IJPSR (2019), Volume 10, Issue 10 (Research Article)

INTERNATIONAL JOURNAL OF PHARMACEUTICAL SCIENCES AND RESEARCH

Received on 24 January 2019; received in revised form, 14 April 2019; accepted, 21 April 2019; published 01 October 2019

THE PATTERN OF ANTIBIOTICS PRESCRIPTION AT AL-RASS HOSPITAL

Mugahid A. Mobark [* 1], Haifa S. Al-Harbi [1], Eiman Sayed Ahmed [1] and Yousef N. Al-Harbi [2]

Department of Pharmacy Practice [1], Department of Pharmacology [2], College of Pharmacy, Qassim University, KSA.

Keywords:

Al Rass, Antibiotics, Patterns, Prescribing

Correspondence to Author:
Mugahid A. Mobark

Assistant Professor,
Department of Pharmacy Practice,
College of Pharmacy, Qassim University, KSA.

E-mail: mojahidmobark@gmail.com

ABSTRACT: Background: The irrational uses of antibiotics play a crucial role in emerging of antimicrobial resistance. So regular review of the prescribing patterns represents an effective monitoring study that enhances rational prescription of antibiotics. This study evaluated the prescribing pattern of antibiotics at Al-Rass hospital in Qassim region. **Methodology:** A retrospective cross-sectional study was approved by the Regional Research Ethics Committee and conducted at Al-Rass hospital. A total of 3595 emergency prescriptions and 1203 from in-patient were evaluated, and only 177 antibiotics prescriptions were included in the study. Descriptive statistics were used in the analysis of data. **Results:** Among 240 antibiotics prescribed in 177 prescriptions, 58.7% were for female. Antibiotics were commonly prescribed for upper respiratory tract infections (URTI) in 26.6% and lower respiratory tract infections (LRTI) in 16.4%. The most commonly prescribed antibiotic was amoxicillin/clavulanate (26.9%), and it was mostly prescribed for URTI. The second antibiotic was ceftriaxone (25.2%) with high prescription in obstetrics and LRTI. For surgical prophylaxis metronidazole was mostly prescribed (5.5%), followed by ceftriaxone (4.3%). Paracetamol was the commonly co-prescribed medication with antibiotics, and intravenous ceftriaxone was improperly prescribed with enoxaparin. **Conclusion:** The health system in Al Rass hospital is integrated with a clear policy regarding the rational use of antibiotics. The prescription pattern was consistent with international guides; however, minor improvements need to be addressed, and implementation of clinical pharmacists' role will improve the quality of prescription to avoid drug interaction.

INTRODUCTION: Antibiotics have been widely used as antimicrobial agents, and they have saved the lives of many people from serious bacterial infections. They are one of the commonly prescribed drugs in hospital practices. Despite this effectiveness in treating the bacterial infections, much threatening bacterial resistance has been emerging and this is largely attributed to irrational uses of antibiotics [1, 2].

QUICK RESPONSE CODE

DOI: 10.13040/IJPSR.0975-8232.10(10).4776-81

The article can be accessed online on www.ijpsr.com

DOI link: http://dx.doi.org/10.13040/IJPSR.0975-8232.10(10).4776-81

As stated in various studies conducted in developing countries, the irrational uses of antibiotics is a worldwide problem and about 75% of antibiotics are prescribed inappropriately with resultant consequences of treatment failure and emergent of antibacterial resistance [3, 4].

The level of experiences and knowledge of the health care practitioners, personal preferences and the patient's pressure are regarded as the main factors behind the inappropriate prescription of antibiotics [5]. The worldwide increases in antimicrobial resistance are measured as one of the serious public health problems that represent an international health threat [6]. The emergence of this threat is strongly related to the overuse and misuse of antibiotics as a result of increased frequency of

self-dependent prescription and ignoring of routine susceptibility testing [7, 8]. The rational use of antibiotics is achieved through the proper definition of patients' problems and accurately defines the effective and safe medication that should be written in a legible prescription with the accurately stated drug, duration, and dosage. Beside all these; patients' education and planning for evaluation of treatment response are the most important complementary points. Moreover, the WHO and INRUD (International Network for the Rational Use of Drugs) have applied standard drug use to improve the overall drug prescription [9].

