International Journal of KIU

Journal home page : https: //ij.kiu.ac.lk/
DOI: https://doi.org/10.37966/ijkiu2023042043

*Original Article*

# Assessment of Antibiotics Prescribing Patterns at the Outpatient Department of a Specialized Children Hospital in Sri Lanka: Using WHO Recommended Prescribing Indicators

Gayanthi B. B.[1], Athugala A. G. U.[1], Jayasooriya T. M. D. U.[1], Bandara G. G. A. L.[1], Madanayaka T. M.[1], Sandakumari H. H. H. S.[1], Sewwandi K. P. A.[1,2], Kanchana K. T. G.[1,3*], Yimenu D. K.[4]

[1]*Faculty of Nursing, KIU, Sri Lanka*
[2]*Department of Nursing, Faculty of Allied Health Sciences, Open University of Sri Lanka*
[3]*Department of Public Health, Faculty of Medicine, University of Kelaniya, Sri Lanka*
[4]*Depatment of Discipline of Pharmacy, University of Western Australia, Australia*

Article history:
Received: 03.04.2023
Received in revised form - 02.09.2023
Accepted - 25.09.2023

Cite as: Gayanthi B. B., Athugala A. G. U., Jayasooriya T. M. D. U., Bandara G. G. A. L., Madanayaka T. M., Sandakumari H. H. H. S., Sewwandi K. P. A., Kanchana K. T. G., Yimenu D. K. (2023) Assessment of Antibiotics Prescribing Patterns at the Outpatient Department of a Specialized Children Hospital in Sri Lanka: Using WHO Recommended Prescribing Indicators, International Journal of KIU, 4 (2), 56-62. https://doi.org/10.37966/ijkiu2023042043
*Corresponding author: gayani@kiu.ac.lk

## Abstract

**Introduction:** "Essential Medicines List," was released by the World Health Organization (WHO) and contains medications including some antibiotics that are considered the most effective and secure ways to fulfil the best patient management. Despite the establishment of standard metrics by the WHO to govern pharmaceutical utilization, irrational prescription is common, particularly in developing countries.
**Objective:** To assess the antibiotics prescribing patterns at the Outpatient Department of Sirimawo Bandaranayake Specialized Children Hospital in Sri Lanka using WHO prescribing indicators.
**Methodology:** A descriptive cross-sectional study was conducted among 375 pediatric patients' prescription notes aged 1 to 14 years using a data extraction sheet from prescription notes and prescription registration books. The extraction details included the generic name of the drug, number of drugs recommended, presence of antibiotics and mode of administration.
**Results:** The majority of the encounters (52.8%, n=198) included male pediatric patients. The average number of medications administered per encounter was 3, with 6 medications being the highest. In the outpatient department, 46.9% (n=176) of the encounters contained antibiotics while none of the prescriptions contained injectable medications. The majority of the prescriptions (53.6%, n=201) contained drugs that were not from the essential medicines list while 50.1% (n=188) contained medications prescribed using the trade name.
**Conclusion:** In conclusion, polypharmacy, and antibiotics which were not from the essential medicines list were prominent among the prescription sheets issued to pediatric patients.
**Keywords:** Antibiotics, Pediatrics, WHO prescribing indicators-group 1

## Introduction

Antibiotics are recommended medications used to treat, and in certain instances, to prevent bacterial infections (Angulo et al., 2009). Antibiotics are among the most frequently prescribed medications in modern medicine. However, antibiotics should not be issued without a medical prescription since antibiotic abuse can result in the emergence of resistant strains of bacteria contributing to a global crisis. Further, antibiotic utilization has risen globally, with most of the increase occurring in low and middle-income countries (Fink et al., 2020; Iskandar et al., 2021).

Children and infants are among the most vulnerable populations when it comes to bacterial infections. Consequently, the use of antibiotics in the treatment of bacterial infections among children has become frequent. Also, pediatricians and other health workers who provide health care for infants and children in developing nations face significant challenges, including a lack of adequate drugs, rising costs, and insufficient infrastructure, followed by antibiotic resistance, which is primarily caused by antibiotics being prescribed for viral infections where antibiotics are contraindicated (Arulmoli et al., 2009). In this manner, several studies have shown that nearly 37% of the prescriptions contain antibiotics (Anong & Akoachere, 2018; Ntšekhe et al., 2011).

