

# Antibiotics Prescription Practice for Inpatients Clients at St. Paul's Hospital Mellinium Medical College in Addis Ababa, Ethiopia: Cross Sectional Study

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## ABSTRACT

**Background:** Antibiotics are one of the most widely used groups of drugs. Irrational and uncontrolled use of these agents both in developing and developed countries has resulted in an evolution of resistant strains in addition to poor health outcome. The abusive use of antibiotics is a worldwide problem and worth investigation. The regional data from Ethiopia is contributing to worldwide understanding of the situation.

**Objective:** To assess prescription practice for inpatients clients at St Paul's Hospital millennium Medical College in Addis Ababa, Ethiopia 2018.

**Methods:** Data was collected prospectively from March 1-30/2018 G.C. through chart abstraction, observation and interview by following patients from admission to discharge, death or left against medical advice. Sample size was calculated using a single population proportion formula and the calculated sample size was 264. Data was analyzed using (SPSS) version 24.0. Descriptive statistics were done by running frequencies.

**Results:** Antibiotics for systemic use were prescribed to 87.5% of the patients which was nine out of ten. Of total admitted patients for 87.50% antibiotics were prescribed as treatment, of which only 38.50% prescription of antibiotics were prescribed based on treatment guidelines. The most frequently prescribed antibiotics were third generation cephalosporin alone which accounts 48.92% of all antibiotics prescribed for clients and cephalosporin (ceftriaxone, cefotaxime and ceftazidime) in combination with metronidazole were 16.88% and cephalosporin in combination with Vancomycin were prescribed for 9.96% for inpatients clients.

**Conclusions:** In the present study for nine out of ten patients antibiotics were prescribed and more than half of prescription was inappropriate prescription 61.67% which indicated that an abusive use of antibiotics at inpatient setting of SPHMMC. Therefore, Health care practitioners' would be better to adhered to drug prescription guideline regarding antibiotics and others drugs in developing countries Hospital settings for inpatient treatments.

**Keywords:** Antibiotics; Inpatient St. Paul's Hospital Millennium Medical College

**Abbreviations:** AIDS: Acquired Immune Deficiency Syndrome; AGE: Acute Gastroenteritis; CNSOI: Central Nervous System Opportunistic Infections; HAP: Hospital Acquired Pneumonia; HIV: Human Immunodeficiency Virus; PI: Principal Investigator; SAM: Sever Acute Malnutrition; SPHMMC: Saint Paul's Hospital Millennium Medical College; STG: Standard Treatment Guide Line; TASH: Tikur Anbessa Specialized Hospital; TB: Tuberculosis; UTI: Urinary Tract Infection; WHO: World Health Organization.

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## Introduction

### Background

Antimicrobial agents are the most commonly used and misused of all the drugs [1]. Antibiotics are powerful and effective drugs in the fight against infectious diseases caused by bacteria and have been frequently used for decades worldwide for effective treatment of a variety of bacterial infections [2,3]. Since their introduction into medicine in 1941, antibiotics have saved millions of lives and transformed modern medicine. As a result, bacterial infections have become easily treatable, and the horizons for surgeries, transplants, and more complicated life-saving procedures have expanded [4]. Yet, more and more people are dying from infectious disease that were curable but for which we no longer have the right treatment. This is because certain bacteria are transforming themselves and developing resistance to antibiotics [5]. Antibiotics are an essential part of modern medicine and play a major role both in the prophylaxis and treatment of infectious diseases [6] and are among the drugs most commonly prescribed for children [7]. The issues of their availability, selection and proper use are of critical importance to the global community [8]. Over prescribing not only increases the costs of health care, but may result in super-infection due to antibiotic-resistant bacteria, as well as opportunistic fungi, and may increase the likelihood of an adverse drug reaction. The frequent use of antibiotics is considered to be one of the main reasons for the high prevalence of antimicrobial resistance observed in hospitals [7]. Prudent use of antibiotics will curtail health care costs and potential adverse effects to the individual taking them and also diminishes the wide ecologic effects leading to selection of antibiotic resistant pathogenic Organisms [6]. Irrational drug use, especially antimicrobials in a pediatric population, has become a commonly noted practice. A study in the USA and Canada has shown that 50% and 85% of antibiotics, respectively, were prescribed inappropriately to children [7]. Worldwide, it is estimated that over 50% of all medicines are prescribed, dispensed or sold inappropriately [9]. Though inappropriate use of antimicrobial agents has been found to be common in various parts of the world, but there have been few studies in developing countries [10]. The majority of hospitalized patients receive antibiotics for therapy or prophylaxis during their inpatient stay. It has been estimated that at least 50% of patients receive antibiotics without clear indications [11]. Compared to adult medicine, drug use in Pediatric is not extensively researched and the range of licensed drugs in appropriate dosage form is limited [12]. Pediatric antibiotic prescription is a major concern in terms of public health [13]. Infants and children are among the most vulnerable population groups to contract illnesses because of this the use of antimicrobial agents, especially antibiotics has become a routine practice for the treatment of Pediatric illness [14]. Hence, health care professionals, parents and care takers should know about the judicious use and the negative impact of antibiotics so that they can make informed and proper decision while prescribing or using it. At the same time antimicrobial agents are over prescribed in inpatient setting and the availability of antimicrobial agents without prescription in many developing countries has been facilitating the development of resistance [15-17]. Ethiopian hospitals consume about 50% of the national drug budget, which are considered to have high drug budget compared

