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RESEARCH ARTICLE

Trend And Pattern Of Antibiotic Practice In Paediatric Surgery In Bangladesh

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Abstract

Introduction: Antibiotics are frequently over prescribed, misused or inappropriately used both in developed or developing countries. The extent and pattern of inappropriate use is well documented in developed countries but such studies are few in developing countries like Bangladesh. **Objective:** To find out trend and pattern of antibiotic practice in paediatric surgery in Bangladesh **Methodology:** This cross sectional descriptive study was carried out on 260 paediatric patients of 0-15 years age range, to find out the pattern of antibiotic practice in pediatric practicing hospital and different clinic of Cumilla, Bangladesh. All the patients were studied after categorization into i) Clean ii) Clean-contaminated iii) Contaminated and iv) Dirty wounds according to their potentiality of post-operative wound infection. Total period of antibiotic practice was divided into a. Pre-operative (Up to the day before operation) b. Per-operative (during or just before operation) c. Post-operative (days after operation) and d. Post-discharge stage for the convenience of this study. Antibiotic practice in all categories during all periods mentioned were compared and evaluated. **Results:** More than two antibiotics were given in a single patient in 48.1% of clean and 51.9% of contaminated patients in a combination or sequentially. More than 3 antibiotics were used in a single patient. On the average total number (mean) of antibiotic use was more than two (2.64 +1.09). The highest number (mean) of antibiotics was used in contaminated category (3.29) with range of (0-7). Overall total duration (mean) of antibiotic used was 17.40 days.

Keywords: Antibiotic practice, Paediatric surgery, preoperative, Post-operative

1 | INTRODUCTION

Antibiotics are frequently over prescribed, misused or inappropriately used both in developed or developing countries[1]. This is not only unnecessary and wastes of resources but also increases the risk of adverse clinical consequences in a situation where objective benefits are doubtful[2]. Studies conducted in general and teaching hospitals showed that about 28% of our patients and 52% of the inpatient of a general hospital and 60.36% of the patients in a teaching hospital received antibiotic therapy that was not appropriate[3]. Irrational use of antibiotic was also wide spread seen in several studies conducted in China[4,5], Indonesia and Sudan[6] and Thailand.[7] Antibiotic misuse is also commonly seen at discharge after operation. This abuse of antibiotic prophylaxis leads to excessive surgical wound infection rates and strongly contributes to the emergence of bacterial resistance[8]. The number of this antibiotic resistance strains has been correlated with the number of kilograms of antibiotic used in any given hospital. The cost of such irrational drugs is enormous in terms of our scarce resources[9].It has been observed that even after obtaining adequate asepsis surgical site infections are still one of the most important causes of postoperative morbidity and mortality[10]. Antibiotics have a key role to play in minimizing these unwanted consequences[11]. The risk of postoperative wound infection has been reported to a range from 0% to 40% depending upon the surgical procedure performed. Most surgeons tend to use antibiotic in almost all cases of surgery irrespective of their categories in order to have an infection free record[12]. Common errors in antibiotic prophylaxis includes selection of wrong antibiotic, administering first dose too early or too late of making incision, failure to repeat doses during prolong procedures, excessive duration of prophylaxis and inappropriate use of broad spectrum agents. The reasons behind this over use may be lack of confidence regarding sterilization status of operation theatre and instruments, inadequate information about sensitivity pattern of local infecting agents, over reliance on newer antibiotics, preference of daily dosing to multiple dosing, affluent patients preference of costly drugs and above all aggressive sales promotion by pharmaceutical companies[13]. Although the extent and pattern of inappropriate antibiotic uses are extensively documented in the developed world[14], such types of studies are now few and limited in developing countries like Bangladesh. This study will therefore be undertaken to find out the extent and pattern of antibiotic use in our paediatric surgery to identify the prescribing trend to emphasize the issue of rational usage.

