Section: Microbiology

Original Research Article

A POINT PREVALENCE SURVEY ON ANTIMICROBIAL USAGE AT A GOVERNMENT TERTIARY CARE HOSPITAL FOR WOMEN AND CHILDREN

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ABSTRACT

Background: The study was aimed to assess current patterns of antibiotic use among inpatients. The information collected can support in policy-making and hospital interventions aiming to improve antibiotic prescription and practices.

Materials and Methods: A cross sectional point prevalence survey was carried out on all inpatients in single day at 09.00 am at a tertiary care hospital for women and children, Hyderabad. The data was abstracted principally from patient medical records. Data was collected through the standardized online data collection tool in the form of google sheet and uploaded from smart phones. For data analysis, Microsoft Software was used.

Results: A total number of 717 patients were on treatment as in patients on the day of survey. Out of them 127 patients were excluded, because either they were admitted after 09.00am or were due for discharge on the day of survey. A total number of 590 eligible patients were included in the study out of which 427(72%) patents were receiving antimicrobial agents. Out of them 58%(n=248)of the patients were prescribed one antibiotic, while 28% (n=118)of the patients were prescribed two antibiotics. The mean number of antimicrobials per patient was found to be 1.09. Indication for antibiotic use was infections for 61%, medical prophylaxis for 16% and surgical prophylaxis for 23%. The most common classes of antibiotics prescribed were third-generation cephalosporin (47%) followed by amoxyclav (22%). Out of 427 patients 96% (n=409) were receiving antimicrobial agent through parenteral route. As per AWaRe classification 68%(n=290) patients were on watch group of antibiotics, 31%(n=134) patients were on access group of antibiotics.

Conclusion: The current study depicted the baseline parameters of intervention for instituting future action and policy changes.

Keywords: Antimicrobial resistance (AMR).

INTRODUCTION

Antimicrobial resistance (AMR) is the current global health problem. Resistance is a natural phenomenon which gives organisms the opportunity to adapt and change, rendering medicines ineffective.[1] Existing resistance patterns are spreading and new resistance patterns are emerging around the world.[2] Emergence of antibiotic resistance is one of the extreme concerns for public health because resistant organisms lead to longer illnesses, increased costs of treatment and increased mortality.[2,3]

AMR is the result of a number of factors, including over prescribing and over dispensing of antimicrobial medicines by health workers, noncompliance with treatment courses, low-quality medicines and incorrect prescription with wrong dosage, poor infection prevention and control practices in hospitals.

WHO has developed a Global Action Plan (GAP), to combat the AMR. Optimizing the use of

antimicrobial agents is one of the five key strategic objectives outlined in the GAP.[4]

Inappropriate use of antibiotics is widespread; however, information on antibiotic consumption and use is scarce in our country. In order to inform effective institutional antibiotic policies it is essential to collect information on the current situation of antibiotic use in that particular organization.

Collecting hospital data and subsequently implementing informed interventions to optimize antibiotic use in hospitals has significant potential to lower antibiotic resistance at local and higher levels. Harmonized data collection and strengthening of monitoring systems is needed to provide a reliable picture of the use of antibiotics.[5]

In the vast majority of countries worldwide, continuous data collection on antibiotic prescribing is not possible due to the high workload and level of resources needed for regular monitoring. A viable alternative is to collect data at a specific point in time, which can be done successfully using the point prevalence survey (PPS] methodology.[6]

Considering this background information the survey was designed to collect the data on the trends involved in antimicrobial use at our institute to enable judicious utilization of antimicrobials. The survey was also devised to assess the adherence of prescription patterns to national guidelines and to recommend crucial points through the initiation of a customized antimicrobial stewardship program (ASP).

MATERIALS AND METHODS

The current study was aimed to conduct a point prevalence survey on antimicrobial use at Niloufer hospital for women and children, Hyderabad. The objectives of the study were to estimate the prevalence of antibiotic usage, to collect information on the prescribing of antibiotics, to inform hospital administrators who can implement the interventions aiming to improve antibiotic prescription and use.

A cross sectional point prevalence survey of antimicrobial use was conducted at Niloufer hospital for women and children, Hyderabad. The hospital is a tertiary-care, teaching hospital; with 1230 bed capacity having four major clinical departments. (Neonatology, Pediatrics, OBY and Pediatric surgery. The survey was conducted by the Department of Microbiology in November 2021, on single day after due approval and permission from the institutional ethics committee.

Patient Inclusion Criteria

All patients who are admitted to hospital in the ward and ICU at 09:00am on the day of the survey were included in the survey.

Patient Exclusion Criteria

Patients admitted after 09:00am and due for discharge on the same day were excluded from the survey.

Preparation of the Survey: A team of investigators were Identified and established. The data was collected by faculty members, resident doctors of department of microbiology and resident doctors of department of pediatrics. Adequate training regarding the methodology of the survey and data collection tool was given to the survey members. All in patient locations (wards /ICU) in hospital were listed and unique identification codes were allotted. Data investigators were assigned to each location and required material was provided for data collection. The survey was conducted at one point in time in a particular ward, commencing at 10:00 AM, on single day from 36 locations including wards and ICUS.

