

Full Length Research Paper

Audit of use of antimicrobial agents at a tertiary health centre in Lagos, Nigeria

Sunday O. Ogundele^{1*}, Olayinka O. Ogunleye¹, Bamidele Mutiu² and Samuel O. Akodu³

¹Department of Pharmacology, Lagos State University College of Medicine Ikeja, Lagos, Nigeria.

²Department of Microbiology, Lagos State University College of Medicine Ikeja, Lagos, Nigeria.

³Department of Paediatrics, Lagos State University Teaching Hospital Ikeja, Lagos, Nigeria.

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Antimicrobial agents are reported to be the commonest prescribed medication among physicians. Studies have shown that up to 50% of antimicrobial agents prescriptions are inappropriate. The study was a retrospective cross-sectional design. Records of all patients admitted to both the medical and paediatrics wards during the period of audit were reviewed after discharge from the hospital. The appropriateness of the prescribed antimicrobial agents given to them was determined by a microbiologist who was independent of the team that managed the patients. More than 50% of antimicrobial agents prescribed for our inpatients were inappropriate. The most common test done to investigate infections in these patients was complete blood count and the most common class of antimicrobial agents prescribed was cephalosporin. Based on the outcomes of this study we recommend constituting a drug and therapeutics committee to develop an antimicrobial stewardship policy and the guideline for implementing the policy for a more rational use of these agents.

Key words: Antimicrobial agents, physicians, prescriptions.

INTRODUCTION

Antimicrobial agents (AA) are reported to be the commonest prescribed medication among physicians (Odusanya and Oyediran, 2000; Arroll and Goodyear-Smith, 2000). Studies on drug use indicators showed that inappropriate use of AA is common, with the rate of inappropriate prescription of these agents exceeding 50% in many centres (Pulcini et al., 2007; Akinyede et al., 2000; Ohaju-Obodo et al., 2008; Hawkey, 2008). Consequences of inappropriate use of AA include increased morbidity, mortality, and cost of health care (Arroll and Goodyear-Smith, 2000; Lee et al., 2007; Norberto et al., 2007; Hsueh et al., 2005; Shira and Lisa

2011). Problems associated with inappropriate use of AA are caused by emergence of drug resistant microorganisms, increased rate of *Clostridium difficile* infection, AA toxicity, drug-drug interactions, catheter related infections and other hospital acquired infections (Pulcini et al., 2007; Albrich et al., 2004).

Therefore, this study sought to audit the prescription pattern of antimicrobial agents for patients admitted to our hospital wards. The study broad objective was to determine the rate of inappropriate use of AA at our centre and to use findings from this study as a basis for recommending appropriate steps to reduce this practise.

*Corresponding author. E-mail: soogundele@hotmail.com. Tel: +234 803 721 3422.

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The specific objectives were to determine the appropriateness of the use of the AA in our hospital settings, pattern of use of these agents and assessment of laboratory investigations for assessing possible infection in patients before prescribing AA. The study design was a retrospective cross-sectional review of case records of patients treated with AA during their hospital stay.

MATERIALS AND METHODS

Site

This study took place at Lagos State University Teaching Hospital, Ikeja, Lagos State, Nigeria in Departments of Medicine and Paediatrics. The review was conducted in April 2014.

Study design

The design was a retrospective cross-sectional review of case records of all patients given antimicrobial medicine during the period. All the available case records of adults and children admitted to the medical and paediatric wards during the study period were included for review.

Study procedure

From the available case notes, relevant information for the study were extracted and transferred onto a structured questionnaire which served as a guide for the information required. The audit took place over a four week period. Information extracted from the patients record include the following: gender, indications for antibiotic use, co-morbid conditions, investigations requested and completed, name(s) of antimicrobial agent(s) and other medications used during inpatient care, dosages of the antimicrobial agent, duration of use and outcome of patient care. The appropriateness of the prescribed antimicrobial agents was determined by a microbiologist who was independent of the team that managed the patients. Extractions of data from the patients' case record were done by the investigators and not the physicians in the team that managed the patients at admission.

Microbiologist review

The assessment of appropriateness was done using the algorithm developed by Gyssens et al. (1992). Important factors considered in the determination of appropriateness of these studies include the use of the agent indicated, spectrum of activity of the agent, dosage interval, route of administration, duration of therapy, effectiveness, toxicity, and cost. The diagnosis and the results of the laboratory work up were also considered in the assessment of the antimicrobial agents.

Ethics

Patients' information were treated with confidentiality and no form of personal identifiers was disclosed.

RESULTS

A total of 82 case notes of patients who received AA

during their admission into both the medical and paediatrics wards of our centre during the study period were assessed.

The profile of these patients showed that 44 (54%) of them were males, with 45 (55%) of them admitted to the medical wards (Table 1).

