Original Article

Pattern of Using Antibiotic among Hospital Admitted Patients according to WHO Access, Watch, Reserve (AWaRe) Classification

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Abstract

Objective: Antibiotics are the most commonly prescribed drug throughout the world. But due to overuse and uncontrolled use of antibiotics causing resistance to pathogen. To improve overall drug use, international agencies like the World Health Organization (WHO), classified antibiotics into three groups, Access, Watch, and Reserve (AWaRe) categories. **Objectives:** The aim of this study was to evaluate the prescribing pattern of antibiotics using the AWaRe classification by the WHO for antimicrobial use in post-operative patients in the Surgery of a tertiary care hospital in Dhaka. **Methods:** This cross-sectional descriptive study was conducted in the Department of Pharmacology & Therapeutics, Sir Salimullah Medical College, Dhaka with collaboration of Surgery Department of Sir Salimullah Medical College, Dhaka from July 2023 to June 2024.Total 216 patients were enrolled in this study after meeting the selection criteria. **Result:** In this study 45.86% of antibiotics were prescribed from the Access group; 53.13% of antibiotics were prescribed from the Watch group and 1.1% of antibiotics were prescribed from the Reserve group. **Conclusion:** Access group of antibiotics were most commonly prescribed antibiotics.

Keywords: *Access, Watch, Reserve, indicator, prescribing, antibiotic, evaluation, hospital, WHO*

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Introduction

The importance of antibiotics is increasing day by day because of their wide range of usage. So appropriate use of antibiotics is an important health issue all over the world.[1] Overuse or misuse of antibiotics, self-medication, multiple uses of broad-spectrum antibiotics, random selling by pharmacists in patients' demands, and not completing the antibiotic course are the main causes for the emergence of resistance in our country.[2] Most of the antibiotics which are prescribed in our country are on an empirical basis. Many physicians are prescribing antibiotics without proper culture and sensitivity tests due **to** lack of proper facilities or financial crisis of the patient or emergency condition of the disease. To solve or reduce the problem it is necessary to study antibiotic usage patterns and their associated factors such as monitoring, evaluation of the document and proper following the WHO guidelines.[3] The AWaRe classification of antibiotics was developed in 2017 by the WHO Expert Committee. It was developed to support antibiotic stewardship program at local, national and global levels.[4] The antimicrobial stewardship program is an important initiative to improve the safe and appropriate use of antimicrobials, reduce patient harm and decrease the incidence of antimicrobial resistance to ensure quality of care.[5] According to WHO guidelines, Antibiotics are classified into three groups: Access, Watch, and Reserve which is known as AWaRe classification of antibiotics. This classification was developed in 2017 by the WHO Expert Committee to promote the use of Essential Medicines to support antibiotic stewardship at local, national, and global levels and their appropriate use to reduce resistance to antibiotics. **AWaRe classification was updated in 2023 by WHO. This classification includes 258 number of antibiotics.**[6] Access groups contain First-line antibiotics, low-resistance potential antibiotics. Access group of antibiotics are first and second choices for empirical treatment of common clinical syndromes. This group of antibiotics should always be made available in every place at an appropriate quality, dose, duration, formulation and price.[7] Watch group includes antibiotics with higher toxicity and resistance potential than the Access group. The reserve group contains Antibiotics for Multi-Drug-Resistance organisms. So, it is also called "Last Resort Antibiotics".[8] The Reserve group antibiotics are used for specific patients and clinical settings in case of failure

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of other alternatives. Thus, the AWaRe index helps to estimate the relative use of narrow-spectrum and broad-spectrum antibiotics. It is updated every 2 years.[9] The AWaRe classification is a tool for monitoring antibiotic consumption. It also helps to evaluate the effects of stewardship policies that aim to optimize antibiotic use and to prevent their resistance.[10] The WHO 13th General Program of Work 2019–2023 includes a country-level target of at least 60% of total antibiotic consumption should be from Access group antibiotics.[11]

Materials and Method: The study was a cross-sectional observational study. This study was conducted at the Department of Pharmacology, Sir Salimullah Medical College, Dhaka in collaboration with the Surgery Department of Sir Salimullah Medical College, Dhaka. The study was conducted from July 2023 to June 2024. Before beginning of the study, ethical clearance was obtained from the Ethical Review Committee of Sir Salimullah Medical College, Dhaka. Total 216 post-operative patients admitted to Surgery Department of Sir Salimullah Medical College Hospital, Dhaka was enrolled in this study. **Convenient** sampling technique was applied to take the study population.

