

Tracking Antibiotic Administration and Side Antibiotic Effects among Inpatient Medical Jordanian Children Patients

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Abstract—

Background: Antibiotics are commonly administered in hospitals. Infections are a major factor of morbidity and mortality in a big percentage of hospital admissions in children.

Aim: To assess the antibiotics administration frequency and side antibiotic effects in medical inpatient Jordanian children patients.

Methods: This prospective and double blind investigation included 257 medical children inpatients, of both sexes, aged 4 months-11 years, administered antibiotics and admitted to Prince Hashim military hospital, Zarqa, Jordan, during the period Jan 2016-Apr 2018. Period of hospital admission and antibiotics administered in hospital including dosing, indications and side antibiotic effects were recorded. Participants were followed up until discharge, admission to the Pediatric Intensive Care Unit or death. The data were analyzed for numerical parameters, skewed parameters and categorical parameters.

Results: The incidence of antibiotic administration was 81.7% (210). Most of the 210 children who were administered antibiotics were males (59.5%) and came from rural and low socioeconomic origin. Mean age was 4 years. Four children died (1.9%), 32 were transferred out (15.2%) and the remaining (174) were discharged (82.9%). Two (38.1%) or one antibiotic (33.3%) was used. Mean number of antibiotics per patient was 2.0 ± 1 ; most of antibiotics (76.2%) were administered by parenteral route. Prescriptions were commonly ordered in generic name. The mean antibiotic therapy period was 10 days. 75 % of four side antibiotic effects were skin rashes.

Conclusions: Antibiotics administered empirically may be satisfactory. Side antibiotic effects are often and commonly mild.

Keywords— Antibiotics; children; side effects inpatients.

I. INTRODUCTION

With increasing administration of antibiotics, the incidence of resistance increases. The correlation between resistance and the administration of antibiotics was recorded among in- and outpatients (1). Infections are a major factor of morbidity and mortality in a big percentage of hospital admissions in children. Antibiotics are important drugs in the community and in hospitals. There is a relation between improper administration of antibiotics and modified susceptibility infecting organisms and frank resistance (2). Rational administration of antibiotics includes general shortage of awareness, improper personal hygiene, environmental sanitation, shortage of monitoring of antibiotic administration and resistance, empirical administration of antibiotics because of low microbiology laboratory support, ineffective antibiotic administration protocol and nonhuman administration of antibiotics (3). Antibiotic prescribing alters with time because spectrum of infecting organisms change and new antibiotics are invented.

Side drug effects in children are relatively more severe than in adults (4). The frequency of side drug effects in children is 9.5%, causing 2.1% of hospital admissions, of which 39.3% are life-threatening (5). Side drug effects were more in infants where antibiotics were frequently used (6).

Rational administration of antibiotics requires continuous monitoring of antibiotic administration and side drug effects.

The aim of our investigation was to monitor antibiotic administration in children medicine ward to assess antibiotic use and side antibiotic effects.

II. METHODS

Our prospective and double blind investigation included 257 medical children inpatients, of both sexes, aged 4 months-11 years, administered antibiotics and admitted to Prince Hashim military hospital, Zarqa, Jordan, during the period Jan 2016-Apr 2018, after obtaining written informed consent from parents and approval from our local ethical and research board review committee of the Royal medical services. Period of hospital admission and antibiotics administered in hospital including dosing, indications and side antibiotic effects were recorded. Participants were followed up until discharge, admission to the Pediatric Intensive Care Unit or death. Parents were interviewed in terms of residential and socio-economic condition and the clinical features for admission.

The data were analyzed for numerical parameters, skewed parameters and categorical parameters. Analysis of variance (ANOVA) and Fisher's exact test were used. P was considered statistically significant if was less than 0.05.

III. RESULTS

47 patients were not administered antibiotics. The incidence of antibiotic administration was 81.7% (210). 125 (59.5%) patients were males (P>0.05). Most of patients were of the preschool age group, with a mean age of 5 years. Most of children were from rural (61.9%) and low socioeconomic areas. Most of parents had primary or secondary education. Table I.

The overall number of antibiotic agents prescribed was 420. Table II. The highest number of antibiotic prescribed was the cephalosporin (160; 38.1%) while the least was co-trimoxazole (8,1.9%).P<0.05. Most of cephalosporins were prescribed for respiratory tract infections (55; 34.4%). Penicillins, other β-lactams and vancomycin were used in 125 (29.8%) children. This group was used mainly for respiratory tract infections (60,48%).P<0.05. Table III.