to the population segment using these health facilities. However, very little is known how drugs (particularly antibiotics) are used in hospitals like in other health facilities [6].

## Materials and Method

### Study area and period

The study was conducted in SPHMMC which was built in 1969 by Emperor Haile Selassie in collaboration with the German Evangelical Church, as a source of medical care for underserved populations. It is the second largest hospital in the country with a catchment population of more than 5 million. Currently it has 392 beds, with an annual average of 200,000 patients. Approximately 75% of the patients receive medical services free of charge. It has over 1,300 clinical and non-clinical staff. Data were collected prospectively over a period on one month (March 1-30, 2018).

### Sample size determination

Sample size was calculated using single population proportion formula from study done in university of Lusaka, Zambia revealed that 78.0% of admitted patients' antibiotics were prescribed inappropriately.

### Sampling and data collection technique

Data were collected through chart abstraction, observation and interview. Information pertaining socio-demographic characteristics, clinical diagnosis and laboratory results were collected using a structured and pretested questionnaire from admission to discharge, death or left against medical advice. Consecutive cases of hospital inpatients who were admitted during the study period and who full filled the inclusion criteria were included in the study until the calculated sample size was achieved. All patients who were admitted to SPHMMC in departments of pediatrics and child health, internal medicine and surgical wards were included in the study.

### Data management and analysis

The returned questionnaires were checked for completeness, cleaned manually, coded and entered into SPSS windows version 20.0 for further analysis. Frequencies mean and standard deviation was used to summarize descriptive statistics of the data and text, tables and graphs were used for data presentation. Simple frequencies, proportions and odds ratios was determined when possible. P-value less than 0.05 was considered statistically significant.

### Operational definitions

**Antibiotics:** Chemotherapeutic agents with activity against microorganisms.

**In appropriate antibiotics:** In appropriate antibiotics use means that when spectrum, dose, or duration of antibiotic prescribed is /are not in line with clinical practice guidelines for antimicrobial Prophylaxis in surgery guideline for prophylaxis for surgical patients admitted to surgical ward and the infectious diseases society of America (IDSA) 2016 for patients admitted to pediatrics and child health, and internal medicine wards [18].

Hospital acquired infection: Pediatrics: Individuals with age up to 18 years.

## Result

As study result revealed on Table 1 below that 40 (15.2 %) patients were from department of pediatrics and Child Health, 68 (27.8%) patients were from department of Internal Medicine and 156 (59.1 %) patients were from department of Surgery. Forty two (15.9 %)

patients were age less than five years and of the total inpatients clients participated in the study more than half 144 (54.5 %) were male.

As shown in Table 1 below revealed that of total clients antibiotics were prescribed for 231 (87.5%), of which 22.7% from internal medicine, 134 (50.8%) were from surgery and 37 (14.0%) were from pediatrics and child health antibiotics were prescribed respectively.

**Table 1:** Demographic characteristics and Clinical characteristics of inpatients clients at SPHMMC, Addis Ababa (July, 2018).

