Journal of Pharmaceutical Research International

33(43A): 395-400, 2021; Article no.JPRI.73179
ISSN: 2456-9119
(Past name: British Journal of Pharmaceutical Research, Past ISSN: 2231-2919, NLM ID: 101631759)

Antibiotics Using Pattern in Surgery Department of a Maternity and Children Hospital

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

Article Information

DOI: 10.9734/JPRI/2021/v33i43A32503
Editor(s):
(1) Dr. Fahmida Khan, National Institute of Technology Raipur, India.
Reviewers:
(1) Brandon Lucke-Wold, University of Florida, USA.
(2) Shao-Wen Hung, Animal Technology Research Center, Agricultural Technology Research Institute, Taiwan.
Complete Peer review History: https://www.sdiarticle4.com/review-history/73179

Original Research Article

Received 20 June 2021
Accepted 26 August 2021
Published 07 September 2021

ABSTRACT

Aim: This study aimed to identify antibiotics using pattern in surgery department of a maternity and children hospital in Alkharj.
Methodology: This is a retrospective review of the drugs that were prescribed in maternity and children hospital in Alkharj from January 2018 to August 2020.
Results: The most prescribed antibiotics by emergency department for surgery patients were metronidazole (45.59%) and ceftriaxone (42.65%). Metronidazole IV was the most commonly prescribed antibiotic (38.73%) by inpatient department for surgery patients followed by ceftriaxone (38.73%). Vancomycin vial (43.75%) was the most commonly prescribed antibiotic by critical care unit for surgery patients. The most commonly prescribed antibiotic outpatient department and day case unit for surgery patients by was fusidic acid ointment (35.00%).
Conclusion: The study showed that the most commonly prescribed antibiotics for surgery patients were metronidazole and ceftriaxone. Continuous monitoring for antibiotics prescribing is vital to increase the judicious use of these medications and more educational programs and awareness workshops for surgeons are needed.

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Keywords: Antibiotics; pattern; surgery; use.

1. INTRODUCTION

Since the availability of antibiotics in 1940s, its role has been expanded from the management of severe infectious diseases to preventing nosocomial infections and used in surgery patients either as a prophylaxis or as therapy in addition to its use in protecting immuno-compromised patients [1].

Antibiotics are substances, which are obtained from one microorganism and prove fatal for other microorganism at low concentration and can be either a bactericidal or bacteriostatic agents [2]. Surgical patients are in general high consumers of antibiotics [3]. Antibiotics have two indications in surgery either to prevent postoperative infections or to treat established infections.

Bacterial infections could be treated with antibiotics. Nevertheless, there is an increase in the rate of antibiotic-resistant infections [4-7]. Incorrect use of antibiotics will result in microorganisms becoming resistant to the antibiotic, thus causing the antibiotics to lose their functions [4-7]. Several studies showed that antibiotics are used incorrectly in surgery department [8-10]. Several interventions could be used to improve antibiotic use in surgery department that includes broad, pharmacy driven and infection and syndrome specific interventions [11].

The administration of antibacterial agent wisely is important to reduce infection-related morbidity and mortality rate [1]. It is important to identify the antibiotic prescribing patterns in order to improve antibiotic prescribing and use. Therefore, this study aimed to identify antibiotics using pattern in surgery department of a maternity and children hospital in Alkharj.

2. METHODOLOGY

This is a retrospective review of the drugs that were prescribed in maternity and children hospital in Alkharj from January 2018 to August 2020.

The study included the patients who received antibiotic from the hospital pharmacy. The exclusion criteria included the patients who didn't receive antibiotics or who received it before January 2018 or after August 2020.

The data included number of antibiotics that were prescribed during the study period in outpatient department, emergency department, day case unit, in critical care unit and inpatient department.

3. RESULTS AND DISCUSSION

The present study included the number of antibiotics prescribed for surgery in the maternity and children hospital. Table 1 shows the antibiotics prescribed by emergency department (ER) for surgery patients. The most prescribed antibiotics were metronidazole (45.59%) and ceftriaxone (42.65%).

Table 2 shows the antibiotics prescribed by inpatient department (IPD) for surgery patients. Metronidazole was the most commonly prescribed antibiotic (mainly as an IV infusion 500 mg Bottle or Bag 38.73%) followed by ceftriaxone sodium 1 gm vial (38.73%).

Table 3 shows the antibiotics prescribed by critical care unit for surgery patients. Vancomycin Hcl 500 mg vial (43.75%) was the most commonly prescribed antibiotic followed by ampicillin sodium 500 mg vial (25.00%).

