

Evaluation of antibiotic use among inpatients in surgical ward at Mbarara Regional Referral Hospital, South-Western Uganda

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Author contributions

Tadele Mekuriya Yadesa: conceptualized the research and reviewed and edited the manuscript; Odecha Michael, Akankunda Bridget, Kabaana Jude Elizabeth, Kapanga Muhamed and Nabigwo Edward: conceptualized and conducted the research, and wrote the manuscript.

Competing interests

The authors declare no conflicts of interest.

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Abbreviations

CME, continuous medical education; DDRFD, drug, dose, route, frequency, duration; MRRH, Mbarara Regional Referral Hospital; MUST, Mbarara University of Science and Technology; SAP, surgical antibiotic prophylaxis; SPSS, statistical package for the social sciences; SSI, surgical site infection; UCG, Uganda Clinical Guidelines; WHO, World Health Organisation.

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Abstract

Objective The main aim of this study was to evaluate antibiotic use among inpatients in surgical ward at South-Mbarara Regional Referral Hospital, South-Western Uganda. **Methodology:** A retrospective cross-sectional study was carried out on patients' follow-up forms of Mbarara Regional Referral Hospital, surgical ward from 15th November to 15th December. Data abstraction tool was employed to extract data, entered in excel version 2010 then imported into SPSS software version 2010 where different variables were analyzed. **Results:** A total of 136 patient forms were studied. At least one antibiotic was prescribed in 76 (56 %). Majority (81.58%) of the antibiotics were prescribed for therapeutic purpose while some lacked documented and approved indications. Specific indications were not documented in 15 (19.73%) of the forms. Sepsis without culture and sensitivity was the most frequent indication 14 (18.42%) for antibiotics followed by prophylactic use 12 (15.79%). Ceftriaxone was the most commonly (82.9%) prescribed antibiotic; followed by metronidazole for 31 (40.8%) and Ampicillin/Cloxacillin for 8 (10.5%) of the patients. Out of the 76 patients who used antibiotics, the overall use was found to be appropriate in only 20 (26.3%). Most prescriptions had right doses 57 (75.0%) followed by right frequencies 53 (69.7%); whereas the duration was the least appropriate with only 46 (60.5%) of the 76 patients. **Conclusion:** More than half of the patients had at least one antibiotic prescribed to them. Ceftriaxone and metronidazole were the most prescribed, the majority of antibiotics were used for treatment and some of the patients were on antibiotics without specific indications. Sepsis was the most common indication for the antibiotics used. Most antibiotics were inappropriately used. Duration of treatment was the most inappropriate parameter and antibiotic use varied greatly with guidelines.

Keywords: antibiotic; use; surgery; inpatient

Introduction

Globally, surgical infections are a significant burden of disease and its management focuses on source control and appropriate antibiotic therapy. However, in low and middle income settings, where access to surgical care and antibiotics are limited, it is a challenge [1]. A study conducted in Ghana found a high (96.3%) prevalence of antibiotic use among surgical patients and is inconsistent with the country's treatment guidelines [2].

The indication of antibiotic on surgical ward includes surgical antibiotic prophylaxis and surgical site infection [3]. Ceftriaxone (37.01%) is the most commonly used antibiotic followed by metronidazole (19.23%) [4].

Most inappropriate antibiotics prescription is driven by diagnostic uncertainty due to the absence of a laboratory facility, perceived demand or expectations from patients, misguided impression that the poorer section of society needs antibiotics due to unhygienic living conditions, over-supplied and near-expiry antibiotics [5].

A study conducted in Kenya, showed a high rate of inappropriate prescriptions 45.4% among prophylactic antibiotics followed by treatment antibiotics 33.4% among inpatients and the same was observed with discharge antibiotics (52.6%) [6].

A study conducted in Uganda showed that most inpatients receive fewer doses than the prescribed and there are high rates of antibiotic use both before admission and during hospitalization where under administration of prescribed antibiotics is common, especially on the day of prescription [7].

Since there was no similar published study in the area, this study evaluated antibiotic use among inpatients in surgical ward at Mbarara regional referral hospital, South-Western Uganda.

Methods

Study area

The study was conducted at Mbarara regional hospital (MRRH) which serves as the teaching hospital for the Mbarara University of Science and Technology and Bishop Stuart University Nursing students. The hospital is in Mbarara District, Ankole Sub-region and is located within the central business district of the city. This location is approximately 265 kilometers southwest of Kampala by road, the capital and largest city of Uganda. The study focused on patients admitted to surgical ward from 15th November to 15th December 2019 and data was collected in October 2020.

Research design

The study was a retrospective cross sectional study employing quantitative methods for evolution antibiotic use among inpatients in Surgical Ward at MRRH.

Study population

All patients admitted to surgical ward of Mbarara regional hospital, South-Western Uganda from 15th November to 15th December 2019.

All patients follow-up forms admitted to surgery wards between from 15th November to 15th December 2019 with complete information-age, weight clear medication and dosage and ward stay of more than two days were included in the study, while those with illegible records were rejected.