Conversely, antibiotic prescription varies between countries, as evidenced by the fact that in Africa and Asia, one out of every two hospitalized patients receive antibiotics, but in Europe, one out of every three patients receive antibiotics (Yimenu et al., 2019). Meanwhile, infectious diseases are on the rise in low-income countries (LICs), due to drug shortages and lack of qualified healthcare providers. Further, when there is a shortage of drugs, healthcare practitioners are more vulnerable to prescribing arbitrarily. Therefore, WHO in partnership with the International Network of Rational Medicine Use (INRDU) has established a set of indicators to measure the use of antibiotics in healthcare facilities that include prescribing indicators, facility indicators, and patient care indicators (WHO, 2018). These indicators could be utilized as a benchmark for implementing antibiotic stewardship programs (ASPs) in various healthcare settings. The WHO has issued the "WHO Model List of Essential Medicines", known as the Essential Medicines List, which includes the drugs together with some antibiotics that are considered the most efficient and secure means for meeting the crucial requirements in a health system (WHO, 2019).

Currently, antibiotic resistance is accelerated due to the misuse and overuse of antibiotics. Previous reports suggest that antibiotics are often provided erroneously or improperly for 44% to 97% of hospitalized patients in underdeveloped nations (Otim et al., 2021; Zellweger et al., 2017). In Sri Lanka, the rate of antibiotic prescriptions was 69.9%, which is three times higher than the WHO recommended figures, according to a study by Thiyahiny et al. (2019). Additionally, it stated that the antibiotic prescribing patterns were poor due to its incompleteness, and improvements needed to be made (Thiyahiny et al., 2019). Therefore, to prevent and control the spread of antibiotic resistance, health professionals must adhere to guidelines when prescribing and dispensing antibiotics. Yet, there is a scarcity of published reports on prescribing patterns in Sri Lanka, especially in the pediatric population. Therefore, the current study aimed at assessing antibiotics prescribing patterns at the outpatient department of Sirimawo Bandaranayake Specialized Children Hospital, Peradeniya using WHO prescribing indicators-group 1.

## Methodology

The study was conducted at the outpatient department of Sirimawo Bandaranayaka Specialized Children Hospital (SBSCH) in Peradeniya, Sri Lanka. A descriptive cross-sectional study was conducted, and the sample consisted of 375 prescription notes issued from March 2020 to May 2020. The sample size was

calculated using the Danial formula (p=58.5%-percentage of encounters contained antibiotics) (Dawit, 2019). The prescribing notes of children between 1 to 14 years who had been treated at the outpatient department were included in this study. The sample selection was based on a raffle technique where the first 10 prescription sheets were selected followed by every fourth sheet using the serial number of the prescription sheets as a reference until the sample size was achieved. The data were extracted (the generic name of the drug, number of drugs recommended, presence of antibiotics, and mode of administration) from prescription notes and prescription registration books. A pre-designed checklist was used to collect data. Prescription indicators from the World Health Organization/International Network of Rational Use of Drugs (WHO/INRUD) were used to assess rational drug use, with an emphasis on antibiotic prescribing trends (Shankar, 2014; WHO, 2018). Data were analyzed in SPSS version 24 using descriptive statistics including frequency, average, and percentage. To determine the validity and reliability of the parameters of concern, a pretest of the data extraction sheet was performed using 10 prescription sheets.

The ethical approval was obtained from the Ethics Review Committee of the KIU Campus (KIU/ERC/20/03).

## Results

Of the 375 pediatric prescription notes, 52.8% (n=198) were issued for male children. The majority (42.7%, n=177) of the prescription notes contained patients in the age group of 1 to 5 years followed by 40% (n=150) in 5 to 12 years.

The analysis of the prescription showed that the majority (40.5%, n=152) of the patients had been prescribed three medications, 46.9% (n=176) were prescribed antibiotics, while 50.1% (n=188) of the prescription notes did not have the generic name and 53.6% (n=201) of the prescribed medications included drugs that are not in the essential medicines list (Table 1). However, no injectable medication was given in the outpatient department. A total of 1112 medicines among the 375 pediatric prescription notes were prescribed with an average number of drugs per encounter found to be 3 (Table 2).