2 | METHODOLOGY

This cross sectional descriptive study was carried out on 260 paediatric patients of 0-15 years age range, to find out the pattern of antibiotic practice in pediatric practicing hospital and different clinic of Cumilla, Bangladesh. All the patients were studied after categorization into i) Clean ii) Clean-contaminated iii) Contaminated and iv) Dirty wounds according to their potentiality of post-operative wound infection. Total period of antibiotic practice was divided into a. Pre-operative (Up to the day before operation) b. Per-operative (during or just before operation) c. Post-operative (days after operation) and d. Post-discharge stage for the convenience of this study. Antibiotic practice in all categories during all periods mentioned were compared and evaluated.

Table 1: Classification of Surgical wounds.

Category	Type of surgery
1. Clean	Elective, primarily closed procedure; respiratory, gastrointestinal biliary genitourinary oropharyngeal tract not entered, no acute inflammation, no break in the technique; expected infection rate ≤2%.
2. Clean-contaminated	Urgent or emergency case that is otherwise clean, controlled opening of respiratory, gastrointestinal, biliary or oropharyngeal tract; minimum spillage or mere break in the technique; expected infection ≤10%.
3. Contaminated	Acute non purulent inflammation present; major technique break or more spill from hollow organ; penetrating trauma less than 4 hours old; chronic open wound to be grafted or covered expected infection rate about 20%.
4. Dirty	Purulence or abscess present; preoperative perforation or respiratory, gastrointestinal, biliary or oropharyngeal tract; penetrating trauma more than 4 hours old; expected infection rate about 40%.

Supplementary information The online version of this article (https://doi.org/xx.xxx/xxx.xx) contains supplementary material, which is available to authorized users.

3 | RESULTS

On the average total number (mean) of antibiotic use was more than two (2.64 +1.09). The highest number (mean) of antibiotics was used in contaminated category (3.29) with range of (0-7). The lowest number of antibiotics was used in clean category (2.19 SD+1.06) (Table-2). The difference in the number of total antibiotics used is not significant (P>.05) between clean-contaminated and dirty category. Overall total duration (mean) of antibiotic used was 17.40 days. The duration of total antibiotic used in clean and dirty categories was around 16 days. Maximum total duration (20 days) of antibiotic use was found in clean-contaminated category (Table-3). The difference between Group A, Group C and Group D was not significant revealed by ANOVA (P>.05^{ns}). Mean duration of postoperative antibiotics use was found highest in clean-contaminated category (15.07 days), lowest in dirty category (12.75 days). The duration is significantly higher in group A, group B and group C than group D revealed by ANOVA test.

Table 2: Total number of antibiotic used in each patient (N=260)

Parameters	Clean N=125	Clean Contaminated N=49	Contaminated N=56	Dirty N=30	Total N=260
Mean±SD	2.19+1.06	2.86+1.12	3.29+1.08	2.78+1.29	2.64+1.19
Number of day's antibiotic used in each patient.					
Mean±SD	16.00+9.01	20.00+11.60	18.45+8.11	16.55+8.66	17.40+9.44
Range	1-56	1-58	3-38	4-38	1-58
Postoperative antibiotic use (including advice on discharge)					
Mean±SD	13.47+10.13	15.07+7.48	13.52+5.32	12.75+5.39	13.70+8.20

FIGURE 2:

Table 3: Frequency of use of antibiotic at different stages (N=260)

Antibiotic Used	Clean N=125	Clean Contaminated N=49	Contaminated N=56	Dirty N=30	Total N=260
Pre-operative (from admission)	62-49.6	31-63.2	41-73.2	23-76.6	177-68.0
X^2 test: X^2 = 18.462, df = 3, P<0.001***					
Pre-operative (from admission)					
	93-74.4	37-75.5	35-62.5	12-40.0	207-79.6
X^2 test: X^2 = 9.216, df = 3, P<0.5*					
Postoperative					
	117-93.6	49-100.0	55-98.2	28-93.3	249-95.7
X^2 test: X^2 = 5.263, df = 3, P>0.10^{ns}					
Advice on discharge					
	112-89.6	43-87.7	44-78.5	26-86.6	235-90.3
X^2 test: X^2 = 3.498, df = 3, P>0.10^{ns}					

