

Research Article

Knowledge and Attitudes Regarding Antimicrobial Drug Use and Antimicrobial Resistance Among Patients Admitted to Medical Wards of a Selected Teaching Hospital in Colombo, Sri Lanka

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Abstract

Introduction: Antimicrobial resistance (AMR) is a significant global public health threat. The rising levels of resistance negatively impact healthcare costs, hospital stays, and mortality rates. This study aimed to evaluate knowledge and attitudes regarding antimicrobial drug usage and AMR among patients admitted to the medical wards of Colombo South Teaching Hospital.

Methods: A descriptive cross-sectional design was employed. An interviewer-administered questionnaire, developed based on similar studies, was used. The sample consisted of 231 patients selected via convenience sampling. Patients with a Glasgow Coma Scale score below 15 or altered levels of consciousness or abnormal behavior were excluded. Data were analyzed using SPSS version 26.0, with a significance level set at $p < 0.05$.

Results: Approximately 52.4% of participants had poor knowledge about antimicrobial usage. Among 195 respondents who had taken antibiotics, 82.7% received them through a prescription, while 27.3% of them are regularly using antibiotics without a prescription. A significant 42.9% were unaware of the term "antimicrobial resistance," although 50.2% recognized it as a global health issue. Only 28.71% of participants had a positive attitude towards antimicrobial usage, but 87.5% demonstrated a good attitude towards AMR. About 54.5% perceived they used antimicrobial drugs rationally.

Conclusions: While half of the participants exhibited poor knowledge and attitudes toward antimicrobial drug usage, the majority had a positive attitude toward AMR. Educational programs targeting all societal levels, including school children, are essential to improve public health knowledge.

Keywords: Antimicrobial drugs, antimicrobial resistance (AMR), antibiotics, knowledge, attitudes

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Introduction

Antimicrobial drugs, which include antibiotics, antivirals, antifungals, and antiparasitics, are designed to combat microbial infections by inhibiting or killing pathogens. The overuse of these drugs has led to antimicrobial resistance (AMR), which poses a global health threat. Proper use of antimicrobials, guided by healthcare professionals, is crucial for effective treatment of infectious diseases. Antibiotics, derived from the Greek words "anti" (against) and "bios" (life), specifically target bacteria (Malkawi et al., 2023).

The discovery of penicillin by Alexander Fleming in the early 20th century revolutionized the treatment of bacterial infections, leading to the development of numerous antibiotics. By 1928, over 30 antibiotics were available, earning the 20th century the designation "antibiotic age" (Ilktac et al., 2020).

The World Health Organization (WHO) reports that antibiotics are the most commonly prescribed medications globally. Despite their effectiveness in reducing infectious disease incidence, antibiotics are often overused, fostering the emergence of resistant bacterial strains (Jabbarin, 2023). Antimicrobial resistance occurs when microorganisms become resistant to drugs previously effective against them, leading to prolonged infections and increased morbidity and mortality. AMR strains the healthcare system and complicates infection control (Zerfu et al., 2023). One major contributor to AMR is a lack of knowledge about proper antibiotic use and bacterial resistance making

it a critical public health issue (Antibiotic resistance: multi-country public awareness survey, 2015).

AMR increases treatment costs, extends hospital stays, and deteriorates health outcomes posing a particular threat to developing countries in Asia and Africa (Ahmetaj et al., 2023). Global antibacterial consumption surged by 65% from 2000 to 2015, with projections of a 200% increase by 2030 if current practices persist (Ranganathan et al., 2021). In Sri Lanka, the College of Microbiologists oversees a surveillance program for AMR, yet no infrastructure exists to aggregate antimicrobial consumption data. Antibiotic-resistant bacteria are responsible for over 700,000 global deaths annually, a number projected to reach 10 million by 2050 (Al-Halawa et al., 2023).

Few studies in Sri Lanka assess patients' knowledge and practices regarding antimicrobial use and resistance requiring more studies to see a bigger picture of the issue. This study aims to fill this gap by evaluating these aspects among patients admitted to Colombo South Teaching Hospital.

Methods

Study design and setting

This descriptive cross-sectional study was conducted from April 2023 to July 2023 with 231 patients admitted to the medical wards of Colombo South Teaching Hospital. Participants ranged from 18 to 80 years of age. Those with a Glasgow Coma Scale score below 15 or altered consciousness or

abnormal behavior were excluded.

Sample size and sampling

The sample size was calculated using the Lwanga and Lemeshow formula (1991), allowing for a 10% non-response rate, yielding an estimated sample size of 423. Due to logistical and time constraints, a final sample of 231 was obtained. Convenience sampling was used, with approximately 39 patients from each of the six medical wards.

