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A Study based on Prescribing Pattern of Antibiotics in Hospital Acquired Infections of Tertiary Care Hospital

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Abstract

Introduction: According to World Health Organization (WHO), nosocomial infection, also called "hospital acquired infection" can be defined as: An infection acquired in hospital by a patient who was admitted for a reason other than that for the infection. It is an infection occurring in a patient during hospital stay or other health care facility in which the infection was not present or incubating at the time of admission As far the knowledge of research investigators there are only few research studies were carried out with respect to rational use of antibiotic in hospital acquired infections, but according to epidemiology the microbiological sensitivity pattern can differ from one region to another region. Therefore to understand the sensitivity pattern and resistance of antibiotics, the prescribing pattern of antibiotic should be studied to know how antibiotics is prescribed in according to specific hospital acquired infections prevailing in tertiary care hospital.

Objective: To study the prescribing pattern of antibiotics for hospital acquired infections.

Methods: This was a prospective observational study conducted in Surgery, Neurosurgery and Critical Care units of JSS Hospital, Mysore which is an 1800 bed multi-specialty tertiary care teaching hospital. Patients who met study criteria were enrolled in this research study. This study was conducted over a period of six months. The enrolled patients were monitored on daily basis. The therapy related data such as name of the antibiotic which was identified using ATC code, brand name, dose, route, frequency, dosage adjustment in case of renal insufficiency, cost of the drug, duration of the therapy and choice of antibiotic after culture sensitivity report were collected and documented to determine the prescribing pattern of antibiotic.

Results and Discussion: The most frequently prescribed antibiotic was Cefoperazone + Sulbactum (42%) followed by Linezolid (36%), Piperacillin + Tazobactum (32%), Colistin (32%) and Imipenem (24%).

Conclusion: This research study concludes that more irrational use of antibiotic was observed in hospital acquired infections which had resulted increased health care cost of the patient as well as antibiotic resistance. The average duration of prescribed antibiotic in our research study for Cefoperazone + Sulbactum was 8.8 days followed by Linezolid 6.2 days, Piperacillin + Tazobactum 8.8 days + 4 days, Colistin 8.6 days and Imipenem BD for 8 days and TID for 9.5 days.

Keywords: Antibiotic; Hospital; Acquired; Infection

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Introduction

According to World Health Organization (WHO), nosocomial infection, also called "hospital acquired infection" can be defined as: An infection acquired in hospital by a patient who was admitted for a reason other than that for the infection. It is an infection occurring in a patient during hospital stay or other health care facility in which the infection was not present or incubating at the time of admission. This includes infections acquired in the hospital but appearing after discharge, and also occupational infections among staff of the facility. A prevalence survey conducted in according to WHO in 55 hospitals of 14 countries representing 4 WHO Regions (Europe, Eastern Mediterranean, South-East Asia and Western Pacific) showed an average of 8.7% of hospital patients had nosocomial infections. At any time, over 1.4 million people worldwide suffer from infectious complications acquired in hospital. The highest frequencies of Nosocomial Infections (NIs) were reported from hospitals in the Eastern Mediterranean and South-East Asia Regions (11.8% and 10.0% respectively), with a prevalence of 7.7% and 9.0% respectively in the European and Western Pacific Regions [1].

Tables 1: Most commonly prescribed antibiotics.

Serial Number	ATC code	Antibiotics	Number Prescribed	Percentage Prescribed
1	J01CG01	Cefoperazone + Sulbactum	21	42%
2	J01XX08	Linezolid	18	36%
3	J01CA12	Piperacillin + Tazobactum	16	32%
4	J01XB01	Colistin	16	32%
5	J01DH51	Imipenem	12	24%
6	J01DD04	Ceftriaxone + Sulbactum	11	22%
7	J01XD01	Metronidazole	11	22%
8	J01DH02	Meropenem	9	18%
9	J01DF01	Aztreonam	9	18%
10	J01MA02	Ciprofloxacin	9	18%
11	J01GB06	Amikacin	8	16%
12	J01DD02	Ceftazidime	7	14%
13	J01AA12	Tigecycline	7	14%
14	J01DC02	Cefuroxime	4	8%
15	J01XD02	Tinidazole	4	8%

