the first reception of the pediatric patients in the OPD is done by a Medical Officer (M.O.). The minimum qualification of a M.O. is M.B.B.S. with training in Pediatrics for one year. The protocol followed for ailments which do not require hospitalization is prescription of medicines supported by investigations and call for follow up visits. Difficult cases requiring admissions or those not adequately responding to initial medical treatment are referred to a Pediatric Medicine / Surgery consultant (Assistant Professor onward). All such prescriptions of new cases were included in the study after obtaining written consent from the parents. Initially, during the study period the medical officers were blinded about it. The Nurse-in-charge of Pediatric OPD, who receives all the prescriptions, was instructed to check the prescriptions and send all such new cases to the first author sitting in a separate room in the OPD. The patients were re-evaluated by cross checking the history and clinical examination. Notes were made regarding antibiotics used, disease for which they were prescribed, whether given empirically or guided by any microbiological report, and the dose, duration and route of administration of the drugs. Assessment of the rationality of antibiotic use was based on (1) indication of antibiotic therapy (2) selection of antibiotics (3) dosage and (4) duration of therapy. Specific chemotherapeutic agents such as antimalarials, antitubercular drugs etc. were not included in the study. Combination drugs e.g. norfloxacin-metronidazole combination was treated as a single antibiotic prescription. The parents/guardians, with due consent, were interviewed about their social background, knowledge of the diseases for which treatment was given and their ideas regarding antibiotics and antibiotic use, as per a preformed questionnaire. Answers were noted down by the first author and after completion, repeated to them for their approval. At the end of the study each M.O., with due consent, was requested to fill up a preformed questionnaire without disclosing their identity and without consulting each other, about his/her ideas regarding antibiotic therapy in the pediatric population on OPD

basis. Data were compared between the two groups (Pediatric Medicine and Surgery) and were analyzed by SPSS 10 software. Z test was applied to assess significance. P value less than 0.05 was taken as statistically significant.

## RESULTS

During the six months time, 2859 new prescriptions were crosschecked, of which antibiotics were prescribed in 2427 patients (84.9%). The commonest diagnosis made in Pediatric Medicine OPD was upper respiratory tract infection (URTI) followed by diarrhea/dysentery. The most commonly prescribed antibiotic was amoxicillin (in URTI) and a combination of norfloxacin and metronidazole (in diarrhea/dysentery). In Pediatric Surgery OPD, the commonest presenting ailments were hernia, hydrocele, umbilical granuloma followed by persistent lymphadenopathy. Amoxicillin was the first drug of choice here too. The details of antibiotic use are summarized in Table 1. In 36.8% patients, one or more type(s) of irrationality in the antibiotic use (all types) were documented (Table 2). The use of antibiotic was guided by microbiological report in 5.2% patients. Irrational use of antibiotics was seen more in the Pediatric Surgery OPD, e.g. wrong indication, improper selection, dosage and duration. Oral medications were most commonly favored, intramuscular injections prescribed rarely (only in 3 cases) and intravenous injections were never prescribed from OPD. Medical officers in Pediatric OPD used to perform duties on rotation (4-5 persons / day for six days a week). The mean experience of a M.O. in Pediatrics was  $5.2 \pm 3.4$  years. All of them were adequately trained in diagnosing and treating common pediatric ailments (Table 3). They were aware that they overuse/misuse antibiotics. The justification put forward by them is summarized in Table 3. Analysis of the responses by the parents/attendants (n = 2427) to the questionnaire provided shows that most of the parents/attendants who had volunteered for interviews were male and were in the age group 30-50 years (63.8%). Their education was mostly below junior high school level i.e. class VIII (2339; 96.2%) of which 1411 (58.1%) were illiterate. They were mainly manual laborers working on daily wages. Majority of them did not have any idea of what antibiotic is (86.9%). The purpose of hospital visit was mainly to get free medicines (88.5%) and to consult a doctor (32.4%). Though most of them had visited the hospital before for some other reasons (76.8%) all they wanted was quick relief of symptoms without hospitalization (100%) and were highly reluctant for investigations (98.1%). Very few wanted to revisit the hospital for follow up of the same illness (2.3%).