FIGURE 3:

Overall 68.0% patient received pre-operative antibiotics. Minimum (49.6%) use seen in clean and maximum (76.6%) in dirty category. On the average 79.6% patients received per-operative antibiotics. Maximum (74.4%) per-operative use was seen in clean and minimum (40.0%) in dirty category. Overall 95.7% of patients received post-operative antibiotics including all the patients of clean-contaminated category. More than 80% patients in each group received antibiotic after discharge. No significant difference is found in postoperative and post-discharge antibiotics use among the groups (P>0.1^{ns}).

4 | DISCUSSION

This high frequency of pre-operative antibiotic usage was perhaps due to prolonged pre-operative hospital stay. Antibiotic prophylaxis has been extensively substantiated by controlled clinical trials[15]. Nevertheless much concern has been voiced in the last few decades about indiscriminate use of antimicrobials, including broad-spectrum agents threatening emergence of multiple drug resistance[16]. It was apprehended that indiscriminate use is ubiquitous, as such is also prevalent in our working situation. This trend of antibiotic use increases the risk of drug reaction but also diminishes their effectiveness, promote drug resistance and increases the overall treatment cost [17]. The total duration of antibiotic usage during pre and postoperative periods was found unduly prolonged (17.4 days) and had no significant difference in between clean and clean contaminated categories of wounds[18] had also observed prolonged postoperative antibiotic use where most of the antibiotics were given for more than five days. Postoperative antibiotics were also found to be used for prolong period (13 days) which exceeds the recommended limit of surgical prophylaxis of (24-48 hours) after operation[15,19]. It has been found that the critical period of antibiotic action for effective postoperative bacterial killing in clean or contaminated operation was up to 36 hours of operation[20] and prolong postoperative antibiotic use has no added advantage or therapeutic benefit [17,21]. It was found that most of the patients (98%) belonging to all categories received antibiotics at least at one of four stages of treatment irrespective of their nature of surgical disease and category of wounds. Such practice of generalized use of antibiotic has no rational basis as it has been

observed in studies that antibiotics were generally not needed in "clean surgery" at any stage of treatment [22,23] if not indicated otherwise. It was also found that about two thirds (66.5%) of all patients including about half (50.0%) of those in the clean wound category received pre-operative antibiotics. However it has been found that the length of preoperative hospital stay is not associated with increased risk of post-operative wound infection [24]. Almost all patients received post-operative antibiotics and virtually no significant difference was observed in the frequency of antibiotic usage between different categories of the patients in respect to the nature of wounds. All of the prophylactic antibiotic usage was continued beyond 48 hours of operation. The period of continuance after the recommended 48 hours [25]was also much higher than the finding of Kass[18] where he observed 65% of antibiotic prophylaxis was exceeded this limit in comparison to this study where the limit was exceeded by 100%. The trend of antibiotic usage after discharge in respect to the frequency and duration of their use was found similar in the different categories of surgical wounds and virtually had no significant difference between clean and dirty category. The practice of antibiotic termination also appeared similar among different groups. Antibiotic use was found generous in all the patients of surgical diseases irrespective of their surgical wound categories. No distinct pattern of choice of antibiotic was used in different categories of patients. Postoperative antibiotics were used in a similar frequency in all the categories. Antibiotic use was continued for more than 48 hours after operation in all categories of surgical illness. Present trend of antibiotic practice in Paediatric Surgery.

5 | CONCLUSION

Antibiotic overuse is generalized and not categorized according to the categories of surgical wounds. A consensus and collaborated effort is crucial to minimize this widespread indiscriminate antibiotic use.

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