Characteristics	Number(%) of study subjects from the respective departments			
	Internal Medicine Wards	Surgery Ward	Pediatrics Ward	Total number (%)
Age in years	68(25.8%)	156(59.1%)	40(15.15%)	264(100.0%)
<5	0(0.0%)	13(4.9%)	29(11.0%)	42(15.9%)
5-14	0(0.0%)	17(6.4%)	11(4.2%)	28(10.6%)
15-24	12(4.6%)	31(11.7%)	0(0.0%)	43(16.2%)
25-54	42(15.9%)	63(23.9%)	0(0.0%)	105(39.8%)
>54	14(5.3%)	32(12.1%)	0(0.0%)	46(17.4%)
Sex	68(25.8%)	156(59.10%)	40(15.2%)	264(100.0%)
Male	26(9.9%)	91(34.5%)	27(10.2%)	144(54.5%)
Female	42(15.9%)	65(24.6%)	13(4.9%)	120(45.5%)
Clinical Characteristics	Number(%) of study subjects from the respective departments			
	Internal Medicine Ward	Surgical Ward	Pediatrics And child health ward	Total Number (%)
Was antibiotics given	68(25.8%)	156(59.1%)	40(15.2%)	264(100.0%)
No	8(3.0%)	22(8.3%)	3(1.1%)	33(12.5%)
Yes	60(22.7%)	134(50.8%)	37(14.0%)	231(87.5%)
Type of infection diagnosed/indication for antibiotics	60(26.0%)	134(58.1%)	37(16.0%)	231(100.0%)
Community acquired infection	51(22.1%)	134(58.0%)	26(11.3%)	211(91.3%)
Hospital acquired Infection	9(3.9%)	0(0.0%)	11(4.8%)	20(8.7%)
Indication for antibiotics	60(26.0%)	134(58.1%)	37(16.0%)	231(100.0%)
Pneumonia	25(11.0%)	0(0.0%)	8(3.5%)	33(14.3%)
Sepsis	9(3.9%)	0(0.0%)	7(3.0%)	16(6.9%)
Meningitis	10(4.3%)	0(0.0%)	2(0.9%)	12(5.2%)
Urinary tract infection	3(1.3%)	3(1.3%)	1(0.4%)	7(3.0%)
Neutropenic fever	2(0.9%)	0(0.0%)	0(0.0%)	2(0.9%)
Infective endocarditis	2(0.9%)	0(0.0%)	1(0.4%)	3(1.3%)
Prophylaxis	3(1.3%)	100(43.3%)	0(0.0%)	103(44.6%)
Post-partum endometritis	3(1.3%)	0(0.0%)	0(0.0%)	3(1.3%)
Spontaneous bacterial peritonitis	2(0.9%)	0(0.0%)	0(0.0%)	2(0.9%)
Surgical abdominal infections	0(0.0%)	20(8.7%)	2(0.9%)	22(9.5%)
Bone and soft tissue infections	0(0.0%)	11(4.8%)	1(0.4%)	12(5.2%)
Myocarditis	0(0.0%)	0(0.0%)	1(0.4%)	1(0.4%)
Thrombophlebitis	0(0.0%)	0(0.0%)	1(0.4%)	1(0.4%)
Pyogenic Lymphadenitis	0(0.0%)	0(0.0%)	1(0.4%)	1(0.4%)
Ophthalmia Neonatorum	0(0.0%)	0(0.0%)	1(0.4%)	1(0.4%)
Neonatal sepsis with meningitis	0(0.0%)	0(0.0%)	2(0.9%)	2(0.9%)
SAM+AGE or HAP or Shock or UTI	0(0.0%)	0(0.0%)	4(1.7%)	4(1.7%)
Ophthalmitis	0(0.0%)	0(0.0%)	1(0.4%)	1(0.4%)
Breast abscess	0(0.0%)	0(0.0%)	1(0.4%)	1(0.4%)
Others	1(0.4%)	0(0.0%)	3(1.3%)	4(1.7%)

## Clinical characteristics of study subjects

Out of the total study subjects, 231 (87.5%) of them were given at least one form of antibiotics during their stay in the hospital. The most frequently prescribed antibiotics were third generation cephalosporin alone which accounts 48.92% of all antibiotics prescribed for clients and cephalosporin (ceftriaxone, cefotaxime and ceftazidime) in combination with metronidazole were 16.88% and cephalosporin in combination with Vancomycin were prescribed for 9.96% for inpatients clients.