Hospitals in India have a high burden of infections in their Intensive Care Units (ICU) and general wards, many of which are resistant to antibiotic treatment. Antibiotic use and resistance in India, also states that a large proportion of these HAIs are preventable with increased infection control measures. Research on HAIs in India reveals several concerning trends [2]. In Indian ICUs, the rate of infection due to Vancomycin-Resistant Enterococcus (VRE), a dangerous hospital infection, is five times the rate in the rest of the world. Rates of Methicillin-Resistant Staphylococcus Aureus (MRSA) in Indian ICUs are also high, with one study finding over 80 per cent of *S. aureus* samples testing positive for resistance to methicillin and closely related antibiotics [3]. Antibiotic resistant infections are difficult, and sometimes impossible, to treat. They lead to longer hospital stays, increased treatment costs, and in some cases, death. The GARP research estimates that approximately out of 190,000 neonatal deaths in India each year due to sepsis (a bacterial infection that overwhelms the bloodstream) over 30 per cent are attributable to antibiotic resistance [4]. Antibiotic resistant hospital acquired infections can be especially deadly because antibiotics are used intensively in hospitals when compared with the community settings, and frequent use drives to the development of highly resistant bacteria [5]. Organisms causing hospital infections in India are similar to those around the world, with *S. Aureus* and *P. Aeruginosa* being the most common disease-causing pathogens [6].

Pharmacists have a prominent role to play in the effective management of HAIs by extending help in selection of appropriate antibiotics in accordance to the culture sensitivity reports, developing hospital antibiotic guidelines and creating awareness about maintenance of hygiene and prevention of HAIs [7]. Research investigator Kristi Kuper et al., [8] research study reflects pharmacist's role in the selection of antibiotic for treating hospital acquired infections depending upon the availability of antibiotic in hospital pharmacy. According to this research study the pathogens such as MRSA, vancomycin-resistant Enterococcs, Clostridium difficile and multidrug-resistant, gram-negative organisms were found to be antibiotic resistant [9]. Failure to identify pathogens showing resistance to antibiotics can be more risky to the patients diagnosed with hospital acquired infections. Under these types of circumstances, a pharmacist can play an important role in selecting appropriate antibiotic in accordance to the pathogens' resistance to the antibiotics. Rational use of antibiotics can minimize multidrug resistance to pathogens [10]. Pharmacist can play a significant role in creating antibiotic guidelines in health care institutions like hospital by adopting antibiotic sensitivity test, antibiotic resistance pattern and empirical therapy according to the particular type of infections which can help the clinicians to initiate correct first line therapy so that it can show better prognosis of patient [11]. Rational use of antibiotics can be implemented with the help of microbiological data of patient profile so that morbidity and mortality can be minimized as much as possible [12]. Pharmacists working with surgical care team can always help in initiating appropriate antibiotics before the surgical procedures and assist in initiating appropriate antibiotic for post surgical prophylaxis. Correct duration of antimicrobial therapy depending upon the type of surgical procedure undergone by patient [13]. As far the knowledge of research investigators there are only few research studies were carried out with respect to rational use of antibiotic in hospital acquired infections, but according to epidemiology the microbiological sensitivity pattern can differ from one region to another region [14]. Therefore to understand the sensitivity pattern and resistance of antibiotics, the prescribing pattern of antibiotic should be studied to know how antibiotics is prescribed in according to specific hospital acquired infections prevailing in tertiary care hospital [15].