Study instrument

An interviewer-administered questionnaire collected data on socio-demographics, past antimicrobial drug usage, knowledge and attitudes regarding antimicrobial drugs, and AMR. The questionnaire was based on previous studies (Jayaweerasingham et al., 2019; Geta & Kibret, 2022; Voidăzan et al., 2019) and was pre-tested for validity and clarity.

Data collection

Data were collected through interviews with patients in the six medical wards, following the provision of an information sheet and obtaining informed consent.

Data analysis

Data were analyzed using IBM SPSS Version 26.0. Knowledge was scored and categorized into levels of 'Excellent', 'Good', and 'Poor'. The cut-off for attitudes was determined by scoring and categorizing responses into 'Good' and 'Poor' based on pre-defined thresholds.

Ethical considerations

Ethics approval was obtained from the Ethics Review Committee of the Faculty of Medical Sciences, University of Sri Jayawardenepura (NSG 17). Administrative approval was also secured. Participants were informed about the study's purpose, ensured privacy and confidentiality, and were assured of their right to withdraw at any time. Informed written consent was obtained before data collection.

Results

A sample of 231 was obtained. Demographic characteristics of the participants are presented in Table 1. The mean age was 41.47 ± 13.15 years. Out of 231 respondents, there were more females (51.5%) than males (48.5%). The majority of respondents resided in urban areas (45.0%). More than half of the participants (65.8%) were married. The majority of participants (31.6%) had completed education up to the G.C.E. Advanced Level, and 23.4% had graduated from a university. Nearly a third of the participants (29.4%) were unemployed, the largest group reported under occupation. Skilled workers made up 19.5% of the participants. An overwhelming majority, 80.5%, did not have medical insurance.

Most participants (84.4%) had taken antimicrobial drugs from any source. A majority of participants (72.3%) stated that they had not, and would not, take antimicrobials without a prescription from a medical officer. Among those who used antimicrobial drugs without a prescription (53.1%), the primary reason was to quickly relieve their symptoms. The second most common reason was previous experience as a patient (28.1%). Other reasons included

Table 1: Distribution of socio-demographic characteristics of the participants (N=231)

Demographic	Characteristic	Frequency (%)
Gender	Male	112 (48.5)
	Female	119 (51.5)
Age	18-27	50 (21.7)
	28-37	39 (16.9)
	38-47	69 (29.9)
	48-57	44 (18.9)
	58-67	24 (10.5)
	67 or above	05 (2.1)
Living area	Urban	104 (45)
	Sub-Urban	93 (40.3)
	Rural	34 (14.7)
Religion	Buddhism	194 (84)
	Catholicism	21 (9.1)
	Hinduism	7 (3)
	Muslim	9 (3.9)
Ethnicity	Sinhalese	214 (92.6)
	Tamil	8 (3.5)
	Muslim	9 (3.9)
Marital status	Married	152 (65.8)
	Unmarried	73 (31.6)
Educational level	Up to G.C.E. Ordinary Level	42 (18.2)
	Up to G.C.E. Advanced level	73 (31.6)
	Diploma holder	25 (10.8)
	Undergraduate	26 (11.3)
	Graduate	54 (23.4)
	Postgraduate / <	9 (3.9)
Occupation	Skilled worker	45 (19.5)
	Professional managerial	44 (19)
	Health care related	25 (10.8)
	Unemployed	68 (29.4)
	Teaching	8 (3.5)
	Vehicle hiring	14 (6.1)
	Self-employee	17 (7.4)
	Hotel side job	6 (2.6)
	Engineering	4 (1.7)
Insurance	With medical insurance	45 (19.5)
	Without medical insurance	186 (80.5)

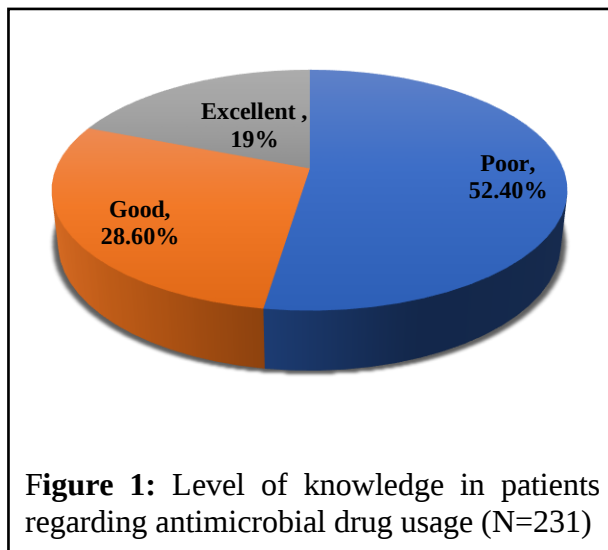
Table 2: Patients' knowledge regarding antimicrobial drug usage (N=231)