**Table 1:** Prescription Pattern

| Prescription | Frequency | Percentage (%) |
|---|---|---|
| Number of medications prescribed | | |
| 1 drug | 13 | 3.5 |
| 2 drugs | 110 | 29.3 |
| 3 drugs | 152 | 40.5 |
| 4 drugs | 78 | 20.8 |
| 5 drugs | 21 | 5.6 |
| 6 drugs | 01 | 0.3 |
| Presence of antibiotics | | |
| Yes | 176 | 46.9 |
| No | 199 | 53.1 |
| Drugs prescribed by generic name | | |
| Yes | 187 | 49.9 |
| No | 188 | 50.1 |
| Drugs from essential medicines list | | |
| Yes | 174 | 46.4 |
| No | 201 | 53.6 |
| Prescription with injectable medication | | |
| Yes | 0 | 0 |
| No | 375 | 100 |

**Table 2:** Summary of Prescribing Indicators

| Prescribing Indicators | Total Number of Drugs | Percentage | WHO Standard Value (%) |
|---|---|---|---|
| Average number of drugs per encounter | 1112 | 2.96 | 1.6-1.8 |
| Percentage of encounters with antibiotics | 176 | 46.9 | 20-26.8 |
| Percentage of encounters with injectable medication | 0 | 0 | 13.4-24.1 |
| Percentage of drugs prescribed by generic name | 187 | 49.9 | 100 |

All the 375 prescription notes included patients' information (age, name, gender) except their height and weight.

## Discussion

In the current study, the average number of drugs per encounter was 3 which was above the recommended range (1.6-1.8) by the WHO. This finding was similar to the previous studies done by Galapatthy et al. (2021) and Rwan et al. (2009) in Sri Lanka which showed the average number of drugs per encounter as 3.0-3.1. However, in contrast, the average number of drugs per encounter was 4.8 in a study conducted in the Sri Lankan tertiary healthcare setting (Galappatthy et al., 2021; Worku & Tewahido, 2018). In this context, the average number of drugs per encounter is comparatively higher than the range of 1.6-2.0, which was found in the reports of Admassie et al. (2013) in Ethiopia; Desalegn (2013) in South Ethiopia and Yimenu et al. (2019) in North Ethiopia. The current study showed higher values in the average number of drugs prescribed per encounter resulting in an increase in the risk of polypharmacy. According to WHO, healthy prescribing practice is necessary to ensure that the number of drugs prescribed per contact is low as it is known to decrease polypharmacy, which reduces complications due to adverse medication reactions and inter-drug interactions (WHO, 2019).

In this study, 46.9% of encounters were with antibiotics which is a higher value than the prescribed WHO value (20-26.8%) for antibiotic prescription. However, this finding was in contrast with the study findings of Galappatthy et al. (2021) which reported that 23.8% of antibiotic prescriptions were from most of the districts in Sri Lanka. Interestingly, the current study findings on antibiotic prescribing were below the value of a study conducted in Northwest Ethiopia (69.6%) (Yimenu et al., 2019) and Southern Ethiopia (58.1%) (Summoro et al., 2015). However, the current finding was greater than the study conducted in Gondar City (29.3%), and Addis Ababa City in Ethiopia (38%) (Worku & Tewahido, 2018; Admassie et al., 2013). The higher rates of prescribing may be due to the clinician's uncertainty in deciding whether the illness is caused by bacteria or viruses or awaiting investigations. Thus, this report highlights the urgent need for antibiotic stewardship.

The current report showed that all the studied prescriptions included patients' basic information such as age, name, and gender. Similarly, Yimenu in 2019 in Northwest Ethiopia reported that most of the prescriptions included age and gender (Yimenu et al., 2019). In contrast, a report by Worku and Tewahido (2018) from Ethiopia demonstrated that only 25% of the prescriptions included basic patient information such as age, name, and gender (Worku & Tewahido, 2018). It is noteworthy that many basic factors such as age and gender are important in the best medical care and in determining any errors that may have occurred during prescribing the medications. Thus, age and gender are necessary in determining the prescribing patterns, thus treatment outcomes (Li, Womer & Silber, 2004). Therefore, the current study reveals that basic information in the prescriptions is satisfactory of the population studied.

A previous study conducted in Sri Lanka found that 90.1% of drugs were prescribed by their generic name while in the current study percentage of medications prescribed by generic name was 49.9% (n=187) which is nearly half of the standard recommended value of 100% by WHO (2019). However, in India, prescribing drugs by the generic name was 73.4% (Awad et al., 2006) while in Nepal it was 19.2% (Lamichhane et al., 2006). The WHO recommends generic name prescribing since it improves communication and transparency among healthcare practitioners while minimizing drug treatment costs (Ofori-Asenso, 2016). Further, the National Medicines Regulatory Authority (NMRA) Act of Sri Lanka made it mandatory for medical professionals to write the generic name of a medication in a prescription in 2015 (NMRA, 2015). Despite the legislative change, the Sri Lankan prescriptions had an alarming lower level of generic name prescribing in the current study indicating the need for an awareness session to emphasize the usage of generic names in prescribing.