Materials and Methods

This was a prospective observational study conducted in Surgery, Neurosurgery and Critical Care units of JSS Hospital, Mysore which is an 1800 bed multi-specialty tertiary care teaching hospital. Patients who met study criteria were enrolled in this research study. This study was conducted over a period of six months. A suitable data collection form (Annexure I) was designed for the collection and documentation of patient data including demographic details of the patient, laboratory parameters, current treatment culture sensitivity report, details of exposure. The enrolled patients were monitored on daily basis. The therapy related data such as name of the antibiotic which was identified using ATC code, brand name, dose, route, frequency,

Table 2: Antibiotics with their commonly used doses, frequency and average duration.

Serial Number	Antibiotics	Dose	Route	Frequency	Average Duration
1	Linezolid	600 mg	IV	1-0-1	6.2 days
			PO	1-0-1	6.75 days
2	Piperacillin + Tazobactum	4.5 g	IV	1-0-1	8.8 days
		2.25 g	IV	1-0-1	4 days
3	Cefoperazone + Sulbactum	1.5 g	IV	1-0-1	8.8 days
4	Colistin	1 MU	IV	1-0-1	8.75 days
				1-1-1	8.6 days
		2 MU	IV	1-0-1	7 days
				1-1-1	8 days
5	Imipenem	500 mg	IV	1-0-1	8 days
				1-1-1	9.5 days
6	Ciprofloxacin	250 mg	PO	1-0-1	5 days
		500 mg	PO	1-0-1	8 days
		2g	IV	1-0-1	6 days
			IV	1-0-1	6 days
7	Meropenem	500 mg	IV	1-0-1	8 days
		1 g	IV	1-0-1	7 days
8	Ceftriaxone + Sulbactum	1g	IV	1-0-1	6 days
		1.25 g	IV	1-0-1	3 days
		1.25 g	IV	1-0-1	7 days
9	Aztreonam	1g	IV	1-0-1	7 days
10	Metronidazole	500 mg	IV	1-0-1	7 days
		1 g	IV	1-1-1	8 days
11	Amikacin	500 mg	IV	1-0-1	8 days
12	Ceftazidime	1g	IV	1-0-1	6 days
		1.125 g	IV	1-1-1	6 days
13	Tigecycline	50 mg	IV	1-0-1	6 days
14	Cefuroxime	1.5 g	IV	1-0-1	4 days
		500 mg	PO	1-0-1	8 days
15	Tinidazole	500 mg	IV	1-0-1	5 days
		800 mg	IV	1-0-0	7 days

dosage adjustment in case of renal insufficiency, cost of the drug, duration of the therapy and choice of antibiotic after culture sensitivity report were collected and documented to determine the prescribing pattern of antibiotic. The data collected using the data collection form was entered into a specially designed online 'Electronic data form for easy retrieval of data for analysis. The database consists of two sections, master entry and data form entry. The collected data was entered into the data form entry, which was electronically prepared in the same format as that of the data collection form used. The data entered into the data form entry automatically registered into the master entry. The master entry constitutes the whole information entered in the data form entry at a glance, with provisions for filtering the required data as the analysis demands.

Results and Discussion

The most frequently prescribed antibiotic was Cefoperazone + Sulbactum (42%) followed by Linezolid (36%), Piperacillin + Tazobactum (32%), Colistin (32%) and Imipenem (24%) as summarised in Table 1.

The most significant reason for extensive use of Cefoperazone + Sulbactum could be the fact that they are the most commonly used class of antibiotics as empirical therapy and for peri-operative prophylaxis in the study hospital due to its easy accessibility, affordable cost and satisfactory therapeutic outcome. Linezolid was found to be widely used in the surgery wards. Being a reserved class on antibiotic the focus should be shifted on other lower class of antibiotics. Culture and sensitivity test of the collected samples should be carried out for more number of antibiotics (Table 2).