Sample size

Using EP-info version 7.2.3.1, at finite population of 290 per month expected antibiotic prescription prevalence is 79% [7] margin of error at 5% at 95% confidence interval. The sample size was 136 patients.

Data collection method

All of postgraduate clinical pharmacy students' patient follow-up forms obtained from 15th November to 15th December 2019 that were submitted to the pharmacy department were used. Thus, the sampling technique was convenience method. The data was filtered

and entered into a data abstraction tool, where gender, indication, and DDRFD were recorded.

Data management and analysis

The data was entered into excel 2010 version and then exported to SPSS software version 2010 which was used to analyse the study variables. The different antibiotics prescribed and their indication. Route frequency and duration of administration were described statistically. The appropriateness of the antibiotics used were compared with UCG 2016 and British National Formulary.

The tool was pretested, double data entry was done (two members abstracted the same data then compared) to minimize error. The supervisor closely supervised to ensure completeness and accuracy and standard software was used for data analysis.

Ethical considerations

The data was collected after approval was granted from the ethics committee of the Department of Pharmacy of Mbarara University of Science and Technology; with a reference number of Phar G10/2020. Informed consent for these secondary data was waived by the same.

Results

Patient characteristics

The study was conducted on patient follow-up forms from 15th November to 15th December 2019. A total of 136 patient forms were studied. The majority (58%) were females and the rest (42%) were men.

Prevalence of antibiotic use

Out of the 136 patients, most 76 (56%) were prescribed at least one antibiotic.

General indication of antibiotics

Most 62 (81.58%) of the antibiotics were prescribed for therapeutic purpose while some had no documented indication 2 (2.63%) (Table 1).

Specific indication of antibiotics

Specific indications were not documented for 15 (19.73%) of the participants who were prescribed antibiotics. Sepsis was the most frequent indication 14 (18.42%) of the antibiotics followed by prophylactic use 12(15.79%) (Figure 1).

Antibiotics used

Ceftriaxone was the most frequently 63 (82.9%) prescribed antibiotic followed by metronidazole 31 (40.8%) and Ampicillin/Cloxacillin 8 (10.5%) (Table 2).

Appropriateness of antibiotic use

Out of the 76 patients who used antibiotics, the overall use was found to be appropriate for only (20, 26.3%). Most prescriptions had right doses 57 (75.0%) followed by right frequencies 53 (69.7%) while the duration was the least appropriate with only 46 (60.5%) of the 76 patients (Figure 2).

Table 1 General indication of antibiotic use in surgical ward MRRH Uganda from 15th November to 15th December 2019

Indication	Frequency	Percentage (%)
Therapeutic	62	81.58
Prophylaxis	12	15.79
No indication	2	2.63
Total	76	100

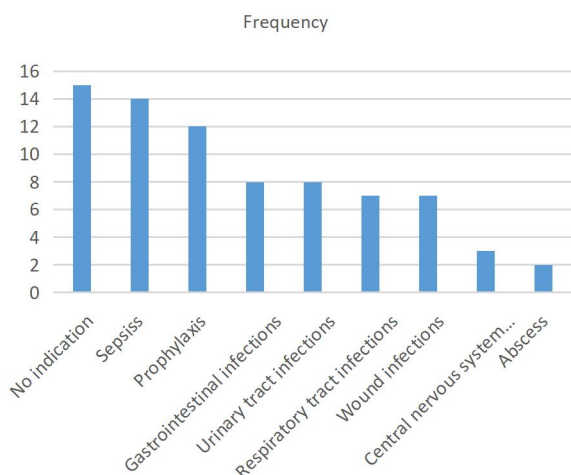


Figure 1 Specific indication of antibiotic use in surgical ward of MRRH Uganda from 15th November to 15th December 2019

Table 2 Antibiotics used in surgical ward MRRH Uganda rom 15th November to 15th December 2019

Antibiotic name	Frequency	Percentage (%) n = 76
Ceftriaxone	63	82.9
Metronidazole	31	40.8
Ampicillin-Cloxacillin	8	10.5
Levofloxacin	7	9.2
Flucocaxillin-Amoxycillin	6	7.9
Benzyl Penicillin	4	5.3
Gentamycin	3	3.9
Meropenam	2	2.6
Amoxycillin	2	2.6
Azithromycin	2	2.6
Piperacillin-tazobactam	2	2.6
Ciprofloxacin	2	2.6
Nitrofrantoin	2	2.6
Ampicillin	1	1.3
Linezolid	1	1.3
Clindamycin	1	1.3

