



PROPHYLAXIS AND POST SURGICAL ANTIBIOTIC UTILIZATION PATTERN IN TERTIARY CARE TEACHING HOSPITAL

Dr. Sweta Kumari	P.hD Scholar Department Of Pharmacology, Santosh Medical College, Ghaziabad, India.
Dr. Kavita Dhar Bagati	Ex- Associate Professor Department Of Pharmacology, Santosh Medical College, Ghaziabad, India.
Dr. Bala Krishnan.S	Head Of The Department, Department Of Pharmacology, All India Institute Of Medical Science, Bhopal India.
Dr. Shaktibala Dutta*	Prof.& Head Of The Department, Department of Pharmacology, Santosh Medical College Ghaziabad, India. *Corresponding Author

ABSTRACT **BACKGROUND:** Antibiotics are at times indiscriminately used in clinical management may cause adverse effects, drug resistance etc. Thus to optimize use, there is a need to regulate the prescription strategies with antimicrobial stewardship. **MATERIAL & METHODS:** To evaluate prophylaxis and post surgery uses of antibiotics with dose, route of administration, duration of antibiotic treatment, duration of stay in wards, no of antibiotics per prescription . This is a prospective observational type of study conducted as a collaboration of Santosh medical college Ghaziabad and All india institute of medical sciences Bhopal. **RESULTS:** Out of 169, 58(34.3%) were in orthopaedics (M/F = 37/21), and 111 in surgery (M/F = 57/75). In surgery, Beta lactam (amoxicillin/clavulanic acid, 84(49.7%) and ceftriaxone (79(46.7%) were given at dose of (mean dose 1040 gram) for duration of 1.29 hours mean time. Post surgery the dose was 1052.97 g for 4.42 days . In orthopaedics Cefazolin of class cephalosporin was used in 31.4 % of cases at dose of (mean dose 999.13 g for mean duration of 4.19 days .Principle **CONCLUSION:** It was found cephalosporins (cefazolin and ceftriaxone) and beta lactam (amoxicillin/clavulanic acid) are preferred in orthopaedics and surgery respectively. This was as per the prescription norms and regulations.

KEYWORDS : Antibiotic stewardship, prophylaxis, prescriptions, surgical site infections

INTRODUCTION

Preoperative antibiotic prophylaxis is defined as the administration of antibiotics prior to performing surgery to help decrease the risk of postoperative infections. The circumstance of anti-microbial administration may vary, but the objective of managing preoperative systemic prophylactic anti-microbial is to have the concentration in tissue at highest at the site of surgery and during surgery. Common organisms involved in surgical site infection include staphylococcus aureus, staphylococcus epidermidis, aerobic streptococci, anaerobic cocci.¹

Enormous and improper use of antibiotics in emergency care hospital is common. Post surgical antibiotic use in developing country. Along with emergency of resistance and prolonged hospital stays was increased. Another study shown that approximately 30% of antibiotics were inappropriate and suboptimal.² Antibiotic prophylaxis prevent antibiotic overuse, misuse and abuse, antibiotic prophylaxis control and prevent occurrence of surgical site infections (SSI). Antimicrobial stewardship supports, optimal use of antibiotic, improves appropriate use of antibiotic and patient outcome also reduces adverse effects³

Surgical site infections are the most common problem. The Centres for Disease Control and Prevention (CDC) estimate that nearly 500,000 SSIs occur annually. Excessive and inappropriate use of antibiotics in acute care hospital is common in developing country, and cause the emergence of antimicrobial resistance, duration in hospital stays is prolonged and high cost of treatment. Selection of suitable antibiotic depends on the pathogen causing infection⁴. A single pre surgical antibiotic dose is appropriate of surgery for 4 hours⁵. The Health care worker is using antibiotics on routine basis for the various diseases. The primary goal of preoperative prophylactic and post surgical antibiotic use is to reduce risk of surgical site infections, antibiotic resistance decrease, less hospital stay and thereby less expensive for the patients. Also in surgeries where huge amount of blood loss is anticipated it proves beneficial.

OBJECTIVE OF STUDY : To evaluate prophylaxis and post surgery uses of antibiotics

MATERIALS AND METHODS

Study design: Prospective observational type

Setting: study conducted with the collaboration of Santosh medical college Ghaziabad and All India institute of medical sciences Bhopal.

Sample size : 169 patients.

Duration of study: 6 months

INCLUSION CRITERIA : either gender who admitted and prescribed antibiotics in orthopaedic and surgery ward.