Table 1. Antibiotics prescribed by Emergency Department (ER) for surgery patients

Antibiotic	Number of orders N(%)
Amoxicillin Trihydrate + Clavulanate Potassium 125 mg + 31 mg / 5 ml 100 ml Suspension	8 (2.35%)
Cefuroxime Sodium 750 mg Vial	27 (7.94%)
Fusidic Acid 2% 25-30 Gm / Tube Cream	1 (0.29%)
Gentamicin Sulfate 80 mg Ampoule Or Vial	4 (1.18%)
Ceftriaxone Sodium 1 Gm Vial	145 (42.65%)
Metronidazole Iv Infusion 500 mg Bottle or Bag	155 (45.59%)
Total	340

Table 2. Antibiotics prescribed by Inpatient Department (IPD) for surgery patients

Antibiotic	Number of orders N(%)
Amoxicillin Trihydrate + Clavulanate Potassium 125 mg + 31 mg / 5 ml 100 ml Suspension	19 (3.17%)
Amoxicillin Trihydrate + Clavulanate Potassium 500 mg + 100 mg Vial	2 (0.33%)
Amoxicillin Trihydrate + Clavulanate Potassium 500 mg + 125mg Tablet	2 (0.33%)
Amoxicillin Trihydrate 250 mg / 5 ml 100 ml Suspension	1 (0.17%)
Ampicillin Sodium 1 Gm Vial	1 (0.17%)
Azithromycin 200 mg / 5 ml 15 ml Suspension	4 (0.67%)
Cefuroxime 250 mg / 5 ml Suspension	3 (0.50%)
Cefuroxime Sodium 750 mg Vial	44 (7.35%)
Ciprofoxacin 500 mg Tablet	2 (0.33%)
Erythromycin Lactobionate or Gluceptate 1 Gm Vial	7 (1.17%)
Fusidic Acid 2% 10 - 15 Gm/ Tube Ointment	18 (3.00%)
Fusidic Acid 2% 25-30 Gm / Tube Cream	13 (2.17%)
Gentamicin Sulfate 20 mg Ampoule Or Vial	1 (0.17%)
Gentamicin Sulfate 80 mg Ampoule Or Vial	6 (1.00%)
Vancomycin Hcl 500 mg Vial	6 (1.00%)
Ceftriaxone Sodium 1 Gm Vial	232 (38.73%)
Metronidazole 125 mg/5 ml 100 ml Suspension	4 (0.67%)
Metronidazole 500 mg Tablet	2 (0.33%)
Metronidazole Iv Infusion 500 mg Bottle or Bag	232 (38.73%)
Total	599

Table 3. Antibiotics prescribed by Critical Care Unit for surgery patients

Antibiotic	Number of orders N(%)
Ampicillin Sodium 500 mg Vial	4 (25.00%)
Clindamycin Phosphate 300 mg Ampoule	3 (18.75%)
Fusidic Acid 2% 25-30 Gm / Tube Cream	1 (6.25%)
Meropenem 500 mg Vial	1 (6.25%)
Vancomycin Hcl 500 mg Vial	7 (43.75%)
Total	16

Table 4. Antibiotics prescribed by outpatient department and day case unit for surgery patients

Antibiotics prescribed by outpatient Department	
Antibiotic	**Number of orders N(%)**
Cefuroxime Sodium 750 mg Vial	5 (25.00%)
Gentamicin Sulfate 80 mg Ampoule Or Vial	3 (15.00%)
Ceftriaxone Sodium 1 Gm Vial	2 (10.00%)
Metronidazole Iv Infusion 500 mg Bottle or Bag	3 (15.00%)
Antibiotics prescribed by Day Case Unit	
Fusidic Acid 2% 10 - 15 Gm/ Tube Ointment	7 (35.00%)
Total	20

Table 4 shows antibiotics prescribed by outpatient department and day case unit for surgery patients. The most commonly prescribed antibiotic was fusidic acid 2% 10 - 15 gm/ tube ointment (35.00%) followed by cefuroxime sodium 750 mg Vial (25.00%).

Table 5 shows the total number of antibiotics orders prescribed for surgery patients. Overall, the most commonly prescribed antibiotic for surgery patients was metronidazole (40.62%) followed by ceftriaxone (38.87%).

