

RESEARCH ARTICLE

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Assessment of Antimicrobial Use Pattern in Paediatric Intensive care unit in tertiary care hospital Northern India

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Received: 21 January,2019

Accepted: 27 March,2019

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Published by: OZZIE Publishers



Abstract

Background: In India, antimicrobial resistance are getting increase day by day due to misuse of antimicrobial drugs or irrational prescription practice by Clinicians. After implementing so many guidelines by government but hence there is no control on antimicrobial resistance. Irrational prescribing of medicine results in increased morbidity and mortality as well as additional economic burden to health services. The aim of this study was to assess antimicrobial use pattern in Pediatric intensive care unit in tertiary care hospital. **Methodology:** This retrospective observational study was carried out in a 338-bedded multispecialty hospital for 4 months. Data was collected and analyzed as per World health Organization (WHO) and Indian Council of Medical Research (ICMR) guidelines. **Results:** A total of 52 patient's case sheets and 34 (65.38%) patients were having antibiotics in their prescription. Febrile Seizure was a common clinical condition in which the antibiotics were prescribed in high percentage (20.5%). It was found that 21 (61.76%) prescription was mono-antibiotic prescription and 13 (38.23%) prescription was poly- antibiotic prescription. Among the mono-antibiotic prescription ceftriaxone was most commonly prescribed and in case of poly-antibiotic therapy combination of ceftriaxone and amikacin was mostly prescribed. Out of 48 antibiotics total 3 (6.25%) antibiotics were found inappropriate as per WHO guidelines and 45 (93.75%) antibiotic was prescribed appropriately. **Conclusion:** It was found that antibiotics were prescribed frequently in most of the prescription in which mono-antibiotic therapy was preferred more over poly-antibiotic therapy. Sometimes physician have to choose antibiotic out of the guideline, in such cases antibiotic should be de-escalated based on culture reports and clinical condition of patient within 48 hours. Hence, there is a need to promote rational use of antimicrobials, as their irrational use would lead to antimicrobial resistance.

Keywords: WHO, Indian Council of Medical Research, antibiotic, antimicrobial resistance.

INTRODUCTION

Antibiotics are important for the treatment of bacterial infections, but their inappropriate use is the leading cause of antibiotic resistance [1]. People residing in the developing world often develop resistance to antibiotics which is one of the causes for poor treatment outcomes and higher healthcare utilization [2]. According to the World Health Organization (WHO), more than 50% medications are prescribed, dispensed, or sold inappropriately, and in that half of the patients took their medicines wrongly [3]. Development of antibiotic resistance is an alarming issue due to inappropriate use of antibiotics and it is a serious challenge to the healthcare professionals [4]. To control the antimicrobial resistance globally, comprehensive policies on antibiotics use are needed while different countries are at different stages of development of these policies. This could include bringing systematic interventions to educate healthcare professionals about prescribing antibiotics, developing infections control

guidelines and keeping a control on the marketing and sales of the antibiotics. Similarly, many hospitals in India have established policies to minimize the surgical infections as patients are directly exposed to the serious antibiotic resistant microbes in health care facilities [5]. Monitoring antibiotic prescriptions can provide feedback about prescription patterns to the physicians. Physicians can understand the reasons for prescribing antibiotics, the process of development of antibiotic resistance and the associated complications in patients [6]. Hence, this study aims to procure information about prescribing patterns of antibiotics in the Pediatric department of tertiary care hospital in Northern India.

METHODOLOGY

The Cross sectional, Retrospective observational study was carried out in a 338-bedded multispecialty hospital in North India during the period of Sep 2018 – Dec 2018. An about 4

month's data was collected and analyzed as per World health Organization guidelines and ICMR guidelines.

In this study, 52 patients files were audited from PICU Department. A data collection form was designed, and the required data were collected from the patient's chart in data collection form. The data included the name, age, weight, identification number, diagnosis, Co morbidities, previous hospitalization (last three week), antibiotic name, dose, route, frequency and Its appropriateness. The data were analyzed by performing descriptive statistics by using the Microsoft Excel software. Since it is a retrospective observational study, ethical committee approval is not required.

RESULTS

A total of 52 patient's case sheets were reviewed in PICU ward during 4 months study period in which 38(73%) patients were Males and 14(27%) patients were Females.

Table 1: Gender wise Distribution of Patients.

S. No	Gender	No of Patients	Percentage
1	Male	38	73.07
2	Female	14	26.92
3	Total	52	100

The patient age was Mean± SD (3.9 ±3.95) ranging from 0 to 15 years. Total 52 cases reviewed of which 34 (65.38%) patients were having antibiotics in their prescription. A total of 48 antibiotics were prescribed to 34 patients. Among that 28 (82.35%) were males and 6 (17.64%) were females. Total of 52 patient in which 36 patients were admitted without co-morbidities and 16 were admitted with co-morbidities. Out of 36 patients without co-morbidities, 21(58.33%) patient were having antibiotic in their prescription and in 16 patients with co-morbidities, 13(81.25%) patient were having antibiotic in their prescription.