Overall, the highest numbers of antibiotics were used for respiratory tract infections (144, 34.3%) then for infections of the genitourinary tract (93, 22.1%) and of the central nervous system (76,18.1%).P<0.05. Among the total number of antibiotics for respiratory tract infections; the highest numbers were from other β-lactam group then by cephalosporins and aminoglycosides. For CNS infections, highest numbers were from cephalosporins then by other β-lactams. For non specific fever, antibiotics included firstly cephalosporins (14,3.3%) then other betalactams (9,2.1%).

70 (33.3%) prescriptions included one antibiotic, 80 (38.1%) included two and 60 (28.6%) included three. Most (160; 76.2%) of the antibiotics were used intravenously and the remaining orally (50; 23.8%). Most antibiotics (400; 95.2%) were prescribed in generic name.

Side effects were recorded in 4 (1.9%) patients, of which 75% were skin reactions. Vancomycin was the cause for skin rash in 3 patients. Most patients were discharged (174; 82.9%) or transferred to the pediatric intensive care unit (32; 15.2%).

TABLE I. Children patients' characteristics.

Variable	Mean +/-SD
Weight (kg)	16.6 +/- 4.2
Height (cm)	75.5 +/- 14.2
Sex(no)	
F	85
M	125
Age (years)	5
Origin(no,%)rural	130(61.9%)
urban	80(38.1%)

TABLE II. Total antibiotic administration.

Variable	Number
Overall antibiotics used	420
Per patient (Mean +/- SD)	2 +/- 1
Period of therapy (Mean +/-SD, days)	10 +/- 5
Period of hospital admission(Mean +/-SD, days)	13 +/- 3
Parenteral use	160,76.2%

TABLE III. Antibiotic administration according to site of infection.

	CNS	GIT	GUT	RTI	SEPSIS	FEVER	TOTAL
cephalosporins	35	18	35	55	3	14	160(38.1%)
Betalactam/vancomycin/penicillins	21	5	25	60	5	9	125(29.8%)
Amikacin(aminoglycosides)	4	2	5	15	1	3	30(7.1%)
metronidazole	2	5	4	0	1	0	12(2.9%)
Macrolides	2	0	3	4	0	1	10(2.4%)
Co-trimoxazole	0	0	8	0	0	0	8(1.9%)
Others	12	14	13	10	11	15	75(17.9%)
total	76	44	93	144	21	42	420

IV. DISCUSSION

Antibiotic administration is common in inpatient children wards. Researchers found that of 1373 patients, 631 (46%) were administered one antimicrobial agent, 198 (31%) of whom were below 1-year age (7). In our investigation, most of patients were male and came from rural regions, comparable to (8,9). The most frequent indication for antibiotic administration in our investigation was pneumonia then by other lower respiratory tract infections. Of the antibiotics used for respiratory tract infections; mostly were cephalosporins or other β-lactams. Increased antibiotics were used for respiratory tract infections from β-lactam and aminoglycosides groups (10).Pneumonia was the most frequent cause for in-patient antibiotic administration (9).

In our investigation, cephalosporins were most frequently used antibiotics then other β-lactams and aminoglycosides. Cephalosporins were the most frequently administered antibiotics then penicillins (9). Aminoglycosides, cephalosporins, quinolones and cloxacillin were most

commonly used antibiotics (11). Percentage of antibiotic administered and mean number of antibiotics per prescription are an important indicators for rational administration of antibiotics (12). To reduce the hazard of agent-agent interactions, bacterial resistance and costs, it is advisable to keep the number of agents per prescription low. In our investigation, more than 50% of prescriptions included two or three antibiotics. Median number of agents per prescription was 1.97 and number of prescriptions with two or more antibiotics was 70% (10).Use of two antibiotics was frequent (60%) in children inpatients(11).Most (93%) patients were prescribed one antibiotic (9).

86.8% of antibiotics were used by parenteral route and 13.2% were by oral route; 83.5% of agents were prescribed in generic name (10). The preponderance of parenteral use is explained by the inpatients seriously ill. Antibiotic prescribing must be controlled by suitable protocols and antibiotic resistance program. In most cases, primary antibiotic selection was empirical and therapy was started by laboratory tests in few cases as in (9). Antibiotic administration protocol is an

important prerequisite for rational antibiotic administration. (13). Spread of antibiotic resistance and decreasing frequency of new antibiotic development are serious recent issues with clinical burden (14).

In our investigation, side antibiotic effects were recorded in few patients and were mostly skin rashes. Antibiotics were the cause of a large part and urticaria and other rashes were the most frequent side antibiotic effects (6).

V. CONCLUSION

Administration of known antibiotics by generic names is satisfactory. Multiple antibiotics administration in the same patient by the parenteral route is a matter of concern. Empirical selection of antibiotics uses more costly cephalosporins in place of less costly agents. Antibiotic resistance program with previous data must direct antibiotic administration protocols for inpatient children. Over administration of multiple antibiotics per prescription and the parenteral route need investigation.

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