Statement	Characteristic	Frequency (%)
1. Antibiotics are active against bacteria. (True)	True	184 (79.7)
	False	9 (3.9)
	Don't know	38 (16.5)
2. Antibiotics are active against fungi, viruses, and protozoa. (False)	True	75 (32.5)
	False	81 (35.1)
	Don't know	75 (32.5)
3. Antibiotics are active against any type of bacteria. (False)	True	73 (31.6)
	False	71 (30.7)
	Don't know	87 (37.7)
4. Antibiotics are indicated for the common cold. (False)	True	91 (39.4)
	False	85 (36.8)
	Don't know	55 (23.8)
5. Antimicrobial drugs carry a risk of causing anaphylaxis. (True)	True	90 (39)
	False	21 (9.1)
	Don't know	120 (51.9)
6. Taking antibiotics is similar to taking paracetamol; I don't think that it is important after I feel better, so I can stop the use of the drug." (False)	True	46 (19.9)
	False	119 (51.5)
	Don't know	66 (28.6)
7. How important is the interval between two consecutive administrations of antimicrobials? (Important)	It's very important	136 (58.9)
	It is not important	13 (5.6)
	No idea	82 (35.5)

minimizing costs (10.9%) and saving time (7.8%). As presented in Table 2, the majority of participants (79.7%) were aware that antibiotics are active against bacteria. However, a third of the participants (32.5%) were under the false impression that antibiotics are also effective against viruses, fungi, and protozoa. Additionally, nearly a

third of the participants (31.6%) mistakenly believed that antibiotics are effective against all types of bacteria. A significant portion of the study sample (39.4%) thought that antibiotics are indicated for the common cold. A majority of the participants (51.9%) stated that they didn't know whether antibiotics could cause anaphylaxis.

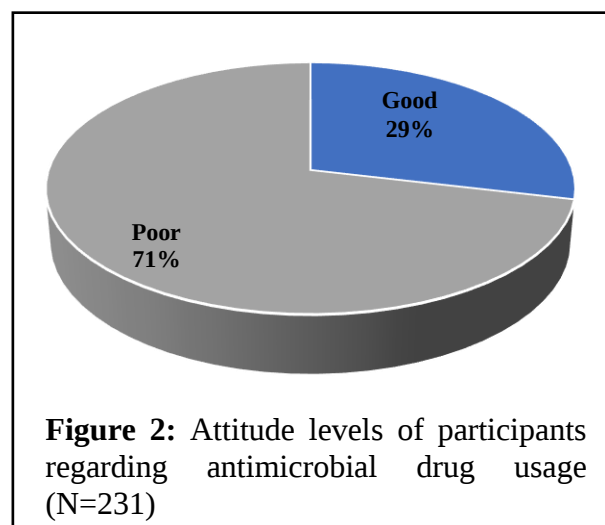
Furthermore, a majority of the study population (58.9%) acknowledged that the interval between consecutive antimicrobial administrations is very important. Half of the participants (52.4%) had poor knowledge regarding antimicrobial drugs, 28.6% had good knowledge and only 44 participants (19%) had excellent knowledge (Figure 1).



Patients' attitudes regarding antimicrobial drug usage

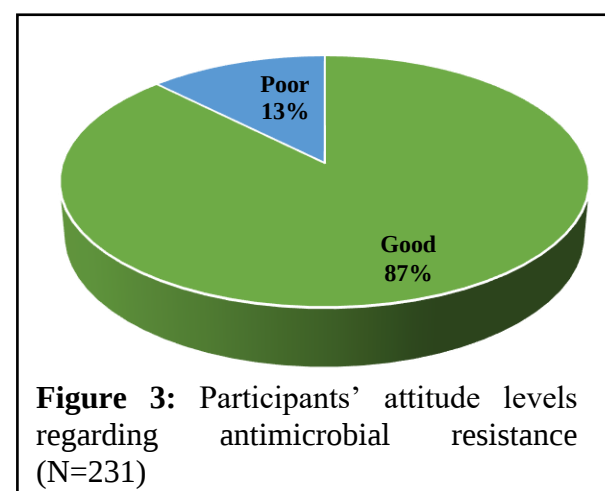
The findings from the study on patients' attitudes regarding antimicrobial drug usage are presented in Table 3. More than 30% of patients strongly agreed to take antibiotics according to label guidelines or doctor's prescriptions. However, a small proportion strongly agreed or agreed (36.8%) that antimicrobial drug treatment should never exceed 7 days, and 61.1% agree that antibiotics cause side effects. Alarming, 47.6% (strongly agreed and agreed) admitted to stopping antibiotics when feeling better, while 20.8% (strongly agreed and agreed) would request antibiotics even if not prescribed by a doctor. As shown in Figure 2.