Appropriate selection of antibiotic requires a thorough knowledge of various conditions, including the likely pathogens causing the infection (taking into account individual host factors), susceptible patterns of these pathogens (which can change over time), pharmacokinetic and pharmacodynamics properties of the relevant antibiotics, possible drug interactions, hypersensitivity and adverse effects [10]. Assessment of the antibiotic prescribing patterns is an important indicator of the quality of clinical practice. Regular review of the antibiotic prescribing patterns represents an effective monitoring study and promotes the rational use of antibiotics [2]. This study evaluated the prescribing pattern of antibiotics at Al-Rass hospital with aim to participate effectively in antibiotics prescription monitoring and rational uses.

MATERIALS AND METHODS:

Study Design: A retrospective cross-sectional study was approved by the Regional Research Ethics Committee, registered at National Committee of Bio & Med and conducted at Al-Rass hospital in Al-Rass City, Qassim region, Kingdom of Saudi Arab. IEC number for publication is 20181017 approved on 7th November 2018.

Data Collection: The data was collected from patients' prescriptions on the electronic system of the hospital from 12th to 26th November 2017 from both the emergency and the in-patient departments. A total of 3595 and 1203 prescriptions from the emergency and inpatients department respectively were evaluated, and only antibiotics' prescriptions were included, and any prescription with incomplete data was excluded. A total of 177 antibiotics' prescriptions were included in this study. The data was collected by the researchers using data collection form that was developed after extensive literature review, the data was only used for research purposes, and the researchers maintained the confidentiality of patients' information throughout the study period.

Statistical Analysis: The data were analyzed using SPSS version 23. Descriptive statistics were used (frequency, percentage) in the analysis of data.

RESULTS:

Demographic Characteristics of the Study Participants: A total of 177 patients' prescriptions were investigated; the frequency of females was the highest representing 104 (58.7%). The patients were categorized into groups according to their age, and the most common age group was from 18 to 30-year-old representing 17.5% and 26% in male and female respectively **Table 1**.

TABLE 1: PATIENT DEMOGRAPHIC CHARACTERISTICS (N = 177)

Age group	Male	Female
18-30	31(17.5%)	46(26.0%)
31-45	21(11.9%)	29(16.4%)
46-59	14(7.9%)	14(7.9%)
≥60	7(4.0%)	15(8.0%)
TOTAL	73(41.3%)	104(58.7%)

Indication for Antibiotics Prescription among Study Participants: The most common indication for antibiotic prescription was the upper respiratory tract infections in (26.6%) prescriptions, followed by lower respiratory tract infections (16.4%), while skin infections and other minor infections were receiving the lower percentage **Table 2**.

TABLE 2: THE INDICATIONS FOR ANTIBIOTICS PRESCRIPTION (N = 177)

Diagnosis	Frequency (%)
Upper respiratory tract infection (URTI)	47 (26.6%)
Lower respiratory tract infection (LRTI)	29 (16.4%)
Gastrointestinal tract infection	23 (13%)
Obstetrics and Gynecology	23 (13%)
Trauma	15(8.5%)
Surgical prophylaxis	11 (6.2%)
Urinary tract infection	11 (6.2%)
Skin infections	10 (5.6%)
Other	8 (4.5%)

The Types and Frequency of Antibiotics Prescribed: A total of 240 antibiotics were prescribed in the evaluated 177 prescriptions. The vast majority of patients received only one

antibiotic in 70.1% followed by patients who received two antibiotics in 25.4%. The most commonly prescribed antibiotic was amoxicillin/ Clavulanate (26.9%) followed by ceftriaxone (25.2%) and metronidazole (20.9%), while meropenem, colomycin, ampicillin and gentamicin were the lowest in prescriptions **Fig. 1**.