EXCLUSION CRITERIA: patients who were not given antibiotics

ETHICAL APPROVAL : After approval of ethical clearance (letter no. SU/2016/431(9) from the Institutional ethics committee of Santosh Medical College Ghaziabad

DATA COLLECTION: Done with the patients IPD records with every day ward round until the patients was discharged from the hospital, there was no direct contact with the patients hence consent form not required.

Surgical department includes superspeciality pediatrics surgery, burns, plastic surgery, ENT, and dentistry and orthopaedics. The data included the age, diagnosis, antibiotic name, route of antibiotics used, duration of antibiotics treatment and duration of stay of patients. All antibiotics were recorded with date, duration of treatment, frequency and route of drug administration. Prophylaxis antibiotic was given one hour before surgery.

STATISTICAL ANALYSIS :

Continuous data presented as a mean standard deviation when normally distributed and median with range when non parametric in distribution .Categorical variables are presented as frequency and percentages. In analysis SPSS (ver.22. IBM Corp.) was used. The data were checked for frequency distribution and represented as cross-tabs. Pearson's chi square statistic was used for assessing the association between antibiotic use and various variables. Two-tailed alpha of <than 0.05 was considered as significant.

RESULTS

Fig 1 Gender wise patients distribution

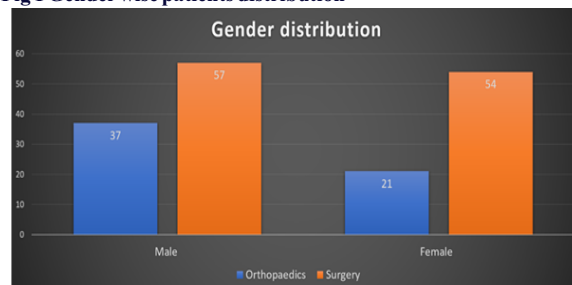


Fig 1 Total of 169 patients 58(34.3%) patients was in orthopaedics out of 58, 37 (21.9%) male and 21(12.4%) female . In surgery out of 111 patients , 57 (33.7%) male and 75 (44.4%) female .

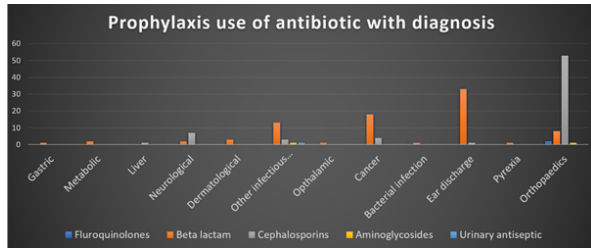


Fig 2 Prophylaxis use of antibiotics with system wise diagnosis

Fig 2 Most common drugs use for prophylaxis is a beta lactam (amoxicillin/clavulanic acid) 84 (49.7%) and cephalosporins (ceftriaxone 79 (46.7%), 33 (19.5%) used in ear discharge , 18 (10.7%) in cancer, 13 (7.7%) used in other infectious disease and 8 (4.7%) used in orthopaedics surgery. Next common drugs which used as prophylaxis is cephalosporins (cefazolin 1st generation cephalosporins) in that 53 (31.4%) used in orthopaedics surgery , and 7 (4.1%) used in neurological disease , 3 (1.8%) used in other infectious disease.

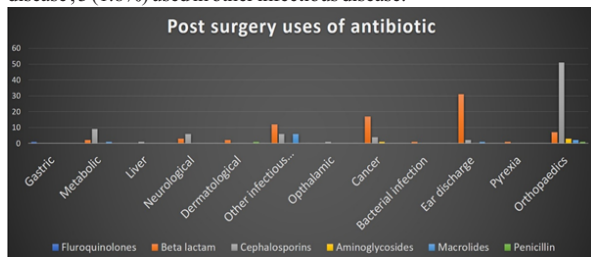


Fig.3 Post surgery uses of antibiotics

Fig. 3 Post surgery most common antibiotics used in orthopaedics out of 58 (34.3%) patients 47 (27.8%) received cephalosporins and 5 (3%) received beta lactam, 3(1.8%) aminoglycosides 2 (1.2%) received macrolides, 1 (0.6%) received penicillin. In surgery out of 111 (65.7%) , 73 (43.2%) received aminoglycosides and 33 (19.5%) received cephalosporins, 2(1.2%) received macrolides, 1 (0.6%) fluoroquinolones, 1 (0.6%) aminoglycosides 1 (0.6%) penicillin .