Inclusion criteria for selecting patients were:

Age ≥ 18 years
Both male and female patients.
Post-operative patients taking antibiotics were admitted in the surgery department of Sir Salimullah Medical College.

Exclusion criteria were:
Pre-operative patients.
Pregnant patients.

According to inclusion and exclusion criteria 216 patients were enrolled in this study. Informed written consent was taken from every subject. The following variables such as age, sex, personal history, drug history was analyzed by observing the prescription, and this information was entered into data collection sheets. Pharmacotherapy investigation data was taken from documents of patients. Data was analyzed by using descriptive statistics. Continuous data was expressed as mean ± SD (Standard deviation) and nominal data was expressed as percentages. Analysis of data was carried out by using the Statistical Package for Social Sciences (SPSS) 26.

Result:

The mean age of the patients were 39.87 ± 13.94 years. Highest number of the patients were from the age group of 21-30 years which was 66(30.6%). Male participants were predominant in number which was 126(58.3%) and female were 90(41.7%). Table 1 shows the age and sex distribution of study patients.

Table 1: Age and sex distribution of study patients (n = 216)

Age group in years	Frequency	Percentage (%)
≤20	8	3.7
21-30	66	30.6
31-40	53	24.5
41-50	35	16.2
51-60	41	19.0
61-70	10	4.6
71-80	2	0.9
>80	1	0.5
Male	126	58.3%
Female	90	41.7%

Out of the 216 patients that were included for the study, patients had appendicitis 36 (16.7%) followed by cholecystitis 31 (14.3%), then inguinal hernia 21 (9.7%), perianal abscess and breast abscess was 16 (7.5%).

Table: 2. Frequency distribution of disease condition. (n =216)

Name of disease condition	Frequency	Percentage (%)
Anal fissure	1	0.4
Anal fistula	14	6.5
Appendicitis	36	16.7
Axillary abscess	5	2.4
Breast abscess	16	7.5
Carcinoma of breast	10	4.7
Carcinoma of colon	7	3.2
Carcinoma of stomach	4	1.8
Cholecystitis	31	14.3
Diabetic foot	7	3.2
Gluteal abscess	6	2.7
Hemorrhoids	3	1.3
Hydrocele	2	0.9
Incisional hernia	6	2.7
Inguinal hernia	21	9.7
Intestinal obstruction	7	3.2
Lipoma	4	1.8
Perforation	5	2.3
Perianal abscess	16	7.4
Peritoneal abscess	5	2.3
Wound infection	10	4.6

In this study, cephalosporin 157 (39.3%) was the most commonly prescribed antibiotic. The second most used antibiotic group was Nitroimidazole which was 137 (34.3%), penicillin 41 (10.3%), carbapenems 33 (8.2%), fluoroquinolone 15 (3.8%), aminoglycosides 12 (3%), oxazolidinone 4 (1%).

Table 3: Frequency distribution of prescribed antibiotics group.

Antibiotic group	Number of antibiotics	Percentage (%)
Cephalosporin	157	39.3
Penicillin	41	10.3
Fluoroquinolone	15	3.8
Aminoglycosides	12	3.0
Carbapenems	33	8.2
Nitroimidazole	137	34.3
Oxazolidinone	4	1.0
Total antibiotics	399	100

In table 4, shown that Ceftriaxone 154(38.5%) was the most commonly prescribed antibiotic then Metronidazole 137(34.3%) then flucloxacillin37(9.2%), meropenem 33 (8.2%), ciprofloxacin 15 (3.8%), amikacin 12 (3%), co-amoxiclav 4 (1%), cefixime 3 (.8%).

Table 4: Frequency distribution of prescribed antibiotics among the study patients.

Antibiotic group	Frequency antibiotics use	Percentage (%)
Cefixime	3	0.8
Ceftriaxone	154	38.5
Ciprofloxacin	15	3.8
Co-amoxiclav	4	1.0
Flucloxacillin	37	9.2
Meropenem	33	8.2
Metronidazole	137	34.3
Amikacin	12	3.0
Linezolid	4	1.0
Total antibiotics	**399**	100

Table 5: Distribution of prescribed antibiotics according to WHO AWaRe classification of antibiotics.