The mean reasons of prescription of antibiotics due to commonly presumed diagnosis made by the treating physicians were Pneumonia 33 (14.3%), sepsis 16 (6.9%), meningitis 14 (6.1%), bone and soft tissue infection 13 (5.6%) and surgical abdominal infection 22 (9.5%) at study area respectively. One hundred and three patients (44.6%) were given antibiotics as prophylaxis, of which department of surgery accounts for 100 (97) clients. Of the total patients who received antibiotics 8.7% were with diagnosed

hospital acquired infection in the study setting Hospital. Of total clients antibiotics were prescribed in hospital stay for about 21 (9.1%) patients antibiotics were switched, the main reasons cited for switched antibiotics were patient not improving while being on antibiotics 17 (81.0%) and diagnosis was being confirmed by bacteriological test 4 (19.5%). The type of bacteriological tests done before switching antibiotics were blood culture 1 (25.0%), urine culture 2 (50.0%) and stool culture 1 (25.0%) (Table 2).

Duration of antibiotics administration was as follows: 110 (47.6%) patients received for less than 5 days, 46 (19.90%) patients received for five to seven days, 36 (15.6%) patients for eight to ten days and the remaining for more than ten days. Twelve patients (5.2%) had received antibiotics for more than twenty one days and of these patients had received antibiotics >21 days, significant numbers were patients were 18 died which accounts 18 (7.8%) in the study area (Table 2).

Of total admitted patients had received antibiotics, only 38.0%

**Table 2:** Clinical characteristics of study subjects, SPHMMC, Addis Ababa (July, 2018).

Type of antibiotics Prescribed	60(26.0%)	134(58.1%)	37(16.0%)	231(100.0%)
Third generation Cephalosporin	2(0.9%)	99(42.9%)	9(3.9%)	113(48.9%)
Third generation cephalosporin with Metronidazole	7(3.0%)	30(13.0%)	2(0.9%)	39(16.9%)
Third generation cephalosporin with Vancomycin	17(7.4%)	1(0.4%)	5(2.2%)	23(10.0%)
Ciprofloxacin with Metronidazole	3(1.3%)	0(0.0%)	0(0.0%)	3(1.3%)
Cephalosporin with Azithromycin	9(3.9%)	0(0.0%)	1(0.0%)	9(3.9%)
Ampicillin with Gentamycin	0(0.0%)	0(0.0%)	6(2.6%)	6(2.6%)
Third generation cephalosporin with Vancomycin and Metronidazole	4(1.7%)	0(0.0%)	2(0.9%)	6(2.6%)
Ciprofloxacin	1(0.4%)	2(0.9%)	1(0.4%)	4(1.7%)
Cotrimoxazole	2(0.9%)	0(0.0%)	0(0.0%)	2(0.9%)
Vancomycin with metronidazole	1(0.4%)	0(0.0%)	0(0.0%)	1(0.4%)
Cloxacillin	0(0.0%)	2(0.9%)	0(0.0%)	2(0.9%)
Vancomycin+ metronidazole+ Ant- Tb	1(0.4%)	0(0.0%)	0(0.0%)	1(0.4%)
Third generation cephalosporin with Vancomycin and Cotrimoxazol	1(0.4%)	0(0.0%)	0(0.0%)	1(0.4%)
Cloxacillin with Gentamycin	0(0.0%)	0(0.0%)	1(0.4%)	1(0.4%)
Vancomycin with Meropenem	0(0.0%)	0(0.0%)	1(0.4%)	1(0.4%)
Nitrofurantoin	0(0.0%)	0(0.0%)	1(0.4%)	1(0.4%)
Cefepime with Vancomycin	1(0.4%)	0(0.0%)	1(0.4%)	2(0.9%)
Third generation cephalosporin with cotrimoxazole and azithromycin	1(0.4%)	0(0.0%)	0(0.0%)	1(0.4%)
Metronidazole with norfloxacin	1(0.4%)	0(0.0%)	0(0.0%)	1(0.4%)
Third generation cephalosporin with metronidazole and ciprofloxacin	1(0.4%)	0(0.0%)	1(0.4%)	2(0.9%)
Third generation cephalosporin with Vancomycin and Ant-Tb	1(0.4%)	0(0.0%)	0(0.0%)	1(0.4%)
Ciprofloxacin with clindamycin	1(0.4%)	0(0.0%)	0(0.0%)	1(0.4%)
Third generation cephalosporin with Vancomycin and ampicillin	1(0.4%)	0(0.0%)	1(0.4%)	2(0.9%)
Ciprofloxacin with cloxacillin	1(0.4%)	0(0.0%)	0(0.0%)	1(0.4%)
Meropenem with clindamycin	1(0.4%)	0(0.0%)	0(0.0%)	1(0.4%)
Third generation cephalosporin with gentamycin	0(0.0%)	0(0.0%)	1(0.4%)	1(0.4%)
Third generation cephalosporin with cloxacillin	0(0.0%)	0(0.0%)	3(1.3%)	3(1.3%)
Meropenem	1(0.4%)	0(0.0%)	1(0.4%)	2(0.9%)
Meropenem with metronidazole	1(0.4%)	0(0.0%)	0(0.0%)	1(0.4%)