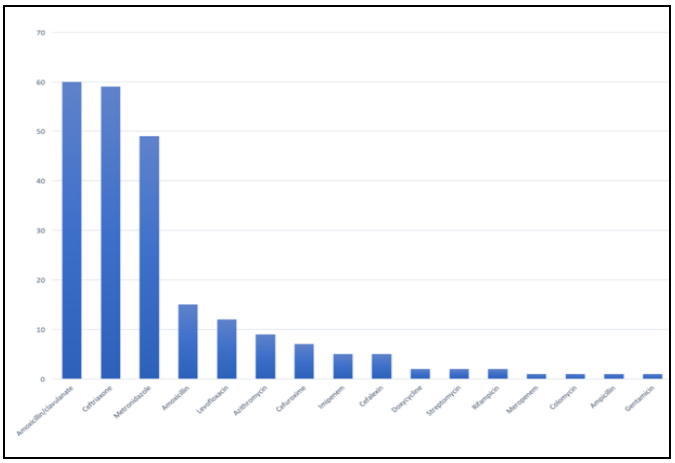

FIG. 1: THE TYPES AND FREQUENCY OF ANTIBIOTICS PRESCRIBED (N= 240)

The Antibiotic Prescribed Correlated with Indications: Amoxicillin/clavulanate was mostly prescribed for upper respiratory tract infections in 32 prescriptions (19.4%), ceftriaxone and metronidazole showed high-frequency prescription in Obstetrics and Gynecology (9.1% and 11.5%) respectively.

Both metronidazole (5.5%) and ceftriaxone (4.3%) were prescribed for surgical prophylaxis. Lower respiratory tract infections in this study were treated by ceftriaxone (7.3%), levofloxacin (4.8%), azithromycin (4.2%) and imipenem (2.4%).

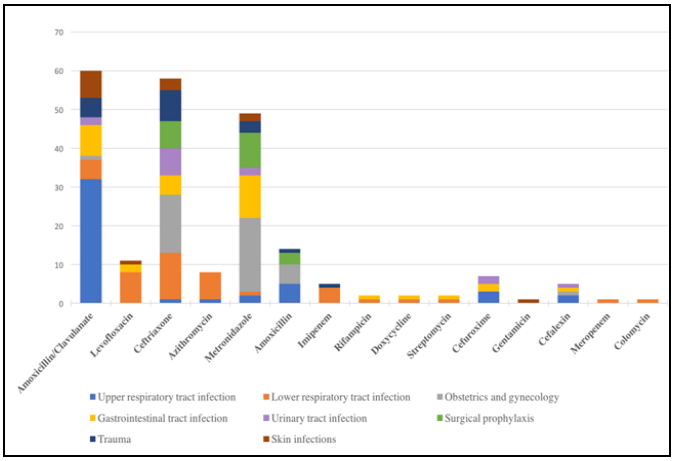

FIG. 2: DISTRIBUTION OF ANTIBIOTIC PRESCRIBED WITH THE INDICATION (N= 240)

Distribution of Prescribed Antibiotics with Co-Administered Medications: Several patients received other medications with the antibiotics, and the commonly found was paracetamol.

There were several significant differences between them, besides that 16 patients received ceftriaxone and enoxaparin.

TABLE 3: THE PRESCRIBED ANTIBIOTICS WITH CO-ADMINISTERED MEDICATIONS

Medications	Amoaxilin\clav n=22 (%)	Levofloxacin n=39 (%)	Ceftriaxone n=96 (%)	Azithromycin n=18 (%)	Metronidazole n=54 (%)	Amoxicillin n=9 (%)	Imipenem n=15 (%)
Paracetamol n=84 (%)	15 (14.0)	6 (5.6)	34 (31.8)	6 (5.6)	20 (18.7)	7 (6.5)	2 (1.9)
Omeprazole n=23 (%)	0 (0.0)	2 (1.9)	13 (12.1)	0 (0.0)	5 (4.7)	1 (0.9)	2 (1.9)
Ranitidine n=24 (%)	0 (0.0)	2 (1.9)	8 (7.5)	5 (4.7)	7 (6.5)	0 (0.0)	2 (1.9)
Enoxaparin n= 29 (%)	0 (0.0)	1 (0.9)	16 (15.0)	1 (0.9)	11 (10.3)	0 (0.0)	0 (0.0)
Ibuprofen n=12 (%)	7 (6.5)	2 (1.9)	1 (0.9)	0 (0.0)	1 (0.9)	0 (0.0)	1 (0.9)
Simvastatin n=10 (%)	0 (0.0)	1 (0.0)	4 (3.7)	2 (1.9)	2 (1.9)	0 (0.0)	1 (0.9)
Fentanyl n=5 (%)	0 (0.0)	0 (0.0)	3 (2.8)	0 (0.0)	2 (1.9)	0 (0.0)	0 (0.0)
Phenytoin n=2 (%)	0 (0.0)	0 (0.0)	2 (1.9)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Amlodipine n=8 (%)	0 (0.0)	2 (1.9)	3 (2.8)	1 (0.9)	1 (0.9)	0 (0.0)	1 (0.9)
Oseltamivir n=14 (%)	0 (0.0)	4 (3.7)	4 (3.7)	2 (1.9)	0 (0.0)	0 (0.0)	4 (3.7)
Aspirin	0	1	3	0	1	0	1