Conclusion

The most frequently prescribed antibiotics for management of Hospital Acquired Infections were found to be Cefoperazone + Sulbactum followed by Linezolid, Piperacillin + Tazobactum, Colistin and Imipenem. Initially when patients were suspected with any hospital acquired infections they were prescribed with empirical antibiotic, and once the culture sensitivity report came, antibiotic was prescribed in according to that. But most often practising clinicians don't follow the strict antibiotic policies that were recommended by

pharmacy therapeutic committee of hospital. Therefore this research study concludes that more irrational use of antibiotic was observed in hospital acquired infections which had resulted increased health care cost of the patient as well as antibiotic resistance. The average duration of prescribed antibiotic in our research study for Cefoperazone + Sulbactum was 8.8 days followed by Linezolid 6.2 days, Piperacillin + Tazobactum 8.8 days + 4 days, Colistin 8.6 days and Imipenem BD for 8 days and TID for 9.5 days.

References

1. Ducel G, Fabry J, Nicolle L, WHO. Prevention of hospital-acquired Infections: a practical guide. 2002.
2. Mohammed M, Mohammed AH, Misba Ali B. Mirza, Azizullah Ghori. Int Res J Pharm. 2014;5(1):7-9.
3. Hidron A, Edwards JR, Patel J, Horan TC, Sievert DM, Pollock DA, et al. Al. NHSN annual update: Antimicrobial-Resistant Pathogens Associated With Healthcare-Associated Infections: Annual Summary of Data Reported to the National Healthcare Safety Network at the Centers for Disease Control and Prevention, 2006-200. Infect Control Hosp Epidemiol. 2008; 29(11):996-1011.
4. Emily Sydnor RM, Perl TM. Hospital Epidemiology and Infection Control in Acute-Care Settings. Clin Microbiol Rev. 2011;24(1):141-73.
5. Isikgoz TM, Durusoy R, Pullukcu H, Sipahi OR, Ulusoy S. Hospital-acquired urinary tract infection point prevalence in Turkey: Differences in risk factors among patient groups. Ann Clin Microbiol Antimicrob. 2013;12:31.
6. Hospital acquired infections high in India: Study. India Medical Times. 2011.
7. Malhotra S, Sharma S, Hans C. Prevalence of Hospital Acquired Infections in a tertiary care hospital in India. Int Inv J Med Med Sci. 2014;1(7):91-4.
8. Kuper KM, Septimus EJ. Health care associated Infections: The Legislative Perspective and the Pharmacist's Role. Am J Health Syst Pharm. 2009;66(5):488-94.
9. Patel Disha, Patel Kiran, Bhatt Seema, Shah Hetal. Surveillance of hospital acquired infection in surgical wards in tertiary care centre Ahmedabad, Gujarat. Natl J Commun Med. 2011;2(3):340-5.
10. Sharma DK, Tiwari YK, Vyas N, Maheshwari RK. An investigation of the incidence of Nosocomial infections among the patients admitted in the intensive care unit of a tertiary care hospital in Rajasthan, India. Int J Curr Microbiol App Sci. 2013;2(10):428-35.
11. Rello J, Ollendorf DA, Oster G, Vera-Llonch M, Bellm L, Redman R, et al. Epidemiology and Outcomes of Ventilator-Associated Pneumonia in a Large US Database. Chest. 2002;122(6):2115-21.
12. Leroy O, Jaffre S, d'Escrivan T, Devos P, Georges H, Alfandari S. Hospital Acquired Pneumonia Risk Factors for Antimicrobial Resistant Causative Pathogens in Critically ill Patients. Chest. 2003;123(6):2034-42.
13. Mythri H, Kashinath KR. Nosocomial, infections in patients admitted in intensive care unit of a Tertiary Health Center, India. Ann Med Health Sci Res. 2014;4(5):738-41.
14. Dasgupta S, Das S, Chawan NS, Hazra A. Nosocomial infections in the intensive care unit: Incidence, risk factors, outcome and associated pathogens in a public tertiary teaching hospital of Eastern India. Indian J Crit Care Med. 2015;19(1):14-20.
15. Ak O, Batirel A, Ozer S, Colakoglu S. Nosocomial infections and risk factors in the intensive care unit of a teaching and research hospital: A prospective cohort study. Med Sci Monit. 2011;17(5):PH29-34.