Third generation cephalosporin with ampicillin	0(0.0%)	0(0.0%)	1(0.4%)	1(0.4%)
Others	1(0.4%)	0(0.0%)	0(0.0%)	1(0.4%)
Was there switch of antibiotics during hospital stay	60(26.0%)	134(58.0%)	37 (16.0%)	231(100.0%)
No	51(22.1%)	130(56.3%)	29(12.6%)	211(91.3%)
Yes	9(3.9%)	4(1.7%)	8(3.5%)	21(9.1%)
Reason for switching Antibiotics	9(42.9%)	4(19.1%)	8(38.1%)	21(100.0%)
Diagnosis	2(9.5%)	0(0.0%)	2(9.5%)	4(19.1%)
Confirmed by bacteriological test				
Patient not improving	7(33.3%)	4(19.1%)	6(28.6%)	17(81.0%)
Type of Bacteriological test done to switch antibiotics	2(50.0%)	0(0.0%)	2(50.0%)	4(100.0%)
Urine culture	1(25.0%)	0(0.0%)	1(25.0%)	2(50.0%)
Stool culture	1(25.0%)	0(0.0%)	0(0.0%)	1(25%)
Blood culture	0(0.0%)	0(0.0%)	1(25%)	1(25%)
Duration of antibiotics Administration	60(25.97%)	134(58.01%)	37(16.02%)	231(100%)
<5 days	8(3.46%)	101(43.72%)	11(4.76%)	120(51.95%)
5-7 days	20(8.66%)	15(6.50%)	11(4.76%)	46(19.91%)
8-10 days	13(5.63%)	12(5.19%)	4(1.73%)	36(15.58%)
11-14 days	4(1.73%)	3(1.30%)	8(3.46%)	11(4.76%)
15-21 days	6(2.60%)	3(1.39%)	2(0.87%)	17(7.36%)
>21 days	9(3.90%)	0(00%)	1(0.43%)	12(5.19%)
Patient outcome	60(25.97%)	134(58.01%)	37(16.02%)	231(100%)
Died	16(6.93%)	0(00%)	1(0.43%)	18(7.79%)

of prescriptions were labeled as appropriate based on Clinical practice guidelines for antimicrobial Prophylaxis in surgery guideline for prophylaxis for surgical patients admitted to surgical ward and the Infectious Diseases Society Of America (IDSA) 2016 for patients admitted to pediatrics and child health and internal medicine wards.

## Discussion

The main aim of this study was to assess the antibiotics prescription practice of hospital inpatients at St Paul's Hospital Millennium Medical College. The current study found out that 87.6% of admitted patients antibiotics were prescribed as treatment during hospital stay as compared to previous study conducted in Addis Ababa is high which revealed that 73.7% patients were prescribed antibiotics for systemic use [19]. This difference may be due to increased use of antibiotics in the hospital settings and more than half of prescription was inappropriate prescription 61.67%. Appropriate antibiotic use has both clinical and economic significance to any health system should be great public concern. The inappropriate use of antibiotics can potentially lead to antimicrobial resistance and increase the necessity to use more expensive antibiotics to treat common and life threatening infections [20,21].

This study identified that the most frequently prescribed antibiotics were third generation cephalosporin alone which accounts 48.92% of all antibiotics prescribed for clients and cephalosporin (ceftriaxone, cefotaxime and ceftazidime) in combination with metronidazole were 16.88% and cephalosporin in combination with Vancomycin were prescribed for 9.96% for inpatients clients which was similar with previous study done in Ethiopia at Bishoftu General hospital showed that 43.5% and 25.6% of the study subjects were given ceftriaxone and gentamycin respectively [22]. Hence, the wide spread use of cephalosporins in Hospital setting can lead to rapid emergence of resistant bacteria against

these important antibiotics as the mechanism of developing resistance by the bacteria can be inducible with increased use of the cephalosporins. Development of resistance by the bacteria against these important antibiotics can be either plasmid or gene mediated. Production of beta- lactamase or cephalosporins by the bacteria is the major mechanism for resistance against cephalosporins and synthesis of these enzymes by the bacteria can be inducible in the presence of antibiotics [23].