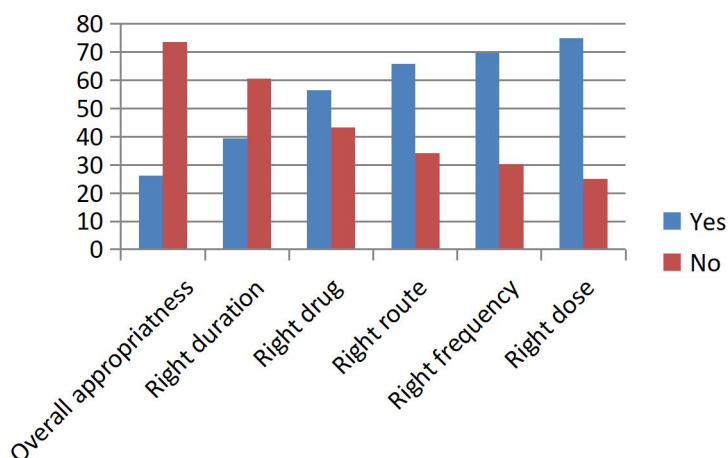


Figure 2 The appropriateness of antibiotic use in surgical ward of MRRH-Uganda from 15th November to 15th December 2019 from 15th November to 15th December 2019

Discussion

More than half of the antibiotics were prescribed for females. The prevalence of antibiotic use in this study is comparable to a study conducted in Ghana where the prevalence of antibiotic use was 51.4% [8] and in Kenya where the prevalence of antibiotic prescribing was 54.7% [9]. However, the current prevalence is much lower compared to a study conducted in Regional Referral and Teaching Hospitals in Uganda that showed 94.5% of all inpatients in surgical ward received antibiotic agents during hospitalization [10]. This might be attributed to the shorter follow up period in the current study compared to the former which followed throughout hospitalization period.

According to the study we conducted, most of the antibiotics were used therapeutically, followed by prophylaxis. Some antibiotic prescriptions had no documented indication which is not comparable to a study carried out among selected hospitals in Ghana where 58.6% of the antibiotics were for treatment and 37.7% were for prophylaxis [2]. This was probably contributed by diagnostic uncertainty due to the absence of a laboratory facility, perceived demand or expectations from patients, misguided impression that the poorer section of society needs antibiotics due to unhygienic living conditions [5] in developing countries like Uganda.

In this study, the significant number of antibiotics used therapeutically lacked documented specific indication which is much lower compared to 50.7% of the patients who received antibiotics with un documented indication in developing countries [11]. This difference is likely because the general unnecessary use of antibiotics at primary health care settings that were considered in the previous study is much higher compared to unnecessary use by inpatients. A previous study conducted in Uganda also showed that decisions by healthcare practitioners to prescribe systemic antibiotics to inpatients are often based on unconfirmed diagnoses [7].

Sepsis was the most documented specific antibiotics indication which is lower compared to the study conducted in rural eastern Uganda where post-operative sepsis was 69 (86.2%) [12]. The difference might be attributed to different study setting for urban verses rural setting most rural including difference in surgical techniques.

The patients who were prescribed antibiotics for surgical prophylaxis were fewer as compared to 25% reported by [13]. This difference was probably due to the shorter study period and smaller sample size compared to the study.

The most prescribed antibiotic was ceftriaxone followed by metronidazol, then Ampicillin/Cloxacillin. This is comparable with [14] and [15] that reported ceftriaxone followed by metronidazole was the most frequently used antibiotics in surgical wards (19.23%). Ceftriaxone was also the most prescribed antibiotic in surgery ward of MRRH [16].

The study showed a low overall appropriateness of antibiotic use among surgical ward patients, especially with duration though most prescriptions had the right doses. These findings are similar to the study conducted in a surgical setting in Malaysia that showed only 34 (26.4%) patients had received appropriate antibiotic therapy while 95 (73.6%) patients received at least one course of inappropriate antibiotic therapy [17]. Another study in the Kenya showed that inappropriate antibiotic use was mostly caused by inappropriate duration (45.9%) [6]. Inappropriate antibiotic duration (60.5%) was the most common reason for irrational antibiotic use during hospitalization and this is believed to be due to minimal or absent review of indication of antibiotics and poor documentation on the duration of the antibiotics on the treatment sheet which leads to the continuation of the antibiotics till discharge.

Inappropriate antibiotic use contributes to antibiotic resistance which has both economic and clinical consequences and inappropriate antibiotic can lead to ineffectiveness. Additionally, other complications, such as prolonged duration of admission, high doses or increased frequency is associated with increased drug toxicities and adverse drug reactions which may affect patient's compliance hence the poor quality of life.

The study was conducted during COVID-19 pandemic. Inconveniences such as incomplete demographic data in the patient follow up forms, limited time offered by the university to complete the program and resources directly affected the study data collection and outcomes.

Conclusion

The study found that more than half of the patients had an antibiotic prescribed to them. Similar to other studies found out that ceftriaxone and metronidazole were the most prescribed. Majority of antibiotics were used for therapeutic purposes, which most of the patients were on antibiotics without specific indications, followed by sepsis. Most antibiotics were inappropriately used with a duration of treatment as the most inappropriate. The antibiotic use varied greatly with guidelines.

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