The most common class of antimicrobial agents prescribed during the study period was cephalosporin, 59 (72%) of the patients had a drug in this class; this was followed by co-amoxiclav, which was given to 14 (17%) of the patients (Figure 1).

The assessment of the antimicrobial agents prescription performed by a microbiologist independent of the team that managed the patients revealed that less than half, 46% of the antimicrobial agents prescribed during the study period was appropriate; there was no sufficient data available to assess the AA prescription for 13% of the patients (Table 2).

DISCUSSION

This study showed that inappropriate prescriptions of antimicrobial agents are still common among physicians in our centre. The finding that less than 50% of antimicrobial agents prescribed during the study period were appropriate in keeping what had been reported from previous studies (Odusanya and Oyediran 2000; Akinyede et al., 2000; Lee et al., 2007). The most common form of inappropriate use of antimicrobial agents in this study was the prescription of AA when there was no justification for their use. The lack of justification can either be that there was no need to use these agents for prophylaxis, no evidence of infection is present to indicate their use or the suspected infection is of viral origin. The finding from an Australia study showed that an average of 82% of prescriptions at eight different hospitals that participated in their review to assess the prevalence and appropriateness of antimicrobial use among children were appropriate showed that it is possible to achieve a higher rate of rational use of antimicrobial agents (Osowicki et al., 2014). The high rate of appropriate use of AA reported in the study was because those hospitals have antimicrobial stewardship policy in place (Osowicki et al., 2014). It has been reported that the problem of inappropriate use of AA is due to poor prescribers' knowledge of rational use antimicrobial as well as lack of standard treatment guidelines for their use (Shira and Lisa, 2011; Leung et al., 2011; Nadjm et al., 2010). Lack of sufficient supervision and training of prescribers, lack of access to rapid diagnostic tests to guide treatment decisions, considerations of financial gains from both prescribers and dispensers, and inappropriate marketing strategies of pharmaceuticals can also lead to improper prescribing (Leung et al., 2011; Nadjm et al., 2010).

Laboratory support is important in the overall management of infectious diseases. Laboratory tests

Table 1. Demographic profile of patients managed with antimicrobial agents on medical and paediatric ward of LASUTH Ikeja.

Variable	Count (%)
Gender	
Male	44 (54)
Female	38 (46)
Number of antimicrobial agents	
One	38 (46)
At least two	44 (54)
Cases per department	
Medicine	45 (55)
Paediatrics	37 (45)
Indication for use of antimicrobial agent	
Empirical	70 (85)
Prophylaxis	12 (15)
Investigation	
Complete blood count	60 (73)
Chest X-ray	20 (24)
Culture and sensitivity	23 (28)
Microscopy	21 (26)

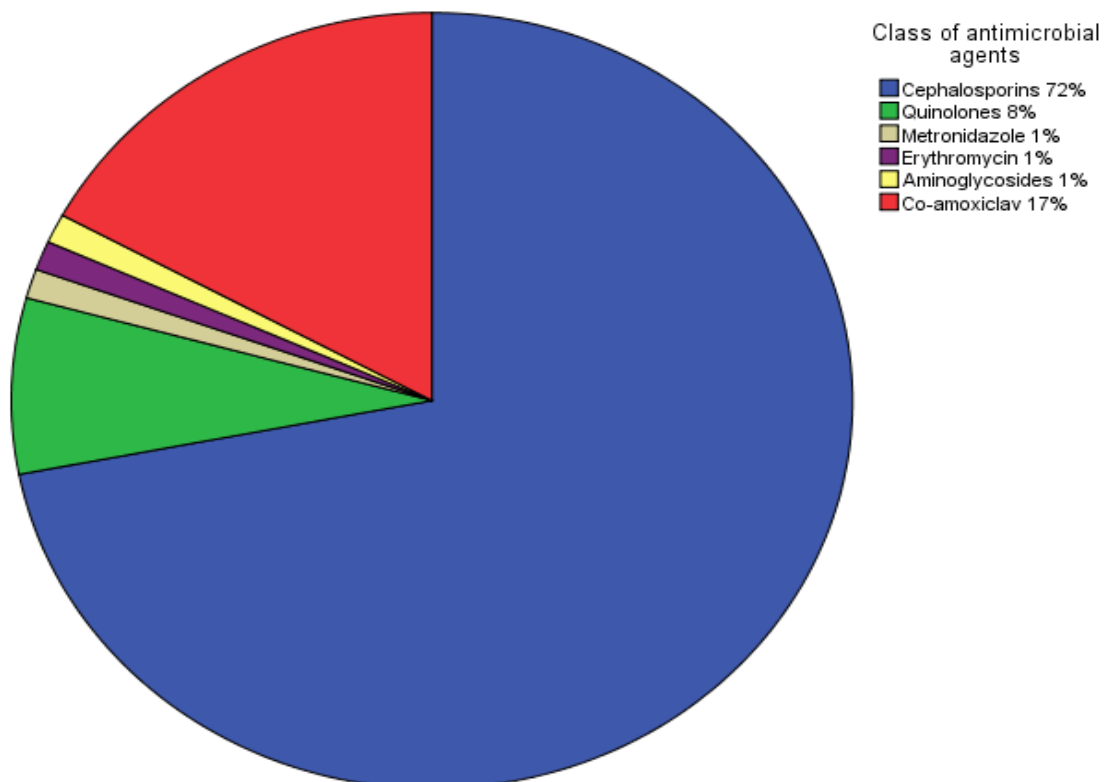
**Figure 1.** Class of antimicrobial agents.