most of the study participants (71.3%) had a poor level of attitude regarding antimicrobial usage.



Participants' attitude regarding antimicrobial resistance

Participants' attitude regarding antimicrobial resistance is presented in Table 4. A significant proportion (42.9%) were not aware of the term "antimicrobial resistance", while 50.2% were aware that antimicrobial resistance is a common global health challenge. As shown in Figure 3 the majority of participants (87.5%) had a good attitude level regarding Antimicrobial Resistance.



Discussion

According to the results of this study, 194 participants (84.4%) had taken antimicrobial drugs from any source. Among these, 73 participants (37.1%) had used antimicrobial drugs “a week ago” before this particular hospital admission. A similar study conducted in Turkey (Ahmetaj et al., 2023) among patients admitted to the hospital for orthopedic surgery reported that 29 participants (31.1%) out of a study population of 93 had taken antibiotics within the last six months, and 16 participants (17.2%) had taken an antibiotic within the last month. Therefore, antimicrobial use observed in this study far exceeds the use reported in the study conducted in Turkey.

A majority of participants (72.3%) stated that they haven't or wouldn't take antimicrobials without a prescription from a medical officer. However, according to a study conducted in Turkey (Ahmetaj et al., 2023), more than half of the participants (53.7%) had taken antimicrobial drugs from a doctor. Similarly, a study conducted in public hospitals in Northwestern Ethiopia (Geta & Kibret, 2022) revealed that more than half of the participants (60.3%) were taking antimicrobial drugs without a prescription. The practice of using antimicrobials through a medical officer's prescription is therefore higher in this study, which is favorable towards preventing antimicrobial resistance.

In the current study, 47.6% of participants stated that they stop the use of antimicrobial drugs once they feel better, while 16% were neutral on the subject. A community-based interventional study conducted in the United Arab Emirates (Rabbani et al., 2020)

revealed that 51% of participants stopped using antibiotics once they felt better. Ahmetaj et al. (2023) reported that almost half of the participants (45.1%) had stopped using antimicrobial drugs once they felt better. The findings of this study, therefore, align with those revealed in these two studies.

Approximately half of the current study participants (51.5%) agreed with the statement, “I take antibiotics when I catch a common cold,” while 18.2% were neutral. When directly questioned about whether antibiotics are indicated for the common cold, 39.4% erroneously stated that they were, while 23.8% stated they didn't know. This amounts to a significant portion of the study population. However, Ahmetaj et al. (2023) revealed that only 48.4% of participants mentioned that a cold or flu could be treated with antibiotic drugs. This reflects a significant lack of knowledge among patients in Sri Lanka regarding a common condition such as the common cold.

Just 26% of the participants in the current study agreed with the statement, “I share antimicrobial drugs with other people,” while only 17.3% agreed that sharing antimicrobial drugs was a good practice. A respectable 17.7% and 18.6% were neutral, respectively. However, Rabbani et al. (2020) revealed that more than half of the participants (54%) were taking antimicrobial drugs from friends and relatives and believed that sharing antimicrobials was a good practice. This reflects the positive attitudes observed among the population in the current study.

In the current study, most of the participants (60.2%) were unaware of the term “antimicrobial resistance”. Upon analysis of

Table 3: Patients' attitudes regarding antimicrobial drug usage (N=231)