WHO AWaRe classification	Frequency	Percentage (%)
Access	183	45.86
Watch	212	53.13
Reserve	4	1.1
Total antibiotics	399	100

Discussion:

The 'AWaRe' classification of WHO develops a general guideline on antibiotic prescribing pattern in the health care system. The objective of this classification is to improve the monitoring system on antibiotic use and prevent irrational prescribing of antibiotics. This classification is needed to be adopted by countries and hospitals for rational use of antibiotics and to fight the global combat against antimicrobial resistance. In this study, the age range of participants were 18-81 years. The majority of the participants were age group 21-30 which was very similar to the study of Panday, D. R. et al and Khyati M. Patel et al. where the majority of the participants age group were 20-39 years.[12] In this study, the demographic profile showed slight male predominance among the participants. It was observed that in this study 58.3% (126) participants were male and 41.7% (90) participants were female. This data coincides with the study of Khyati M et al. where 60.60% were male participants and 39.40% were female participants.[13] The most common disease in this study for which antibiotics were prescribed in the post-operative ward of surgery department was appendicitis 36 (16.7%) followed by cholecystitis 31 (14.3%), then inguinal hernia 21 (9.7%), breast abscess 16 (7.5%), anal fistula 14 (6.%%), which was almost similar to a study done in Gujarat India by Khyati M Pate et al. where most common disease condition was appendicitis (14.9%) and inguinal hernia (10.6%).[14]

In this study, the most commonly prescribed antibiotic group was Cephalosporin which was 157 (39.3%), then followed by the Nitroimidazole group 137 (34.3%), Penicillin group41 (10.3%), Carbapenems33 (8.3%), Fluoroquinolone15(3.8%),Aminoglycosides12(3%), Oxazolidinone 4 (1%). A study by Asawari et al. showed that 28.23% were prescribed antibiotics from cephalosporin group,23.56% from penicillin group, and 19.95 % from nitroimidazole group.[15] Among the cephalosporin group, ceftriaxone was the most prescribed drug in our study which was 154(48.5%), Metronidazole 137 (34.3%), Flucloxacillin 37 (9.2%), Meropenem 33 (8.2%), Ciprofloxacin 15 (3.8%), Amikacin 12 (3%), Linezolid 4 (1%), Co-amoxiclav 4 (1%), Cefixime 3 (0.8%). A study by Fatema Johora et al. showed that ceftriaxone was the most commonly used antibiotic.[16] According to the WHO essential drug list, antibiotics are grouped into three categories: Access group, Watch group, and Reserve group. In this study 45.86% of antibiotics were prescribed from the Access group; 53.13% of antibiotics were prescribed from the Watch group and 1.1% of antibiotics were prescribed from the Reserve group. A study by Rashid et al. showed that

62.9%, 36.4%, and 0.2% of antibiotics were prescribed from Access, Watch, and Reserve groups respectively.[17] The WHO 13th General Program of Work 2019–2023 includes a country-level target of at least 60% of total antibiotic consumption should be from Access group antibiotics.[18]

Conclusion

In this study 45.86% of the antibiotics were used from Access group. This indicates the overuse of Watch group antibiotics. Irrational prescribing or inappropriate prescribing of antibiotics is a crucial contributing factor to antimicrobial resistance. So standard treatment guidelines should be followed to avoid irrational prescribing and provide quality patient care without any compromise. They also prevent unnecessary drug reactions and reduce the **limitations** to the patient and promote a faster recovery for the diseases.

Limitations of the Study

The primary limitation of this study was the lack of patient cooperation within the post-operative ward, which was further compounded by restricted access to the unit. Additionally, the data collection process was hindered by the vulnerability of patients who had recently undergone surgical procedures.