Table 1 Case summary prophylaxis of antibiotics

	Prophylactic antibiotics	Dose	Duration of antibiotic treatment (hrs)
N	58	58	58
Mean	2.86	870.68	1.24
Range	4	1075.00	5
Standard deviation	.544	255.0429	.942
Median	3	1000.00	1.00
Surgery			
N	111	111	111
Mean	2.37	1040.99	1.29
Range	5	4400	4
Standard deviation	.725	463.7028	.835
Median	2.00	1200.00	1
Total			
N	169	169	169
Mean	2.54	982.5444	1.27
Range	6	4400.00	5
Standard deviation	.707	411.62249	871
Median	2.00	1000.00	1.00
Chi square cross tab	P <0.001		

Table 1 In orthopaedics out of 58 patients prophylactic antibiotic was given mean ±2.86, mean dose ± 870.68 and duration of prophylaxis 1.24 hours .

In surgery out of 111 patients prophylactic antibiotics were given mean ±2.37 at mean dose ±1040.99 and mean duration of prophylaxis is 1.29 hours.

Chi square cross tab p<0.001 the overall patients who received optimal

antibiotic prophylaxis initiated within 1 hours before surgical incision was statistically significant.

Table 2 Post surgery antibiotics uses with dose and duration of treatment

Orthopaedics	Post surgery antibiotics	Dose	Post antibiotic duration (days)	Total stay in days
N	58	58	58	58
Mean	3.24	999.1379	4.19	11.91
Range	8	4250.00	9	51
Standard deviation	1.189	709.78	1.583	8.827
Median	3.00	1000.00	4.50	9.00
Surgery				
N	111	111	111	111
Mean	2.46	1052.97	4.42	10.06
Range	9	1920	12	27
Standard deviation	1.025	360.04	1.604	58
Median	2.00	1200	5	
Total				
Mean	169	169	169	169
Range	2.73	4420.00	12	51
Standard deviation	1.143	506.42	506.42	7.093
Median	3	1000	5	8
Chi square cross tab	p< 0.001			

Table. 2 Post surgery in orthopaedics means post surgery, antibiotics ±3.24 at mean dose 999.13⁶ and mean duration of antibiotic treatment was 4.19 days. Total stay in ward the of the patients was ±11.91 days⁷.

During surgery post surgery antibiotic mean was ±2.46 , mean dose ±1052.97 and mean duration of antibiotic treatment was 4.42 and total mean stay of the patients was ±10.06 days. Chi square cross tab p<0.001 indicate post surgical patients received optimal antibiotic therapy with dose, duration of treatment and total stay of the patients.

DISCUSSION

In surgery most common patients were from ENT surgery in that ear discharge 34(20%), cancer 22(13%) in that most common was oral squamous cell cancer, osteoma of right ear, cancer of buccal other infectious disease 18(10.7%). In orthopaedic most common patients was fractured from different part of the body. In previous study antimicrobial prescription pattern penicillin and aminoglycosides were most commonly prescribed. But a similar study done in this decade in our country reported 3rd generation cephalosporins as the most prescribed antibiotics.⁸

In this study we investigated antibiotic prescribing practices in surgical and orthopaedic ward. Surgical patient most likely to received at more than one course of antibiotics during their total stay in hospital. In this study in surgery most commonly (82%) prescribed drug for prophylaxis is beta lactam along with beta lactamase inhibitors (amoxicillin/clavulanic acid) and post surgery beta lactam⁹ and cephalosporins (ceftriaxone)¹⁰ (26%) 3rd generation cephalosporins) most commonly prescribed¹¹.

In orthopaedic surgical prophylaxis cephalosporins (cefazolin) (46%) 1st generation cephalosporins & cephalixin (13%) were used and post surgery follow the same sequence. Some other studies showing (96%, n =284) used as cefazolin as first line prophylaxis antibiotic for treatment of long bone fracture^{12,13}

In surgery stewardship should focus on patients who stay in hospital in post surgical phase where they are initiated on broad spectrum antibiotics. According to 86% of antibiotic were intravenous¹⁴ . All surgical patients received intravenous antibiotics here most common out of 169 patients 143(84.6%) given intravenous¹⁵ and 26 (15.4%) given oral route. In this study most common drugs used in orthopaedics was cephalosporins¹⁶ (cefazolin) prophylactic uses and ceftriaxone (3rd generation) post surgery along with prophylactic(cefazolin) drugs⁶. In surgery most common prophylactic drugs was beta lactam¹⁷(amoxicillin/ clavulanic acid) and post surgery was also same along with ceftriaxone was used.