Item	Strongly agree n (%)	Agree n (%)	Neutral n (%)	Disagree n (%)	Strongly disagree n (%)
1. I take antibiotics according to label guidelines/doctor's prescription.	83 (35.9)	89 (38.5)	39 (16.9)	7 (3.0)	13 (5.6)
2. I think antimicrobial drug treatment should never exceed 7 days.	20 (8.7)	65 (28.1)	94 (40.7)	37 (16.0)	15 (6.5)
3. I think antimicrobial drugs cause side effects.	35 (15.2)	106 (45.9)	72 (31.2)	14 (6.1)	4 (1.7)
4. When I have a common cold, I should take antimicrobials to prevent it from getting worse.	39 (16.9)	80 (34.6)	42 (18.2)	49 (21.2)	21 (9.1)
5. When I get a fever, antibiotics will help to get better.	29 (12.6)	110 (47.6)	38 (16.5)	42 (18.2)	12 (5.2)
6. I stop the use of antibiotics when I feel better.	44 (19.0)	66 (28.6)	37 (16.0)	55 (23.8)	29 (12.6)
7. I request antibiotics from the doctor even if the doctor does not prescribe them.	20 (8.7%)	28 (12.1%)	53 (22.9)	85 (36.8)	45 (19.5)
8. The doctor must prescribe more than one antimicrobial drug if I have severe flu/infection.	16 (6.9)	44 (19.0)	88 (38.1)	52 (22.5)	31 (13.4)
9. More expensive antimicrobials are more effective.	33 (14.3)	45 (19.5)	78 (33.8)	55 (23.8)	20 (8.7)
10. People should keep antimicrobials for their future use without seeking medical opinion after recovering from the current illness.	28 (12.1)	37 (16.0)	72 (31.2)	56 (24.2)	38 (16.5)
11. I share antimicrobial drugs with other people.	20 (8.7)	40 (17.3)	41 (17.7)	58 (25.1)	72 (31.2)
12. Sharing of antibiotics is a good practice.	12 (5.2)	28 (12.1)	43 (18.6)	64 (27.7)	84 (36.4)

Table 4: Participants' attitudes regarding antimicrobial resistance (N=231)

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Attitudes	n (%)	n (%)	n (%)	n (%)	n (%)
1. Antimicrobial resistance is one of the most common global health challenges.	69 (29.9)	94 (40.7)	63 (27.3)	4 (1.7)	1 (0.4)
2. It is necessary to have a set of lab tests done before taking antimicrobial drugs.	51 (22.1)	84 (28.1)	80 (34.6)	12 (5.2)	4 (1.7)
3. Antimicrobial resistance can be prevented.	19 (8.2)	63 (27.3)	113 (48.9)	23 (10)	13 (5.6)
4. Inappropriate use of antimicrobials can lead to Antimicrobial Resistance.	35 (15.2)	77 (33.3)	101 (43.7)	9 (3.9)	9 (3.9)
5. Genes responsible for resistance can spread from one bacterium to another.	29 (12.6)	94 (40.7)	94 (40.7)	9 (3.9)	5 (2.2)
6. Proper hand washing can prevent the spread of resistant bacteria.	54 (23.4)	120 (51.9)	42 (18.2)	14 (6.1)	1 (0.4)
7. Strengthening infection control measures can reduce the spread of Antibiotic Resistance.	58 (25.1)	115 (49.8)	45 (19.5)	12 (5.2)	1 (0.4)

the study results, it was also revealed that almost half of the participants (46.8%) did not have an adequate understanding of how antimicrobial resistance spreads among microbes. A comparable study conducted in Lebanon among university students (Sakr et al., 2020) showed that 56.6% of undergraduates from non-health-related fields were aware of the term “antimicrobial resistance.” This indicates that, despite the

maturity of the current study population, they were less aware of antimicrobial resistance than non-health-related undergraduates. However, a significant majority of the current study population (70.6%) agreed that antimicrobial resistance is one of the most common global health challenges. A comparable study performed among pharmacists in West Bank, Palestine (Al-Halawa, 2023), mentioned that more than

half of the participants (75.6%) agreed that antimicrobial resistance is a common global health challenge. This reflects positively on the current study population, as patients admitted to medical wards were found to have an almost similar view to pharmacists engaged in providing healthcare.

Limitations

The data collection tool for the study was an interviewer-administered questionnaire. It was logistically challenging to gain informed consent for a lengthy questionnaire that took approximately 20 minutes to complete. As a result, the desired sample size of n=423 was not achieved. The study eventually concluded with the participation of 231 individuals. Convenience sampling was used, which is another limitation.

Conclusions

The majority of participants (71.3%) exhibited a poor attitude towards antimicrobial drug usage, and half of the participants (52.4%) demonstrated poor knowledge of antimicrobial drug usage. However, an overwhelming majority (87.5%) had positive attitudes towards antimicrobial resistance. To address these gaps, health education programs focused on improving knowledge of proper drug usage should be implemented. Further research is warranted to explore the specific reasons behind the poor knowledge and attitudes regarding antimicrobial drug usage.

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Conflict of interest

The authors declare that they have no conflicts of interest.

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