According to WHO, 100% of prescribed medications should be from the national essential medicines list. In the current study, drug prescription from the essential medicines list was 46.4% (n=174). Comparatively, reports of Iskandar et al. (2021) showed 91.1% of medicines prescribed from the essential medicines list in the National Hospital Sri Lanka (Iskandar et al., 2021). According to other studies, drugs in the essential medicines list were prescribed to 45.7% in India (Awad et al., 2006); 78.9% in Yemen (Hazra et al., 2000); 70% in Tanzania (Bashrahil, 2010) and 75-95% in Delhi in India (Biswas et al., 2000), respectively. Comparatively, the finding of the current study shows low usage of medications from the essential medicines list in Sri Lanka and an issue that needs the attention of relevant authorities.

The percentage of encounters in which injectable medication was prescribed at Sirimawo Bandaranayake Specialized Children Hospital was "0" which is below the values obtained from several other studies globally including Ethiopia (38.1%), Uganda (48%), Indonesia (17%), and Mali (19%) (Awad et al., 2006; WHO, 2003).

## Conclusion

In conclusion, the percentage of encounters with antibiotics was higher than the standard value of WHO also a degree of polypharmacy was identified as the antibiotic prescription pattern in this study setting.

## Acknowledgment

We appreciate the cooperation and support provided for the study by the Director, Chief Nursing Officer, and the staff of the record room at Sirimawo Bandaranayake Specialized Children Hospital.

## Conflicts of Interests

No conflicts of interest

## References

Admassie, E., Begashaw, B. & Hailu, W. (2013). Assessment of drug use practices and completeness of prescriptions in Gondar University Teaching Referral Hospital. *International Journal of Pharmaceutical Sciences and Research*, *4*(1). http://dx.doi.org/10.13040/IJPSR.0975-8232.4(1).265-75

Angulo, F. J., Collignon, P., Powers, J. H., Chiller, T. M., Aidara-Kane, A. & Aarestrup, F. M. (2009). World Health Organization ranking of antimicrobials according to their importance in human medicine: a critical step for developing risk management strategies for the use of antimicrobials in food production animals. *Clinical Infectious Diseases*, *49*(1), 132-141. https://doi.org/10.1086/599374

Anong, D. N. & Akoachere, J. F. K. (2018). Prescribing patterns and associated factors of antibiotic prescription in primary health care facilities of Kumbo East and Kumbo West Health Districts, North-West Cameroon. *PloS one*, *13*(3). https://doi.org/10.1371/journal.pone.0193353

Awad, A. I. & Himad, H. A. (2006). Drug-use practices in teaching hospitals of Khartoum State, Sudan. *European Journal of Clinical Pharmacology*, *62*(12), 1087-1093. https://doi.org/10.1007/s00228-006-0216-x

Bashrahil, K. A. (2010). Indicators of rational drug use and health services in Hadramout, Yemen. *Eastern Mediterranean Health Journal, 16 (2), 151-155*. https://apps.who.int/iris/handle/10665/117833

Biswas, N. R., Biswas, R. S., Pal, P. S., Jain, S. K., Malhotra, S. P., Gupta, A. S. H. O. & Pal, S. N. (2000). Patterns of prescriptions and drug use in two tertiary hospitals in Delhi. *Indian Journal of Physiology and Pharmacology*, *44*(1), 109-112. https://pubmed.ncbi.nlm.nih.gov/10919106/

Desalegn, A. A. (2013). Assessment of drug use pattern using WHO prescribing indicators at Hawassa University teaching and referral hospital, south Ethiopia: a cross-sectional study. *BMC Health Services Research*, *13*(1), 1-6. https://doi.org/10.1186/1472-6963-13-170

Fink, G., D'Acremont, V., Leslie, H. H. & Cohen, J. (2020). Antibiotic exposure among children younger than 5 years in low-income and middle-income countries: a cross-sectional study of nationally representative facility-based and household-based surveys. *The Lancet Infectious Diseases*, *20*(2), 179-187. https://doi.org/10.1016/S1473-3099(19)30572-9

Galappatthy, P., Ranasinghe, P., Liyanage, C. K., Wijayabandara, M. S., Mythily, S. & Jayakody, R. L. (2021). WHO/INRUD Core drug use indicators and commonly prescribed medicines: a National Survey from Sri Lanka. *BMC Pharmacology and Toxicology*, *22*(1), 1-11. https://doi.org/10.1186/s40360-021-00535-5