Table 2: Number of patients with co-morbidities vs Antibiotic prescribed

Patient History	Number of Patient	Patient with antibiotics	Number of Patient	Percentage
Patient without co morbidities	36	Patient without co-morbidities and antibiotic prescribed	21	58.33
Patient with co morbidities	16	Co-morbidities patients with antibiotic prescribed	13	81.25

Indications for which the antibiotics were prescribed is given in the Table-3. Febrile Seizure was a common clinical condition in which the antibiotics were prescribed in high percentage (20.5%) followed by Acute Febrile Illness (11.7%), Pneumonia (11.7%), Ingestion of Foreign body (8.8%).

Table 3: Indications for which the antibiotics were used

Diagnosis	N	%
Acute Febrile Illness	4	11.76
Acute Gastritis	2	5.88
Acute Laryngotracheobronchitis	1	2.94
Bronchiolitis	2	5.88
Burn Injury	2	5.88
Chronic renal failure	1	2.94
Dengue	3	8.82
Down's Syndrome	1	2.94
Head Trauma	2	5.88
Ingestion of Foreign body	3	8.82
Pneumonia	4	11.76
Febrile Seizure	7	20.58
Wheezing associated lower respiratory infection	2	5.88
Total	34	100

The type therapy used in tertiary care hospital is given in the Table-4. The therapy prescribed is categorized into monotherapy and polytherapy. It was found that number of prescriptions of mono-antibiotic prescription (single antibiotic) was 21 (61.76%) and poly- antibiotic prescription was 13 (38.23%). This shows that mono-antibiotic therapy was preferred more over poly-antibiotic therapy. Among the mono-antibiotic prescription ceftriaxone was most commonly prescribed and in case of poly-antibiotic therapy combination of ceftriaxone and amikacin was mostly prescribed in the prescription.

Table 4: Type of therapy used for the utilization of antibiotics in tertiary care hospital

Type of Therapy	No of prescription	Percentage (%)
Mono-antibiotics therapy	21	61.76%
Poly-antibiotics therapy	13	38.23%

48 antibiotics were prescribed in 34 patients. The profile of antibiotics prescribed is shown in Table-4. The most common antibiotics prescribed were ceftriaxone (44.11%) followed by Ceftriaxone+ Amikacin (14.70%), Cefuroxime (5.88%), Amoxicillin+ Clavulanic acid (5.88%), Meropenem + Vancomycin (5.88%) and Ceftriaxone + Azithromycin (5.88%).

Table 5: Profile of Antibiotics prescribed

S. No	Name of Antibiotics	Numbers of Prescription	Percentage
1	Amoxycillin+ Clavulanic acid	2	5.88
2	Azithromycin	1	2.94
3	Ceftriaxone	15	44.11
4	Ceftriaxone + Piptaz + Amikacin	1	2.94
5	Amikacin+ Cefuroxime	1	2.94
6	Ceftriaxone + Azithromycin	2	5.88
7	Ceftriaxone + Amikacin	5	14.70
8	Cefuroxime	2	5.88
9	Meropenem	1	2.94
10	Meropenem + Vancomycin	2	5.88
11	Piperacillin-Tazobactam + Azithromycin	1	2.94
12	Piperacillin-Tazobactam+ Metronidazole	1	2.94

Out of 48 antibiotics total 3 (6.25%) antibiotics were found inappropriate as per WHO guidelines (Clinician were called and discussed with them about Inappropriateness of antibiotics) and 45 (93.75%) antibiotic was prescribed appropriately. Appropriateness of antibiotic as per WHO guidelines were shown in Table 6 and 7.

Table 6: Appropriateness of antibiotic as per WHO guidelines.

Patient complaint/Diagnosis	Choice of Antibiotic	Appropriateness
Bronchiolitis	Azithromycin	Agreed
Aspiration of Foreign body with Pneumonia and Respiratory distress- Ingestion of Foreign body	Vancomycin Meropenem	Not Agreed for Vancomycin
Focal Seizures; Meningitis-Febrile Seizure	Ceftriaxone Amikacin	Agreed
Sepsis, Dengue	Meropenem Vancomycin	Agreed
Pneumonia	Meropenem	Agreed
Acute Laryngotracheobronchitis	Ceftriaxone	Agreed
Acute febrile Illness	Ceftriaxone + Azithromycin	Agreed
Pneumonia	Ceftriaxone	Agreed
Wheezing associated lower respiratory infection	Ceftriaxone + Amikacin	Agreed
Burn Injury	Augmentin	Agreed
Febrile Seizure	Ceftriaxone	Agreed
Wheezing associated lower respiratory infection	Piperacillin-Tazobactam + zithromycin	Agreed
Acute febrile Illness	Ceftriaxone	Agreed
Difficulty on breathing, CRf on dialysis, afebrile -Chronic renal failure	Ceftriaxone	Not Agreed
Dengue	Ceftriaxone + Piptaz + Amikacin	Agreed
RTA-Severe Head injury	Cefuroxime	Agreed