Table 2. Classification of appropriateness of antimicrobial agents used on the medical and paediatric ward of LASUTH Ikeja.

Classification	Description	Count (%)
I	Appropriate	38 (46)
II	Inappropriate dosage interval	1 (1)
IIIa	Inappropriate due to excessive duration	7 (9)
IIIb	Inappropriate due to short duration	3 (4)
Iva	Inappropriate due to available a more effective alternative	7 (9)
IVb	Inappropriate due to available less toxic alternative	1 (1)
V	Use of antimicrobial agent not justified	14 (17)
VI	Insufficient data for classification	11 (13)
Total	-	82 (100)

help in detecting the presence of infections or in identifying organism causing them, and in assessing sensitivity of organisms to different AA The TDR Diagnostics Evaluation Expert Panel (2010). Pattern of investigations ordered and done in cases reviewed in this study revealed that the most common test done prior to starting antimicrobial agents was complete blood count (CBC). This test is useful in establishing the presence of infection but not for identifying the organism causing it. This test therefore does not help in deciding the choice of the antimicrobial agent to be prescribed. This may explain why most of the AA prescribed in this study were speculative and not directed at the organisms causing the infections.

The finding in this study that prescription of AA is rarely supported by culture and sensitivity results is in line with similar finding by Nadjm et al (2010) as reported in WHO guidelines for antimicrobial treatment in children admitted to hospitals in areas of intense *Plasmodium falciparum* transmission Nadjm et al. (2010). Inappropriate use of medicines affects the safety and quality of therapeutic care and lead to waste of resources.

The most commonly prescribed class of antimicrobial agents of choice in this study are the cephalosporins. Availability of equally effective and cheaper alternative agents make the use of cephalosporins inappropriate in some of the cases reviewed (Nadjm et al., 2010; The TDR Diagnostics Evaluation Expert Panel 2010; NICE, 2014).

The finding of high rate of inappropriate prescription of AA in this study makes the need to have an antimicrobial stewardship programme necessary. Antimicrobial stewardship is defined as 'the optimal selection, dosage, and duration of antimicrobial treatment that results in the best clinical outcome for the treatment or prevention of infection, with minimal toxicity to the patient and minimal impact on subsequent resistance' (Shira and Lisa, 2011). The aim of the stewardship team is to help each patient receive the most appropriate antimicrobial at the correct dose and duration; prevent antimicrobial agents overuse, misuse, and abuse; and to minimize the development of resistance by the currently available antimicrobial agents

Shira and Lisa (2011).

The National Institute for Health and Care Excellence (NICE) guideline for AA use recommends that antimicrobial agents should not be started without clinical evidence of bacterial infection, where evidence exists or suspected local guidelines should be used to commence prompt and effective antimicrobial treatment NICE (2014). Documentation of treatment should include the following clinical indication, duration of treatment or review date, route and dose of antimicrobial agents NICE (2014). Duration review of treatment decision is taken on when to stop, switching from intravenous to oral route, and changing the agent if indicated. The review should occur within 48 h of commencement of the AA NICE (2014).

To promote a more rational use of antimicrobial agents in our hospitals, it was recommended that an antimicrobial stewardship team be established. The main focus of the team should be to develop an antimicrobials policy or guidelines for the hospital. The team may be in the form of a drug and therapeutics committee that will provide a forum for all relevant professionals to work together to achieve a set goal Kathleen and Terry (2014). In many developed countries, a well-functioning Drug and Therapeutics Committees (DTC) has been shown to be effective in addressing drug use problems. DTCs do not exist in many developing countries and where they exist, they do not function optimally due to lack of local expertise or a lack of incentives. The establishment of an infectious disease unit for liaison services within the hospital was also recommended. The unit may be headed by an infectious disease physician or by a clinical microbiologist.

Conflict of interest

Authors have none to declare.

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