**Table 1: Spectrum of Antibiotic Use In The Outpatient Department**

<b>Antibiotics</b>	<b>Total prescriptions (N=2427)</b>	<b>Pediatric Medicine (n=1702)</b>	<b>Pediatric Surgery</b>
Amoxicillin	781 (32.2)	467 (27.4)	314 (43.3)*
Norfloxacin+metronidazole	427 (17.6)	335 (19.7)	92 (21.6)
Cefpodoxime	356 (14.7)	278 (16.3)	78 (10.8)*
Co-amoxiclav	305 (12.6)	236 (13.9)	69(9.5)
Cefixime	292 (12.0)	239 (14.0)	53 (7.3)*
Ofloxacin+tinidazole	205 (8.4)	181 (10.6)	24 (3.3)*
Metronidazole	199 (8.2)	130 (7.6)	69 (9.5)
Ofloxacin+ornidazole	182 (7.5)	161 (9.5)	21 (2.8)*
Norfloxacin	165 (6.8)	113 (6.6)	52 (7.1)
Trimethoprim+sulfamethoxazole	146 (6.0)	98 (5.8)	48 (6.6)
Cefdinir	64 (2.6)	50 (2.9)	14 (1.9)
Ceftriaxone (I.M. Injection)	9 (0.4)	9 (0.5)	0 (0.0)
Gentamicin (I.M. Injection)	6 (0.2)	6 (0.4)	0 (0.0)
Prescriptions with 1 antibiotic	1806 (74.4)	1190 (69.9)	616 (85.0)*
Prescriptions with 2 antibiotics	532 (21.9)	423 (24.8)	109 (15.0)*
Prescriptions with 3 antibiotics	89 (3.7)	9(5.2)	0(0.0)
Prescriptions with >3 antibiotics	0 (0.0)	0 (0.0)	0(0.0)

\* = Statistically significant (p < 0.05); Figures in parentheses indicate percentage

**Table 2: Pattern of antibiotic misuse**

<b>Type or irrational use</b>	<b>Total prescriptions (N=2427)</b>	<b>Pediatric Medicine (n=1702)</b>	<b>Pediatric Surgery (n=725)</b>
Empirical antibiotic without request for investigations	2301 (94.8)	1593 (93.6)	708 (97.7)
Empirical antibiotic with request for investigations	126 (5.2)	109 (6.4)	17 (2.3)
Inappropriate use (total)	892 (36.8)	424 (24.9)	468 (64.5)*
• No indication	856 (35.3)	387 (22.7)	469 (64.7)*
• Improper selection	435 (17.9)	238 (13.9)	197 (27.2)*
• Incorrect dosage	186 (7.7)	124 (7.3)	62 (5.5)
• Incorrect duration of therapy	279 (11.5)	84 (4.9)	195 (26.9)*

\* = Statistically significant (p < 0.05)

Figures in parentheses indicate percentage

**Table 3: Response of Medical Officers (n=14) To The Questionnaires of Antibiotic Utilization.**

<b>Queries</b>	<b>Response</b>
Mean experience in Pediatric OPD (years)	5.2 ± 3.4
Number of new patients examined / day / Medical Officer (mean ± S.D)	26.8 ± 6.2
Feels confident in seeing pediatric patients	
Yes	14 (100.0)
No	0 (0.0)
Can manage minor pediatric ailments of his/her own	
Yes	14 (100.0)
No	0 (0.0)
Think antibiotics are necessary in ALL pediatric ailments	
Yes	0 (0.0)
No	14 (100.0)
Always use antibiotics supported by laboratory investigations	
Yes	0(0.0)
No	14 (100.0)
Thinks he/she overuses antibiotics	
Yes	14 (100.0)
No	0(0.0)
Reason(s) for overuse of antibiotics	
• Patient demand	12 (85.7)
• Time consuming explanation, as there is too much work load	14 (100.0)
• Out of sympathy, as patients are poor and cannot afford a revisit	11 (78.6)
• To buy time for surgery, due to a long waiting list	6 (42.9)