Data Collection and Validation

- A basic PPS tool was devised on the basis of point prevalence survey methodology on antibiotic use from WHO-version 1.1
- The data was collected using two forms ward-level data tool & patient level data tool.
- The relevant data was collected from patient case sheets meticulously.
- The data was entered through the pre-validated G-forms by the collector using their mobile phones or laptops.

Ward-Level Data Tool: Ward level data form is used to collect data regarding Date of survey, Ward Code (This variable is an anonymous code that uniquely identifies the ward within the hospital.), Ward Name (Name of the Ward where survey is being conducted, Ward Type, Ward speciality, Total no of patients admitted in ward, Admitted after 9am in ward, Discharge due on date, Total eligible patients on survey date, Number of patients on antibiotics, Number of patients forms filled.

Patient level data tool: Demographic variables- Patient ID, location, Date of admission, if the patient is on antibiotic, the number of antibiotics

Variables on the indication of antibiotic- The type of indication, diagnosis, the start date of treatment, reasons for antibiotics written in patient's notes

Microbiology variables- results from the culture, antibiotic susceptibility test results

Antibiotic data variables- name of the antibiotic, AWARE Classification, date of giving the first dose of antibiotic, day of therapy, dose per unit: (mention in g/mg/IU), number of doses per day, route, compliance to the guidelines, reason for antibiotic documented or not, stop/ review date documented or not, reason for stop/ review, If treatment based on microbiology data, organism being treated and AST pattern.

Statistical analysis: Microsoft excel was used for sorting and analysis of collected data obtained from the G forms.

RESULTS

A total number of 717 patients were admitted to wards and ICUs on the day of survey. Among 717 patients 154 were OBG cases, 436 were pediatric patients. Out of 717 patients 590 patients were eligible for the survey. Among 590 admitted cases

427 (72%) were on antibiotic and 163(28%) were not on antibiotic. Out of 427 patients 355 were of pediatric age group, 72 were adult patients. Among the 355 pediatric patients 221(62%) were in the various wards and 134(38%) were in ICU. Out of 72 OBG patients 64(89%) were in wards and 8(11%) were in ICU. Percentage of antibiotic usage is 81% (n=355/436) in pediatric patients and 47%(n=72/163) in OBG patients. [Table 1 & Figure 1]

Table 1: Distribution of study population.

Department	OBG	Pediatrics	Total
Total no of patients admitted in ward:	188	529	717
Admitted after 9am in ward:	11	56	67
Discharge due on date:	23	37	60
Total Eligible Patients on survey date?	154	436	590
no of patient forms	72	355	427
No antibiotics	82	81	163
percentage of antibiotic usage	47%	81%	72%

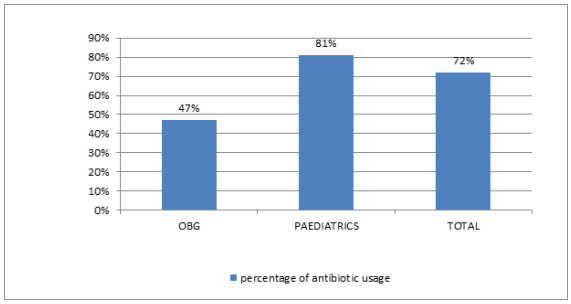

Figure 1: Percentage of antibiotic usage

Out of 427 cases 248 patients were on single antibiotic (58%), 118 were on two antibiotics (2)7%, 41 were on 3 antibiotics (10%) and 20 patients were on more than 3 antibiotics (5%). Among 355 pediatric patients 241 patients were on single antibiotic comprising up to 68%, 83 patients were on two antibiotics (23%), 14 were on three antibiotics (4%) and 17 patients were on more than three antibiotics (5%). Among 72 OBG cases 20 (28%) patients were on single antibiotic, 37(51%) patients were on double antibiotic, 14(20%) patients were on triple antibiotic and 1(1%) patient on more than three antibiotics.

Third generation cephalosporin are the commonly used antibiotic in the current study comprising up to 47%, followed by amoxicillin clavulonate 22% and piperacillin-tazobactum 11%. [Figure 2]

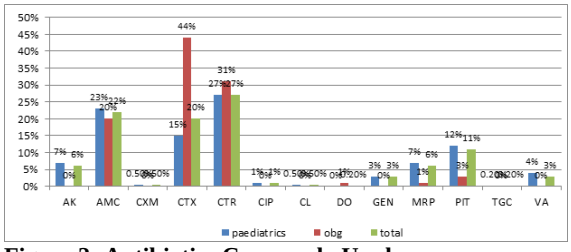

Figure 2: Antibiotics Commonly Used

As per AWaRe classification of antibiotics in the current study 68% (n=290) patients were on watch antibiotics, 31% (n=134) patients were on access antibiotics. Among pediatrics patients 65%(n=232) were on watch antibiotics and 34% (n=120) were on access antibiotics. Among OBG patients 81% (n=58) were on watch antibiotics and 19% (n=14) were on access antibiotic.