n=6 (%)	(0.0)	(0.9)	(2.8)	(0.0)	(0.9)	(0.0)	(0.9)
Furosemide	0	0	1	1	0	0	1
n=3 (%)	(0.0)	(0.0)	(0.9)	(0.9)	(0.0)	(0.0)	(0.9)
Pethidine	0	0	4	0	4	1	0
n=9 (%)	(0.0)	(0.0)	(3.7)	(0.0)	(3.7)	(0.9)	(0.0)

DISCUSSION: Many studies were conducted to document the patterns of medications prescription and indicated that overprescribing, multi-drug prescribing, misuse of drugs, use of unnecessary drugs and overuse of drugs are the most common problems of irrational drug use by prescribers as well as consumers. Many efforts have been undertaken to improve drug use by evaluating the problem, looking forward to remedies if any exist.

The main aim of drug utilization research is to facilitate the rational use of drugs in populations. Monitoring antimicrobial use as well as evaluating prescribing patterns are some of the strategies recommended to contain resistance to antimicrobials in patients [11]. Antimicrobial resistance substantially raises health care costs and ultimately increases patient morbidity and mortality.

In this study, the antibiotics were more prescribed for female representing 58.7%, and this finding is a lined with results of Jørund Straandin 1998; that found 61% of antibiotic prescribed was for female [12]. The most commonly prescribed antibiotics were amoxicillin/Clavulanatein 18.4%, and in fact, this practice goes with findings in an international study done in Antrim Area Hospital in Northern Ireland; they found that the most frequently prescribed antibiotics were combinations of penicillins including beta-lactamase inhibitors [13]. The most common indications for amoxicillin/Clavulanate were upper respiratory tract infections that were further categorized in to common cold and rhinitis (40%), followed by tonsillitis (30%), pharyngitis (20%), sinusitis (3.3%), laryngitis (3.3%) and otitis media (3.3%). In a study conducted on the management of acute upper respiratory tract infection, concluded that the administration of antibiotics is not recommended in younger patients without underlying diseases. However, it's required for high-risk patients [14]. In case of laryngitis, the antibiotic won't do any good because the cause is usually viral and in the study done on acute laryngitis found that antibiotics appear to have no benefit in treating acute laryngitis in adults [15]. Lower respiratory tract infections were treated with ceftriaxone 12(7.3%), levofloxacin 8(4.8%), azithromycin 7(4.2%) and imipenem 4(2.4%). In case of CAP (Community-Acquired Pneumonia), all patients were hospitalized in this study and patients mostly treated with imipenem 3(17.6%) followed by levofloxacin 2 (11.8%), azithromycin 1(5.9%) and colomycin 1(5.9%). There is a study which compared the imipenem and meropenem efficacy in the treatment of hospitalized CAP. It was concluded that both treatments showed the same clinical and bacteriological efficacy and tolerability in the treatment of CAP [16].

In our study, acute bronchitis was treated with ceftriaxone in 29.4%, while there is limited evidence to support the use of antibiotics for treating acute bronchitis [17]. Another important clinical practice in this study was using Azithromycin with a frequency of 12% for treating community-acquired pneumonia and acute bronchitis. Increased resistance rates with macrolide antibiotics suggest careful use be limited to patients with a mild disease without risk factors for resistant bacteria [18]. Additionally, we noted that there is a mismatching prescription between Ceftriaxone and lower respiratory disorders such as acute bronchitis and bronchial asthma with a frequency of 29% and 12%, respectively.