Figures in parentheses indicate percentage

## DISCUSSION

North Bengal Medical College is affiliated to a rural Teaching Hospital in Darjeeling district of India and caters to a large number of patients from six districts of North Bengal, three adjoining states and countries. The Pediatric OPD runs in the morning hours (4 hours a day) for six days a week and daily attendance is about 180-200 cases. Medicines like paracetamol, amoxycillin, metronidazole, chloroquin, oral rehydration solution are provided free at the hospital pharmacy on prescription. It is apparent that there is an enormous rush of patients in the OPD in the face of lesser number of primary physicians. This results in lesser time distribution per patient. Moreover, though it seems that the doctor: patient ratio is manageable (Each M.O. attends to 40 patients in four hours: 10 patients / hour, which means 6 minutes spent per patient), practically speaking the flow of patients is not uniform. The maximum rush occurs from 11 O' clock, when each M.O. might have to attend to almost 18-20 cases per hour. In this situation it is impossible to talk to and counsel each patient adequately and rapid turnover becomes the immediate goal. Apart from this there is a ubiquitous demand from the patients for 'free drugs' provided from the hospital pharmacy. A combination of all these factors encourages rampant antibiotic prescription without adequate counseling. In the present study, URTI (common cold and mild acute rhino-sinusitis) was the commonest ailment. This is in accordance with the previous studies.<sup>6,7</sup> Amoxicillin was the most prescribed antibiotic due to its broad spectrum and free hospital supply. Irrespective of the nature of diarrheal disease a combination preparation of norfloxacin and metronidazole was prescribed to cover all types of diarrhea and dysentery whether bacillary or amebic. These reflect the blanket treatment meted out to the patients and in most instances in the absence of necessary investigations. Irrational use of antibiotics was documented in 36.8% patients. The irrationality was seen mostly as 1) unnecessary use (where not indicated) and 2) improper selection of drugs. Drug dosage and duration of therapy were correct in most prescriptions. Though irrationality was more commonly seen in the Pediatric Surgery prescriptions, there was no difference between the groups when it came to empirical use.

An important point to be noted is the improper selection of antibiotics. This selection irregularity can be attributed to various reasons. It may be to buy time for surgery (long dates), lack of supportive investigations and the reluctance to perform them, easy and free availability of some antibiotics, and

Insistence on the part of the parents/relatives for 'medicines'. In Pediatric surgery cases it was also seen that if the relatives wanted to defer surgery for any reason, they insisted on prescription of 'some' medicines. Hence the cause of misuse is multifactorial. This brings us to one pertinent question: why antibiotics? Why not other drugs like vitamins, iron, antioxidants which have lesser side effects, are easily available and are genuinely indicated in the rural 'health deficient' population. Probably the high infection rates due to unhygienic living conditions and the fear of medico-legal hazards if the patient deteriorates make the prescription of antibiotics and their use a very suitable choice. The mean experience of the medical officers was 5.2 years which is quite good enough to treat common pediatric ailments and it was corroborated by them too (Table 3). Hence lack of practical knowledge or confidence is not the driving reason for misuse of antibiotics. It was interesting to note that they all were well aware of the overuse / misuse of these drugs. The medical officers in Pediatric Medicine and Surgery uniformly showed reluctance to adequately counsel the parents regarding treatment. Prescribing medicines disposed patients faster than explaining to them the natural disease process and not prescribing unnecessary medicines. It was more time consuming and futile in most instances due to very low levels of literacy among the parents. This is reflected by the overwhelming use of single antibiotic in most prescriptions in both Pediatric Medicine (69.9%) and Surgery (85%) OPDs. Another revealing fact is the lesser use of comparatively newer and better oral antibiotics whether it is Cefdinir (overall use 2.6%), Co-amoxycylav (overall use 12.6%) or Ofloxacin-Ornidazole combination (overall use 7.5%). Since the antibiotic use was not guided in most instances by investigations (overall 94.8%), amoxicillin was a universal choice. It probably has a pseudo-satisfying effect on the physicians that they have prescribed an antibiotic, on the patients that they have received 'medicines' and most importantly provided free of cost by the hospital. Supportive investigations were lacking in most prescriptions probably because it was apparent that even if advised they will never be done (98% of parents were not willing for investigation), and the chances of a revisit to the hospital are meager, as a revisit means loss of a day's wage for most of the rural population. Illiteracy is probably the reason behind the lack of awareness of antibiotics and its use among the parents/attendants though many of them have visited the hospital before (86.9%). All they wanted was quick relief without hospitalization, and free medicines. They were not interested in knowing

what it is, what it does and what its hazards are. Coming to hospital was bothersome for most of them as it meant loss of income and added expenses for food and to and fro conveyance for more than one person for that day. For the same reason majority did not want to revisit the hospital for the same disease.