Galappatthy, P., Ranasinghe, P., Liyanage, C. K., Wijayabandara, M., Warapitiya, D. S., Jayasekara, D. & Jayakody, R. L. (2021). Core prescribing indicators and the most commonly prescribed medicines in a tertiary health care setting in a developing country. *Advances in Pharmacological and Pharmaceutical Sciences*. https://doi.org/10.1155/2021/6625377

Iskandar, K., Molinier, L., Hallit, S., Sartelli, M., Hardcastle, T. C., Haque, M. & Roques, C. (2021). Surveillance of antimicrobial resistance in low-and middle-income countries: a scattered picture. *Antimicrobial Resistance & Infection Control*, *10*(1), 1-19. https://doi.org/10.1186/s13756-021-00931-w

Lamichhane, D. C., Giri, B. R., Pathak, O. K., Panta, O. B. & Shankar, P. R. (2006). Morbidity profile and prescribing patterns among outpatients in a teaching hospital in Western Nepal. *McGill Journal of Medicine: MJM*, *9*(2). https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2323523/

Li, Y., Womer, R. B. & Silber, J. H. (2004). Predicting cisplatin ototoxicity in children: the influence of age and the cumulative dose. *European Journal of Cancer, 40(*16), 2445-2451. https://doi.org/10.1016/j.ejca.2003.08.009

Ministry of Health-Sri Lanka (2015). National Medicines Regulatory Act, MOH, Colombo, Sri Lanka.

Ntšekhe, M., Hoohlo-Khotle, N., Tlali, M. & Tjipura, D. (2011). Antibiotic prescribing patterns at six hospitals in Lesotho. *Submit to US Agency International Development by Strength Pharmaceuticals System Program. Arlington, VA: Management Science Health Strength*.

Ofori-Asenso, R. (2016). A closer look at the World Health Organization's prescribing indicators. *Journal of Pharmacology and Pharmacotherapeutics*, *7*(1), 51-54. https://doi.org/10.4103/0976-500X.179352

Ruwan, K. P., Prasad, C., & Ranasinghe, B. D. N. (2009). Pattern of private sector drug prescriptions in Galle: A descriptive cross-sectional study. *Galle Medical Journal*, *11*(1). https://doi.org/10.4038/gmj.v11i1.1136

Shankar, P. R. (2014). Essential medicines and health products information portal. *Journal of Pharmacology & Pharmacotherapeutics*, *5*(1). https://doi.org/10.4103/0976-500X.124434

Thiyahiny, S. N., Sathiadas, M. G., Surenthirakumaran, R. & Layanthini, S. (2019). Prescription of antibiotics among paediatric outpatients at Teaching Hospital-Jaffna. *31*(1); 3-7. http://doi.org/10.4038/jmj.v31i1.59

Worku, F., & Tewahido, D. (2018). Retrospective Assessment of Antibiotics Prescribing at Public Primary Healthcare Facilities in Addis Ababa, Ethiopia. Interdisciplinary Perspectives on Infectious Diseases, 2018, 1–9. https://doi.org/10.1155/2018/4323769

World Health Organization. (2003). *Assessment of the pharmaceutical sector in Ethiopia* (No. TODOC). Addis Ababa, Ethiopia: Ministry of Health.

World Health Organization. (2018). Essential medicines and health products information portal. *Recuperado el*, *5*.

World Health Organization. (2018). WHO report on surveillance of antibiotic consumption: 2016-2018 early implementation. https://www.who.int/publications/i/item/9789241514880

World Health Organization. (2019). Executive summary: the selection and use of essential medicines: report of the 22nd WHO Expert Committee on the selection and use of essential medicines: WHO Headquarters, Geneva, 1-5. https://iris.who.int/handle/10665/325773.

Yimenu, D. K., Emam, A., Elemineh, E. & Atalay, W. (2019). Assessment of antibiotic prescribing patterns at outpatient pharmacy using World Health Organization prescribing indicators. *Journal of Primary Care & Community Health*, *10*. https://doi.org/10.1177%2F2150132719886942

Zellweger, R. M., Carrique-Mas, J., Limmathurotsakul, D., Day, N. P. J., Thwaites, G. E., Baker, S. & Southeast Asia Antimicrobial Resistance Network. (2017). A current perspective on antimicrobial resistance in Southeast Asia. *Journal of Antimicrobial Chemotherapy*, *72*(11), 2963-2972. https://doi.org/10.1093/jac/dkx260