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Original Research Article

A Cross Sectional Point Prevalence Survey of Antimicrobial Consumption in a Tertiary Care Facility

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Abstract

Aim: A point prevalence survey study (PPS) of antimicrobial consumption in a tertiary care super-speciality hospital.

Methods: This cross-sectional observational study was carried out in the Department of pharmacology, A. N. Magadh Medical College and Hospital, Gaya, Bihar, India, from November 2019 to August 2020, after taking the approval of the protocol review committee and institutional ethics committee. The study followed the standard guidelines of point prevalence survey (PPS) methodology as described by Global PPS of Antimicrobial Consumption and Resistance (version January 2019).

Results: A total of 100 patient related data was collected in the designated survey form. Total beds covered were 200 and the number of patients on antimicrobials was found to be low at 20 %. The patients surveyed were predominantly female (80 %). The mean number of antimicrobials per patient was found to be 1.72 (range of 1.5 to 2.3) relatively low numbers of patients were found to be on 2 or more antimicrobials. Double gram negative and double anaerobic coverage of AM used varied across departments covered.

Conclusion: The study was not only able to demonstrate the feasibility of conducting point prevalence survey in high patient volume and paper based medical record system but also generated the baseline intervention for evaluating the impact of future interventions.

Keywords: PPS, AMR, ASP

Introduction

Antimicrobial drugs have revolutionized the treatment of infectious diseases, becoming the cornerstone of therapy for infectious diseases to reduce morbidity and mortality [1]. However, there is increasing Antimicrobial Resistance (AMR) as a result of their overuse, which has become a serious problem worldwide [2]. India is the world's largest consumer of antibiotics for human health, which was reported 12.9 x 109 units (10.7 units per person) in 2010 [3]. The Indian Government has issued a National Policy for Containment of Antimicrobial Resistance (AMR) to promote surveillance on antimicrobial use in the community and hospitals settings across the country. Data about the quantity and quality of antimicrobial prescribing

constitute the cornerstone for guiding antimicrobial stewardship (ASP's) interventions [4]. India has implemented certain measures to control irrational antimicrobial use; "red strip labelling of antimicrobial packages" which indicates the drug should not be dispensed without a legal prescription [5]. Antimicrobial consumption data of 65 countries presented in the WHO report for 2015-18, found wide discrepancies in consumption rates between countries. However, no countries from south-east Asia, including India, have submitted their report while efforts are initiated and ongoing in such countries with the national surveillance programs. Initial reports from India stated a very high level of consumption of third generation cephalosporins in all its states. The WHO reported India as one of the countries for high irrational antimicrobial use and inadequate surveillance and high rates of drug resistance [6]. Point Prevalence Survey (PPS) in a structured qualitative assessment of antimicrobial consumption at a given point of time. It is a feasible method to access data on antimicrobial use and helps to target improvement in the quality of antimicrobial prescribing and establish interventions for better ASH. Periodical PPS serve better ASH and assist in the fight against AMR [7]. PPS is a based stewardship tool in a few developed countries, but in other countries across the globe, clinicians have just begun to understand and explore how to use it [6].

Material and methods

This cross-sectional observational study was carried out in the Department of pharmacology, A. N. Magadh Medical College and Hospital, Gaya, Bihar, India, from November 2019 to August 2020.

Methodology

The study followed the standard guidelines of point prevalence survey (PPS) methodology as described by Global PPS of Antimicrobial Consumption and Resistance (version January 2019).[7]

The survey was collected in the six designated departments. For the same a modified version of the patient data collection form proposed by Global PPS was prepared on Epi Info software version 7 (CDC) and in subsequently converted into a paper- based form. This one-page form captured the demographic characteristics of the patient, particulars of antimicrobials (up to 5 antimicrobials) including generic name, dose, frequency in hoursand route of administration, diagnostic codes and therapeutic indication for antimicrobials on page one. The use of antimicrobials was categorized as empiric, prophylactic or lab based. All inpatients present in the ward, admitted before 8:00 a.m. on the day of data collection were included. These included neonates born on that day before 8:00 a.m. Data of patients receiving at least one antimicrobial were collected on the patient data collection forms.

Results:

A total of 100 patient related data was collected in the designated survey form. Total beds covered were 200 and the number of patients on antimicrobials was found to be low at 20 %. The patients surveyed were predominantly female (80 %). The mean number of antimicrobials per patient was found to be 1.72 (range of 1.5 to 2.3) Relatively low number of patients were found to be on 2 or more antimicrobials. Double gram negative and Double anaerobic coverage of AM used varied across departments covered.