The current study reported that the mean reasons of prescription of antibiotics due to commonly presumed diagnosis made by the treating physicians were Pneumonia 33 (14.3%), sepsis 16 (6.9%), meningitis 14 (6.1%), bone and soft tissue infection 13 (5.6%) and surgical abdominal infection 22 (9.5%) which is in line with study conducted in Buhoftu Hospital the most common reasons for which antibiotics were prescribed for pneumonia 56.3% followed by gastroenteritis 9.4% [22]. It is expected that such infectious diseases to prevail in the hospitals of developing countries like Ethiopia. This was also clear showed that antibiotics are the corner stone in dealing with such diseases and assumed to have different bacterial etiologies which need precise decision by well- equipped and well- staffed bacteriological laboratory in the hospital in the presence of strong antibiotics stewardship from the clinician side. Surprisingly, in this study revealed that only four cases were culture proven infection indicating the need for improving the bacteriological service. The importance of availability of hospital guide line regarding antibiotics use also shouldn't be forgotten in reducing inappropriate antibiotics prescription.

The finding of the present study revealed that 61.50% of antibiotics were inappropriate prescription in study as compared to previous study lower than study conducted in Thailand 80.9% [23], Japan 73.3% [24] and study conducted in Gondar, Ethiopia 70.8% (6). This may be due to recentness of the study and socio-demographics difference of Hospital setting practice and treatment [25].



In Zambia only 21.87% confirmed appropriate, criterion meaning they had the right choice of drug and dose, duration, frequency and route of administration were all documented [26], whereas the current study reported that 38.5% were appropriate. This might be due to different in treatment guidelines and treatment protocol.

The fact that 9.0% of inpatient department clients were diagnosed with hospital acquired infections which are very concerning. In a hospital where there is a high prevalence of the use of broad spectrum antibiotics like cephalosporins, dealing with hospital acquired infection is expected to be very troubling since the bacteria may be resistant to many antibiotics. In such conditions the clinician can be forced to use broader and newer antibiotics to deal with the disease. This could create a vicious cycle where the use of newer and broad spectrum antibiotics leading to the emergence of new strains of resistant bacteria.

## Conclusion

Of total admitted patients for 87.50% antibiotics were prescribed as treatment, of which only 38.50% prescription of antibiotics were prescribed based on treatment guidelines. The most frequently prescribed antibiotics were third generation cephalosporin alone which accounts 48.92% of all antibiotics prescribed for clients and cephalosporin (ceftriaxone, cefotaxime and ceftazidime) in combination with metronidazole were 16.88% and cephalosporin in combination with Vancomycin were prescribed for 9.96% for inpatients clients. In the present study for nine out of ten patients antibiotics were prescribed which indicated that an abusive use of antibiotics at inpatient setting of SPHMMC. This determined that more than half of prescriptions were inappropriate prescription which accounts 61.67% of all prescription.

## Recommendation

Therefore, Health care practitioners' would be better to adhered to drug prescription guideline regarding antibiotics and others drugs in developing countries Hospital settings for inpatient treatments.

Frequently used of broad spectrum antibiotics would be increased an emergence of antibiotics resistant organisms are arming condition in developing countries like Ethiopia and which need great attention for reconsideration in antibiotic prescription practice by clinician or practitioners. Policy maker in developing countries like Ethiopia would be better develop strategies and strengthening an antibiotic prescription monitoring in order to combat the inappropriate use of antibiotics. Ministry of health would better to strengthening and increased availability well equipped microbiology laboratory facilities in order to minimized trial or error prescriptions of antibiotics.

Hospitals managements and clinical coordinators of developing countries would be better to strengthening monitoring of antibiotic prescription on adherence to treatment protocols by health practitioners on regularly to tackle these alarming inappropriate prescription of antibiotics.

## Competing Interests

The author(s) declare that they have no competing interests.

## Authors' Contributions

Dereje Ketema, Atnafu Mekonnen and Dereje Bayissa Demissie conceptualized the study, designed the study instrument and conducted the data analysis and wrote the first draft and final draft of the manuscript.

DK, AM and DBD: Approved the research proposal with some revisions, participated in data analysis, revised subsequent drafts of the paper and involve in critical review of the manuscript. All authors read and approved the final manuscript.

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