Table 5. Total number of Antibiotics orders prescribed for surgery patients

Antibiotic	Number of orders N(%)
Amoxicillin + Clavulanate	32 (3.28%)
Cefuroxime	79 (8.10%)
Fusidic Acid	40 (4.10%)
Gentamicin	14 (1.44%)
Ceftriaxone	379 (38.87%)
Metronidazole	396 (40.62%)
Ampicillin	5 (0.51%)
Azithromycin	4 (0.41%)
Ciprofoxacin	2 (0.21%)
Erythromycin	7 (0.72%)
Vancomycin	13 (1.33%)
Clindamycin	3 (0.31%)
Meropenem	1 (0.10%)
Total	975

The results of the present study showed that the most commonly prescribed antibiotics for surgery patients were metronidazole and ceftriaxone. This result is rational because for the majority of the surgeries one of the cephalosporin antibiotics is used if the expected causative bacteria is aerobic or cephalosporin and metronidazole if the expected causative bacteria is anaerobic. But usually first generation cephalosporin is recommended particularly cefazolin [12,13]. In the present study, although cefazolin is used frequently but in the electronic records there were no data about the use of cefazolin.

Wokuma and Dedefo reported that among Patients Who Undergone Major Surgery at Nekemte Referral Hospital, West Ethiopia, the most frequently prescribed antibiotics drugs were ceftriaxone (52.88%) and metronidazole (29.58%) for treatment and ceftriaxone (71.96%) and metronidazole (17.56%) for prophylaxis [14]. Abula and Kedir stated that in surgical in-patients of a teaching hospital, northwest Ethiopia, frequently prescribed antibiotics or their combinations were ampicillin, chloramphenicol and gentamicin [15]. Ahmed reported that regarding medications' prescribing pattern in the general surgery outpatient department, antibiotics and analgesics were the most commonly prescribed drug classes and that the most prescribed medication was paracetamol (21.32%) followed by amoxicillin/clavulanic acid (12.85%), ciprofloxacin (12.85%), and metronidazole (6.27%) [16]. Moreover, Bediako-Bowan et al stated that in surgical units of selected hospitals in Ghana, the most frequently prescribed antibiotics across all levels of facilities were nitroimidazoles (metronidazole) (25.6%), 2nd and 3rd generations cephalosporins (cefuroxime and ceftriaxone respectively) (20.0%) [17].

Sane et al. [2] stated that in surgical wards, the percentages of antibiotics used for these surgeries were cefotaxime 44%, amikacin 88%, ceftriaxone 52%, metronidazole 30%, and cefixime 54%. Herawati et al. [18] reported that in the Surgery Department of Bangil Regional General Hospital, Pasuruan, the 3 most-used antibiotics are ciprofloxacin (11.8 DDD / 100 patient-days), ceftazidime (6.7 DDD / 100 patient-days), and cefixime (4.3 DDD / 100 patient-days). Hadi et al. [19] informed that in two governmental teaching hospitals in Indonesia all but 20 of 487 of cephalosporins prescribed belonged to the third generation and that most cephalosporins were administered in the department of surgery; 16.4 DDD ⁄ 100 patient days. Furthermore, Maheshwari et al reported that regarding prescribing patterns of antibiotics in post-operative patients of surgery department, most common antimicrobial administered was cephalosporin's (40%) [20]. Saito et al stated that the most common prescribed antibiotic agents during hospitalization were a combination of ceftriaxone and metronidazole, followed by a single regimen of ceftriaxone [21]. They also reported that regarding pattern of peri-operative antibiotic use among surgical patients in a regional referral and teaching hospital in Uganda, the combination of ceftriaxone and metronidazole was more common in the obstetrics and gynecology department whereas other combination regimens were more common in the surgical department [21].

4. CONCLUSION

The study showed that the most commonly prescribed antibiotics for surgery patients were metronidazole and ceftriaxone. Continuous monitoring for antibiotics prescribing is vital to increase the judicious use of these medications and more educational programs and awareness workshops for surgeons are needed.

5. LIMITATION

The main limitation in the study was that there were no indications (type of surgery not written). The second limitation was that there were no data about the use of cefazolin in the electronic records.

DISCLAIMER

The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

ACKNOWLEDGEMENT

This Publication was supported by the Deanship of Scientific Research at Prince Sattam bin Abdulaziz University.

ETHICAL APPROVAL

The study was approved by the central IRB committee with an IRB log number of 20-011E. After approval of the study, the data were collected and represented as numbers.