Table 1: Baseline characteristics of patients surveyed across departments (N=100)

Age (Mean, SD) (in yrs)	31.5 (1.4)	
Gender n, (%)	Male 20 (20 %)	Female 80(80 %)

Table 2: Antimicrobial use and consumption profile across departments surveyed including treatment basis

Department	CCM	Orthopaedics	Urology	CTVS	Plastic Surgery	Paediatric surgery
No of beds surveyed	10	40	50	50	10	40
No (%) of patients on AM	15	25	25	15	15	5
No of AM prescribed (Mean, SD	2.32±1.21	1.44±0.48	1.19±0.29	1.19±0.30	1.35±0.46	1.43±0.57
No. of patients on 1 AM	5	14	25	13	10	5
No. of patients on 2 AM	2	11	0	2	5	0
No. of patients on 3 AM:	6	0	0	0	0	0
No. of patients on 4 AM	1	0	0	0	0	0
No. of patients on 5 AM:	1	0	0	0	0	0
No (%) on Double gram negative cover	5	1	1	0	0	0
No (%) on Double anaerobic cover	1	0	1	1	1	0
No of patients on Empirical treatment	1	22	23	14	6	1
No of patients on Test based treatment	14	0	0	1	0	2
No of patients on Prophylactic treatment	0	5	3	0	0	0
No of patients on Carbapenems	10	1	0	0	0	0
No of patients on Polymixins (Poly B, Poly E)	4	0	0	1	0	0

Discussion

It is believed Infectious diseases constitute an important cause of hospital admissions in Indian hospitals. 12.3% patients received 3 or more antimicrobials (range from 6.5% to 30.9%) [8,9]. Our point prevalence survey conducted at this tertiary care centre a total of 200 patients over two weeks brought forth some important findings. Foremost, the antimicrobial use across the centers was reasonably low at 20%. This relatively low use of antimicrobials is in contrast from an earlier survey conducted in India where a prevalence of around 57.4% was noted [10]. Our survey included a single public sector based super specialty referral hospital from public sector. The departments covered included Critical care medicine (CCM), Orthopedics, Urology, Plastic surgery, Cardiovascular and thoracic surgery (CTVS) and Pediatric surgery, affiliated with the main hospital.

High burden of antimicrobials was not confined to intensive care units alone in some centers. This may be explained by the fact that because of limited availability of intensive care unit beds, critically ill patients are often managed in medical or surgical wards. It was interesting to note that majority (40% total use) of the use of antimicrobials was empiric. Although all the included centers have functioning microbiology labs, relatively less proportion of antimicrobials was lab based (20%). These hospitals often receive patients from other hospitals who are already on antimicrobials which makes culture positivity yield less efficient. Furthermore, for the patients admitted through emergency departments, appropriate cultures are often not sent because of overcrowded emergencies and resource constraints. However, working towards culture of sending cultures is an important interventional strategy for antimicrobial stewardship which has emerged from this data [10,22].

While community acquired infections accounted for majority of antimicrobial used, surgical prophylaxis followed closely. What is most striking is that surgical prophylaxis was continued for more than 24 hours in nearly half of the patients. Secondary infections and febrile reactions was an important reason cited for continuing the prophylactic regimen. Hospital acquired infections continue to remain important drivers for antimicrobial use, particularly so in our country where infections due to multidrug resistant pathogens are quite common [23,26].

Importantly, with regards to redundant antimicrobial use, this practice was not that fairly common. Double anaerobic cover was more than 2% in one department. Double cover for suspected or proven gram-negative infections was a bigger concern. There are very limited indications for empiric or lab-based use of more than one antimicrobial agent for Gram negative infections. However, the practice seems fairly common and needs deeper evaluation of the designated antimicrobials the use of carbapenems, teicoplanin and vancomycin was varied across departments surveyed. However, was fairly low in most. Polymyxin use was relatively varied in some departments of the hospital and largely for the management of healthcare associated infections due to multidrug resistant organisms However, there is a need to strengthen infection control practices along with antimicrobial stewardship in order to bring down the use of these antimicrobials [27].

Conclusion

The study was not only able to demonstrate the feasibility of conducting point prevalence survey in high patient volume and paper based medical record system but also generated the baseline intervention for evaluating the impact of future interventions. The targets for interventions that emerged out were- improving surgical prophylaxis, decreasing double anaerobic

cover, initiating culture of sending cultures and de-escalation. This survey will help generating data in evaluating the impact of various antimicrobial stewardship interventions.

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