We noticed that metronidazole and ceftriaxone were the most prescribed antibiotics in obstetrics and gynecology in 11.5% and 9.1% respectively and the main indications for this were post-operative prophylaxis, premature ruptured membranes and prevention of suspected neonatal infections and policy for rational use of these antibiotics was followed. However, in a study conducted by Anand *et al.*, which compared the effect of metronidazole-ceftriaxone vs. metronidazole-ciprofloxacin, it was found that metronidazole-ceftriaxone lowers the risk of postoperative infection in surgical sites [19]. In contradiction to this, metronidazole-cephalosporine were used by surgeons to prevent wound infection following major abdominal procedure [20].

But according to clinical practice guideline for antimicrobial prophylaxis in surgery, cefazoline is recommended for women with cesarean delivery [21]. Moreover, it was observed that 16 patients were treated by intravenous ceftriaxone together with enoxaparin and according to Rx List and Ultimate Prescribing Guide for Renal Practitioners, there is a potential of serious interaction as intravenous ceftriaxone increases effects of enoxaparin by added drug effects [22]. This is a well-recognized drug interaction, guidelines should be strictly followed and the role and advice of clinical pharmacists should be initiated.

CONCLUSION: The health system in Al-Rass hospital is integrated with a clear policy regarding the rational use of antibiotics and their prescriptions pattern was largely consistent with international patterns. However minor improvements should be considered regarding wide uses of broad-spectrum antibiotics such as ceftriaxone; also the frequent prescription of azithromycin to the admitted patients should be addressed with consideration of care site and the risk for macrolide antibiotics. The direct implementation of clinical pharmacists' role will further enhance proper antibiotics prescription and avoid drug interactions.

ACKNOWLEDGEMENT: We highly appreciate the help from:

- Dr. Salwa Abougalambou; Assistant Professor, College of Pharmacy, Qassim University.
- Pharm. D Abdullah Alowid; Clinical Pharmacist at Al-Rass hospital.

CONFLICT OF INTEREST: We have no any conflict of interest to disclose

REFERENCES:

1. Alumran A, Hurst C and Hou XY: Antibiotics overuse in children with upper respiratory tract infections in Saudi Arabia: risk factors and potential interventions. Clinical Medicine and Diagnostics 2011; 1(1): 8-16.
2. Atif M, Sarwar MR, Azeem M, Naz M, Amir S and Nazir K: Assessment of core drug use indicators using WHO/INRUD methodology at primary healthcare centers in Bahawalpur, Pakistan. BMC Health Services Research 2016; 16(1): 684.
3. Reddy SC, Jacob JT, Varkey JB and Gaynes RP: Antibiotic use in US hospitals: quantification, quality measures and stewardship. Expert Review of Anti-Infective Therapy 2015; 13(7): 843-54.
4. Lim CJ, Kong DC and Stuart RL: Reducing inappropriate antibiotic prescribing in the residential care setting: current perspectives. Clinical Interventions in Aging 2014; 9: 165.
5. Akter SF, Rani MF, Rahman JA, Nordin MS, Satwi S and Awang MB: Antimicrobial use and factors influencing prescribing in medical wards of a tertiary care hospital in Malaysia. Int J Sci Environ Technol 2012; 1(4): 274-84.
6. Prestinaci F, Pezzotti P and Pantosti A: Antimicrobial resistance: a global multifaceted phenomenon. Pathogens and Global Health 2015; 109(7): 309-18.
7. Pramil T, Rajiv A and Gaurav G: Pattern of prescribing at a paediatric outpatient setting in Northern India. Indian Journal of Pharmacy Practice 2012; 5(1): 40-44.
8. Llor C and Bjerrum L: Antimicrobial resistance: risk associated with antibiotic overuse and initiatives to reduce the problem. Therapeutic Advances in Drug Safety 2014; 5(6): 229-41.
9. Prakash B, Nadig P and Nayak A: Rational prescription for a dermatologist. Indian Journal of Dermatology 2016; 61(1): 32.
10. Raveh D, Muallem-Zilcha E, Greenberg A, Wiener-Well Y, Schlesinger Y and Yinnon AM: Prospective drug utilization evaluation of three broad-spectrum antimicrobials: cefepime, piperacillin-tazobactam and meropenem. Journal of the Association of Physicians 2006; 99(6): 397-06.
11. Gopalakrishnan S, Ganeshkumar P and Katta A: Assessment of prescribing practices among urban and rural general practitioners in Tamil Nadu. Indian Journal of Pharmacology 2013; 45(3): 252.
12. Straand J, Rokstad KS and Sandvik H: Prescribing systemic antibiotics in general practice: A report from the M re & Romsdal Prescription Study. Scandinavian Journal of Primary Health Care 1998; 16(2): 121-7.
13. Aldeyab MA, Kearney MP, McElnay JC, Magee FA, Conlon G, Gill D, Davey P, Muller A, Goossens H and Scott MG: ESAC Hospital Care Subproject Group. A point prevalence survey of antibiotic prescriptions: bench-marking and patterns of use. British Journal of Clinical Pharmacology 2011; 71(2): 293-6.
14. Yamamoto YO, Ohmichi MI, Watanabe AK, Niki YO, Aoki NO, Kawai SH, Chida KI, Mikasa KE, Seki MA, Ishida TA and Kadota J: A study on the management of acute respiratory tract infection in adults. Jpn J Antibiot 2014; 67: 223-32.
15. Ospina EG, Reveiz L, Cardona AF, Granados CE, Osorio JV, Zorrilla AF and Pinzón JO: Antibiotics for acute laryngitis in adults. Cochrane Database of Systematic Reviews 2004; 2: 1.
16. Bartoloni A, Strohmeyer M, Corti G, Buonomini MI, Franchino L, Romanelli G, Moretti AM, De GV, Petraglia A, Mancini P and Atzeni R: Multicenter randomized trial comparing meropenem (1.5g daily) and imipenem/ cilastatin (2 g daily) in the hospital treatment of community-acquired pneumonia. Drugs under Experimental and Clinical Research 1999; 25(6): 243-52.
17. Smith SM, Fahey T, Smucny J and Becker LA: Antibiotics for acute bronchitis. Cochrane Database of Systematic Reviews 2014; 3: 1-2.
18. Mandell LA, Wunderink RG, Anzueto A, Bartlett JG, Campbell GD, Dean NC, Dowell SF, File Jr TM, Musher DM, Niederman MS and Torres A: Infectious Diseases Society of America/American Thoracic Society consensus guidelines on the management of community-acquired pneumonia in adults. Clinical Infectious Diseases 2007; 44(S2): S27-72.

19. Anand NI, Parmar DM and Sukhlecha A: Comparison of combinations of ciprofloxacin-metronidazole and ceftriaxone-metronidazole in controlling operative site infections in obstetrics and gynecological surgeries: A retrospective study. Journal of Pharmacology & Pharmacotherapeutics 2011; 2(3): 170.
20. Saha S and Ashrafuzzaman S: Impact of prophylactic use of antimicrobials in abdominal surgery in two tertiary level hospitals. Bangladesh Jou of Pharmacol 2008; 3(2): 80-2.
21. Bratzler DW, Dellinger EP, Olsen KM, Perl TM, Auwaerter PG, Bolon MK, Fish DN, Napolitano LM, Sawyer RG, Slain D and Steinberg JP: Clinical practice guidelines for antimicrobial prophylaxis in surgery. Surgical Infections 2013; 14(1): 73-156.
22. Ashley C and Dunleavy A: The Renal Drug Handbook: The Ultimate Prescribing Guide for Renal Practitioners. CRC Press; 2018: 1073.

How to cite this article:
Mobark MA, Al-Harbi HS, Ahmed ES and Al-Harbi YN: The pattern of antibiotics prescription at Al-Rass Hospital. Int J Pharm Sci & Res 2019; 10(10): 4776-81. doi: 10.13040/IJPSR.0975-8232.10(10).4776-81.