References

1. Rayamajhi, B.B., Basukala, S., Khadka, A., Thapa, N. and Ayer, D.B., 2021. An assessment of antimicrobial prescription pattern among surgical patients: a hospital based cross sectional descriptive study. Journal of Society of Surgeons of Nepal, 24(1), pp.23-27.
2. Ramalingam, V. and Pandian, J.J., 2021. Prescribing Pattern of Antimicrobial Agents in the Post-operative General Surgery Ward of a Tertiary Care Teaching Hospital: A Prospective Observational Study. Technological Innovation in Pharmaceutical Research Vol. 8, 9(10), pp. 144–156.
3. Khatun, S.A. and Shaha, S., 2020. Prescribing pattern of antimicrobials in urinary tract infection at outpatient department in a tertiary care hospital in Dhaka. Journal of Enam Medical College, 10(1), pp.23-26.
4. WHO, 2024. World AMR Awareness Week. World Health Organization, Available at: <https://www.who.int/campaigns/world-amr-awareness-week>
5. World Health Organization, 2016. Antimicrobial resistance: Global Action Plan on Antimicrobial Resistance. World Health Organization. Available at: < https://www.emro.who.int/health-topics/drug-resistance/global-action-plan.html>
6. World Health Organization, 2023. WHO AWaRe (access, watch, reserve) classification of antibiotics for evaluation and monitoring of use, 2023. Proceedings of the Selection and Use of Essential Medicines.
7. Chowdhury, M.K., Siddique, A.A., Sarkar, P.K., Haque, M.M., Biswas, P.K., Biswas, S. and Ahasan, H.N., 2015. Pattern of antibiotic use in different departments of Dhaka medical college hospital. Journal of Medicine, 16(1), pp.35-38.
8. Choudhury, A.U., Biswas, M., Haque, M.U., Arman, M.S.I., Uddin, N., Kona, N., Akter, R. and Haque, A., 2018. Cephalosporin-3G, highly prescribed antibiotic to outpatients in Rajshahi, Bangladesh: prescription errors, carelessness, irrational uses are the triggering causes of antibiotic resistance. Journal of Applied Pharmaceutical Science, 8(6), pp.105-112.
9. Gani, D. M. A., Pareen, F., Saha, S.K., Ahmed, A.U., Uddin, M.M., Afrose, R., Sultana, S. And Siddique, A.S.R., 2021. Antibiotic Uses in the Outpatient Department: Study in a Teaching Hospital. Scholars Academic Journal of Pharmacy, 10(6), pp. 107–110.
10. Honey, P., Shruthy, K.B., Soumya, T., Upendra, N. and Chaithanyakumar, T., 2018. A Study on Prescribing Pattern and Rationality of Antibiotics in the Post Operative Patients in a Tertiary Care Hospital. Indo American Journal of Pharmaceutical Research, 8(02), p. 8.
11. Mani, S. and Hariharan, T.S., 2017. A prospective study on the pattern of antibiotic use in a tertiary care hospital. Int J Basic Clin Pharmacol, *6*(9), pp.2237-43.
12. Panday, D.R., Rauniar, G.P., Rai, D., Shah, R. and Pandey, K.R., 2023. Drug Prescribing Pattern Among the Inpatients in the Surgery Department of Tertiary Hospital of Eastern Nepal. Journal of BP Koirala Institute of Health Sciences, 6(1), pp.8-13.
13. Patel, K.M., Jadav, S.D., Parmar, S.P. and Trivedi, H., 2018. Drug prescribing pattern in surgical wards of a tertiary care hospital in Western part of India. Int J Basic Clin Pharmacol, 7(8), pp.1587-92.
14. Raut, A.S.A.W.A.R.I., Cherian, T.I.R.Z.A.H., Chauhan, S.H.R.E.E.P.A. and Pawar, A.T.M.A.R.A.M., 2017. Antibiotic utilization

pattern at the surgery department of a tertiary care hospital. Asian J Pharm Clin Res, 10(6), pp.131-4.

15. Fatema Johora et al. (2019) 'Pattern of surgical antibiotic prophylaxis in a tertiary care teaching hospital in Bangladesh', International Journal of Infection Control, 6(2), pp. 37–40. doi: 10.3396/ijic.v6i2.014.10.

16. Joshi, D.K., Mohd, R., Kothiyal, P. and Joshi, Y., 2017. Evaluation of prescription pattern of antibiotics for surgical prophylaxis in secondary care hospital. *Int J Basic Clin Pharmacol*, *6*(8), pp.1969-1976.

17. Machowska, A., Sparrentoft, J., Dhakaita, S.K., StålsbyLundborg, C. and Sharma, M., 2019. Perioperative antibiotic prescribing in surgery departments of two private sector hospitals in Madhya Pradesh, India. Perioperative Medicine, 8, pp.1-12.

18. Honey, P., Shruthy, K.B., Soumya, T., Upendra, N. and Chaithanyakumar, T., 2018. A Study on Prescribing Pattern and Rationality of Antibiotics in the Post Operative Patients in a Tertiary Care Hospital. Indo American Journal of Pharmaceutical Research, 8(02), p. 8.