CONSENT

As per international standard or university standard, patient's written consent has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Kujur AD, Ekka NM, Chandra S. Antibiotic utilization pattern in the department of surgery in a tertiary care centre in eastern India. Int J Surg. 2019;6(11):4080- 5.
2. Sane R M, Shahani S R, Kalyanshetti A A. Antibiotic Prescription Pattern in Surgical Wards of MGM Hospital, Kamothe, Int J Infect. 2018;5(1):e57914.
3. Sajan K, Reddy BS, Gowda GM, Jacob L. Drug Utilization Pattern of Antibiotics in Surgery Department in a Tertiary Care Hospital. Int J Adv Res Eng Manag. 2018;1(12):2-8.
4. ATC World Health organization. Antimicrobial Resistance Global Report on Surveillance. World Health Organization, Geneva, Switzerland; 2014. [Cited 16 Aug 2021]. Available:https://apps.who.int/iris/handle/10665/112642.
5. World Health Organization. The world health report 2013: research for universal health coverage; 2013. World Health Organization, Geneva, Switzerland. [Cited 16 Aug 2021]. Available:https://apps.who.int/iris/handle/10665/85761.
6. Centers for Disease Control and Prevention. Office of Infectious Disease. Antibiotic resistance threats in the United States; 2013. [Cited 16 Aug 2021]. Available:https://www.cdc.gov/drugresistance/pdf/ar-threats-2013-508.pdf.
7. Ventola CL. The Antibiotic Resistance Crisis – Part 1: Causes and Threats. 2015;40(4):227-278.
8. Ahmed NJ, Almalki ZS, Haseeb A, Hassali AA, Khan AH. Review of the appropriateness of surgical antimicrobial prophylaxis. J Pharm Res Int. 2021;33(23B):81-92.
9. Ahmad NJ, Alqadi K, Abdul HASEEB, Hassali AA, Khan AH. Appropriateness of Surgical Antimicrobial Prophylaxis Practices in a Public Hospital. Lat Am J Pharm. 2021;40(1):195-200.
10. Ahmed NJ, Jalil MA, Al-Shdefat RI, Tumah HN. The practice of preoperative antibiotic prophylaxis and the adherence to guideline in Riyadh hospitals. Bull Env Pharmacol Life Sc, 2015;5, 8-14.
11. Ahmed NJ, Haseeb A, Hassali AA, Khan AH. Antimicrobial Stewardship Interventions: Narrative Review. J Pharm. Res Int. 2021;33(23B):62-71.

12. 12. Bratzler DW, Dellinger EP, Olsen KM, Perl TM, Auwaerter PG, Bolon MK, et al. Clinical practice guidelines for antimicrobial prophylaxis in surgery. Am J Health Syst Pharm. 2013;70(3):195-283.
13. File Jr TM. New guidelines for antimicrobial prophylaxis in surgery. Infect Dis Clin Pract. 2013;21(3):185-186.
14. Wokuma TA, Dedefo MG. Pattern of antibiotics use for prophylaxis and treatment among patients who undergone major surgery at Nekemte Referral Hospital, West Ethiopia. J Bioanal Biomed. 2018;10:108-113.
15. Abula T, Kedir M. The pattern of antibiotic usage in surgical in-patients of a teaching hospital, northwest Ethiopia. Ethiop J Health Dev. 2004;18(1):35-38.
16. Ahmed NJ. Medications' prescribing pattern in the general surgery outpatient department. J Pharm Res Int. 2021;33(9):1-4.
17. Bediako-Bowan AAA, Owusu E, Labi AK, Obeng-Nkrumah N, Sunkwa-Mills G, Bjerrum S, et al. Antibiotic use in surgical units of selected hospitals in Ghana: a multi-centre point prevalence survey. BMC Public Health. 2019;19:797.
18. Herawati F, Giovanny BE, Yulia R, Jaelani AK. Antibiotic use profiles and microbial patterns in the Surgery Department of Bangil Regional General Hospital, Pasuruan. GJPPS. 2018;6(3):001-006.
19. Hadi U, Duerink DO, Lestari ES, Nagelkerke NJ, Keuter M, In't Veld DH, et al. Audit of antibiotic prescribing in two governmental teaching hospitals in Indonesia. Clin Microbiol Infect. 2008;14(7):698-707.
20. Maheshwari P, Varunrohith N, Shanmugarajan TS, Shanmugasundaram P. A prospective study of prescribing patterns of antibiotics in post-operative patients of surgery department. Research J Pharm and Tech. 2016;9(6):691-693.
21. Saito H, Inoue K, Ditai J, Weeks AD. Pattern of peri-operative antibiotic use among surgical patients in a regional referral and teaching hospital in Uganda. Surg Infect. 2020;21(6):540-546.

Peer-review history:
The peer review history for this paper can be accessed here:
https://www.sdiarticle4.com/review-history/73179