CONCLUSION

Most of the antibiotic prescription from both orthopaedics and surgery were rational regarding with route, dose, duration of antibiotic treatment for a given diagnosis. Drugs prescribed by generic name that reduces patient expenditure. In this study prescribed antibiotics was

broad spectrum mainly beta lactam, cephalosporins. In our study most of the prescription in orthopaedics was cephalosporins in that cefazolin and ceftriaxone was commonly prescribed. In surgery most common was beta lactam (amoxicillin/clavulanic acid) . All prescription got optimal dose, duration of therapy and antibiotics used for giving diagnosis is significance therefore this study showing a appropriate prescribing pattern as they follow ICMR 2017 guideline¹⁸ .

REFERENCES

1. Bhimji2. MFCSS, Sciences 1 Univ. of Arkansas for Medical, Toronto 2 Un of. Preoperative Antibiotic Prophylaxis - StatPearls - NCBI Bookshelf. 2017.
2. Saied Tamer MDMs, Hafez Soad F MDP, Kandeel Amr MDP, El-kholy Amany MDP, Ismail Ghada MDP, Aboushady Mariam MDP, et al. Antimicrobial stewardship to optimize the use of antimicrobials for surgical prophylaxis in Egypt: A multicenter pilot intervention study. *Am J Infect Control*. 2015;
3. Murri R, de Belvis AG, Fantoni M, Tanzariello M, Parente P, Marventano S, et al. Impact of antibiotic stewardship on perioperative antimicrobial prophylaxis. *Int J Qual Heal Care*. 2016;
4. Salkind AR, Rao KC. Antibiotic prophylaxis to prevent surgical site infections. *Am Fam Physician*. 2011;
5. Rehan HS, Kakkar AK, Goel S. Pattern of surgical antibiotic prophylaxis in a tertiary care teaching hospital in India. *Int J Infect Control*. 2010;6(2):1–6.
6. Prokuski L. Prophylactic antibiotics in orthopaedic surgery. *Journal of the American Academy of Orthopaedic Surgeons*. 2008.
7. Mishra BN, Jha A, Maharjan E, Limbu M, Sah S, Gupta Y, et al. Length of stay of orthopaedic inpatients at a teaching hospital in eastern part of Nepal. *J Nepal Med Assoc*. 2015;
8. Saache S, Divhare S, Ghongane B, Shaikh S. Antibacterial Prescription Pattern in Medical and Surgical Intensive Care Units of a Tertiary Care Hospital.
9. Ahmad Khan F, Kumar Singh V, Sharma S, Singh P. A prospective study on the antimicrobial usage in the medicine department of a tertiary care teaching hospital. *J Clin Diagnostic Res*. 2013 Jul 1;7(7):1343–6.
10. Alemkere G. Antibiotic usage in surgical prophylaxis: A prospective observational study in the surgical ward of Nekemte referral hospital. *PLoS One*. 2018;
11. Pinto Pereira LM, Phillips M, Ramlal H, Teemul K, Prabhakar P. Third generation cephalosporin use in a tertiary hospital in Port of Spain, Trinidad: Need for an antibiotic policy. *BMC Infect Dis*. 2004;4:1–7.
12. Gans I, Jain A, Sirisreerux N, Haut ER, Hasenboehler EA. Current practice of antibiotic prophylaxis for surgical fixation of closed long bone fractures: A survey of 297 members of the Orthopaedic Trauma Association. *Patient Saf Surg* [Internet]. 2017;11(1):2–7. Available from: <http://dx.doi.org/10.1186/s13037-016-0118-5>
13. Backes M, Dingemans SA, Dijkgraaf MGW, Van den Berg HR, Van Dijkman B, Hoogendoorn JM, et al. Effect of antibiotic prophylaxis on surgical site infections following removal of orthopedic implants used for treatment of foot, ankle, and lower leg fractures a randomized clinical trial. *JAMA - J Am Med Assoc*. 2017;
14. Charani E, de Barra E, Rawson TM, Gill D, Gilchrist M, Naylor NR, et al. Antibiotic prescribing in general medical and surgical specialties: a prospective cohort study. *Antimicrob Resist Infect Control*. 2019;8:151.
15. Misganaw D, Linger B, Abesha A. Surgical Antibiotic Prophylaxis Use and Surgical Site Infection Pattern in Dessie Referral Hospital, Dessie, Northeast of Ethiopia. *Biomed Res Int*. 2020;
16. Khakhhar T, Shah R, Hemavathi KG. Current status of post-operative antibiotic prophylaxis in surgical wards. *Natl J Physiol Pharm Pharmacol*. 2016;
17. Munckhof W. Antibiotics for surgical prophylaxis. *Australian Prescriber*. 2005.
18. Indian Council of Medical Research. Treatment Guidelines for Antimicrobial Use in Common Syndromes. Indian Council of Medical Research, New Delhi, India. 2017;