Previous studies have shown an overall inappropriate antibiotic usage in 22-65% of patients. Inappropriateness was mostly adjudged as lack of indication.<sup>8-13</sup> Parret T *et al* found maximum errors in therapeutic prescription mainly in indications for urinary and respiratory tract infections, and errors were related to the spectrum of the antibiotic used and the length of treatment.<sup>14</sup> Potocki M *et al* evaluated the utilization of antibiotics in a pediatric teaching hospital. They found 85% prescriptions were justified. The rate of inappropriate prescriptions was similar in the medical and surgical ward, and higher for therapeutic (19%) or prophylactic treatment (18%) than for empirical treatment (12%). Higher inappropriate prescription rates were noted for macrolides than for co-trimoxazole and beta-lactams (50% v 18% and 15%, respectively;  $p < 0.05$ ).<sup>15</sup> Lam TP *et al*<sup>16</sup> examined the non-biomedical reasons which make family doctors over-prescribe antibiotics for upper respiratory tract infection (URTI) in a mixed private/public Asian setting. A significant number of respondents (21.8) felt they might be prescribing antibiotics too often for URTI but the majority of them felt they were using antibiotics just a bit too often. Thomas M *et al*<sup>17</sup> prospectively compared prophylactic and curative use of antibiotics in a tertiary care hospital with a primary care center. Antibiotic prophylaxis was found to be more inappropriate in the primary care hospital (49%) than in the tertiary care one (34%). Antibiotic therapy too was more appropriate at the primary level; 67% as opposed to 60% at the tertiary level.

Practitioners sometimes overestimate patients' expectations.<sup>18</sup> They tend to use less information in decision making regarding management than for diagnosis, and also when deciding to prescribe antibiotics. There is concern that this behavior may be counterproductive as inappropriate prescription of antibiotics may encourage the patient to relate the natural recovery of a commonly self limiting disease to the effect of medication endangering a cycle of repeat consultations for minor problems. Prescribing antibiotics for almost any presenting symptoms enhances the belief that these are effective against almost any ailments and increases antibiotic consumption.<sup>19</sup> Studies by Macfarlane *et al*<sup>20</sup> and Cheng *et al*<sup>21</sup> have shown that irrespective of

geographical distribution, educating general practitioners can reduce antibiotic overuse and educating patients increases their understanding of the disease process and improves compliance.

In our set up, we feel that overuse or misuse of antibiotics is more of a socio-economic problem than a technical one. Lack of knowledge of management of common ailments does not seem to be the primary problem. Most of them are prescribing the correct dose and for correct duration. Irrationality is mostly observed in over-prescription and antibiotic selection. The practice of prescribing antibiotics empirically is thus a common practice. Parents/attendants are poor and illiterate. Ironically they also feel investigations are unnecessary and not worth spending money. Due to this avoidance on the part of the physicians, a vicious cycle is set in, which prompts the patient to consume antibiotics and which in turn prompts the physician to prescribe more antibiotics. In a developing country like India, misuse of antibiotics needs a multi-pronged attack. Improving the health policy to reduce load in the hospital OPDs and increasing the number of medical officers per day to decrease the doctor- patient ratio may help in a long way. Mass awareness and health education of the general population regarding unnecessary antibiotic consumption may bring some betterment. But unless socio-economic status is improved and healthcare is brought to the doorstep of the patient where they need not incur extra cost and at the same time get free medicines and basic investigations done, their attitude towards health and treatment is probably not going to change. It is not only important to provide healthcare to all, we feel it is much more important to see that the goals of such efforts are achieved. In the absence of outcome of any health policy the State's exercise and expenditure remain futile.

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