Among 427 patients 96% (n=409) patients were on parental antibiotics and 4%(n=18) patients were on oral antibiotics. Out of 355 pediatric subjects 172 (48%) received antibiotic for a duration of <5 days, 146 (41%) received 5-14 days and 37 (11%) >14 days. Among 72 OBG patients 56 cases (76%) received antibiotic for duration of <5days and 16 cases received antibiotic for duration of 5-14days.

Indication for antibiotic usage among study participants was as follows. In paediatric age group 63%(n=224) received antibiotic for community acquired infections, 9%(n=33) received antibiotic for Hospital acquired infections, 17%(n=60) received antibiotic as medical prophylaxis and 11%(n=38%) received antibiotic as surgical prophylaxis. In contrast 86%(n=62) of OBG subjects received antibiotic as surgical prophylaxis and 17%(n=8) received antibiotic as medical prophylaxis.

Among 427 study participants antibiotic review after 48hrs was documented in 360 case sheets and not documented in 67 case sheets. Antimicrobial prescription was based on culture reports among 232(54%) members, not among 40(9%) members and AST not documented in 155(36%) patients.

DISCUSSION

In our country data on antibiotic usage is limited due to availability of few studies. The current study is one of the point prevalence studies on antibiotic consumption, which in turn helps in enhancing qualitative prescription of antimicrobial agents. The current study will also contribute data on antimicrobial usage and prescription patterns which helps in formulation of institutional antibiotic policy. The study helps in guiding the implementation of antimicrobial stewardship program at institutional level.

In the current study prevalence of antimicrobial utilization is 72%, which is correlating with study conducted by vadivoo et al(70.11%), where 325 patients were on antimicrobial agent among 502 eligible study participants. The prevalence in current

study is comparable with multicentric PPS study conducted by NCDC across India(72%).[7]

A study conducted by Sumanth gandra et al reported 61.52% prevalence of antibiotic usage among pediatric population, which is relatively comparable with the current study.[8] A study conducted in eastern parts of India reported 69.1% prevalence of antibiotic usage. Lower prevalence of antibiotic usage was reported in studies conducted by Nirula et al(46.54%) and Najmi et al (31.95%).[9,10]

There are many factors affecting the prevalence of antibiotic usage. The present study was conducted at a paediatric tertiary care hospital with multiple specialties which receive referral cases from deferent parts of the state. Most of these cases belongs to patient category 3, who were previously hospitalized, received broad spectrum antibiotics, haemo-dynamically unstable, admitted to ICU with multiple invasive devices. In this scenario prescription of antibiotic is unavoidable and contributing for higher prevalence of antibiotic usage.

In our study 58% patients received single antimicrobial agent, 27% received antibiotics and 15% received >3antibiotics. The results are comparable with other studies like Nirula et al (single antibiotic in 55%cases, 2 antibiotics in 33% and > 3 antibiotics in 11% cases) and shanmuga et al (single antibiotic in 55% >2 antibiotics in 45% cases).[9,7]

In the present study 96% cases receiving parenteral antibiotic and 4% cases oral antibiotics, parenteral antibiotic usage is more compared to other studies can be explained by predominant neonatal and pediatric study population.

In current study antimicrobial agents were prescribed for various infections in 61% cases and as prophylaxis among 39% cases. [Figure 3] Our results are comparable with study conducted by Gandra et al were empirical antimicrobial agents were prescribed in 65.1% cases for treating various infections. Commonest group of antibiotics prescribed in current study are Beta lactum group. Most common agent is ceftriaxone (27%). These results are comparable with other studies.[8,11,12] In our study point of concern is 54% cases received appropriate antimicrobial agent based on culture report, in 9% cases antibiotic was not reviewed and not based on culture report. In36% cases samples were not sent for culture and sensitivity.

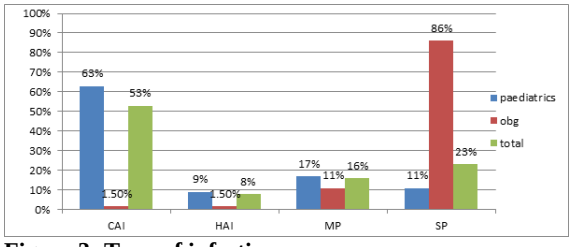

Figure 3: Type of infections

Important key findings in the current study are prevalence of antibiotic usage is more, but comparable with national studies & percentage of parenteral antibiotic is more compared to other studies. Target antibiotic therapy should be improved by sending culture before application of antibiotic agent. The important limitation of the study is results can be influenced by various factors like day-to- day variations or variation in supply of antibiotic agents. The advantage of the study is it is simple, inexpensive and reliable data collection by experts on antimicrobial usage.

CONCLUSION

The present study shows a higher rate of antibiotic usage and high lights important findings pertaining to route, review and culture based antimicrobial therapy. This data will help interviewing of institutional antimicrobial therapy.

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