Acute Febrile Illness	Ceftriaxone + Amikacin	Agreed
Fever, Cough and Cold since 3 days-Febrile Seizure	Ceftriaxone	Agreed
Febrile Seizure	Ceftriaxone	Agreed
Mitochondrial Depletion Syndrome with Pneumonia	Ceftriaxone + Azithromycin	Agreed
Fever and Two episode of Seizure-Seizure	Ceftriaxone + Amikacin	Agreed
Acute Febrile Illness	Ceftriaxone	Agreed
Febrile Seizure	Ceftriaxone	Agreed
Acute Gastritis	Ceftriaxone	Agreed
Ingestion of Foreign body	Ceftriaxone	Not Agreed
Fever, Cough and Fast Breathing-Bronchiolitis	Ceftriaxone	Agreed
Head Trauma	Cefuroxime	Agreed
Febrile Seizure	Ceftriaxone	Agreed
Electric Burn, Sepsis - Burn Injury	Augmentin	Agreed
Fever and Breathlessness-Ingestion of Foreign body	Piperacillin-Tazobactam+ Metronidazole	Agreed
Cough with Fever-Pneumonia	Ceftriaxone + Amikacin	Agreed
Acute Gastritis	Ceftriaxone	Agreed
Dengue	Ceftriaxone	Agreed
Fever, cough and Eye puffiness and Fast breathing-Down's Syndrome	Ceftriaxone + Amikacin	Agreed

Table 7: Appropriateness of antibiotic as per WHO guidelines.

Appropriateness of antibiotic	Number of antibiotics	Percentage
Numbers of Appropriate antibiotics	45	93.75
Number of inappropriate antibiotics	3	6.25
Total	48	100

DISCUSSION:

The present study designates the general mode of prescribing the Antibiotics in the PICU department of tertiary care hospital. Demographic characteristics showed that out of 52 patients, 34 Patients prescribed with antibiotics, male were 28 (82.35%) and 6 (17.64%) were females and maximum amount of antibiotics were prescribed in patients with co-morbidity condition. Febrile Seizure was a common clinical condition in which the antibiotics were prescribed in high percentage (20.5%) followed by Acute Febrile Illness (11.7%), Pneumonia (11.7%), Ingestion of Foreign body (8.8%).

The most common antibiotics prescribed were ceftriaxone (44.11%) followed by Ceftriaxone+ Amikacin (14.70%), Cefuroxime (5.88%), Amoxicillin+ Clavulanic acid (5.88%), Meropenem +Vancomycin (5.88%) and ceftriaxone +

Azithromycin (5.88%). It was found that number of prescriptions of mono-antibiotic prescription (single antibiotic) was 21 (61.76%) and poly- antibiotic prescription was 13 (38.23%). This shows that mono-antibiotic therapy was preferred more over poly-antibiotic therapy similar to Ahmed et al study⁶ and alshakk et al study [11]. Among the mono-antibiotic prescription ceftriaxone was most commonly prescribed and in case of poly-antibiotic therapy combination of Ceftriaxone+ Amikacin (14.70%) was mostly prescribed in the prescription.

93.75 % of the patients received an antimicrobial regimen that was recommended by the WHO guidelines. A substantial number of antimicrobials were used for the treatment of patients. Cephalosporins are widely preferred in the prescriptions due to their high potent action in the patients in

accordance with the disease conditions as similar to Alshakka et al study conducted in Outpatient department in Yemen in 2016 [11].

Sometimes physician must choose antibiotic out of the guideline based on patient symptoms and Clinical condition. In such cases antibiotic should be de-escalated based on culture reports and clinical condition of patient within 48 hours. World Health Organization (WHO) cautions patients against purchase of antibiotics without a prescription as a measure to control emergence of antibiotic resistant strains [7]. Despite such warnings and laws in place, in India and many developing nations, it is possible to purchase antibiotics without a prescription. There are penalties in place in case of sale of antibiotics without a prescription such as closure of business where the sale takes place. There are insufficient measures to prevent irrational sale of antibiotics [8-9]. Interventions focusing on improving awareness about irrational prescribing of antibiotics among physicians and patient should be conducted. Monitoring drug utilization to inform physicians about patient antibiotic usage and educating patients about the usage of different antibiotics can prevent irrational antibiotic use [10,11].

CONCLUSION

The choice of antibiotics for different infectious diseases differed at different Indian hospitals by antibiogram, physician choice and preference. In our study, most of the prescriptions contained only a single antibiotic. It was observed that out of 34 prescriptions, Cephalosporin class of antibiotics were most frequently prescribed and among them mostly ceftriaxone was the drug of choice. This study reveals that there are many standard treatment guidelines available from various state government agencies. Antimicrobial policies given by central government for rational use of antibiotics in the country are not adhered by physicians. The study recommended to more adherence for WHO antibiotic prescribing guidelines and improving knowledge of proper and good prescribing procedure by performing several activities among health system prescribers.

Acknowledgement: None

Conflict of interest: None declare

Abbreviation used: None

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Cite article as: Haque I, Das S, Dang N. Assessment of Antimicrobial Use Pattern in Paediatric Intensive care unit in tertiary care hospital Northern India. *Res Pharm Healt Sci.* 2019;5(1):116-120., doi: <https://doi.org/10.32463/rphs.2019.v05i01.04>