Original Research Article

POINT PREVALENCE SURVEY OF ANTIMICROBIAL PRESCRIPTION AND INDICATORS IN A TERTIARY HEALTHCARE CENTER IN SOUTHERN NIGERIA

ABSTRACT

Background: Antimicrobial stewardshipprogrammes are interventions which have been developed to address irrational and inappropriate use particularly in health care centers.Antimicrobial stewardship programmes involve a set of activities which promote appropriate use of antimicrobials in terms of selection, dosing, route and duration of antimicrobial therapy.

Methods: A Point-prevalence survey (PPS) was organized in line with Global point prevalence patient-based protocol for PPS and antimicrobial use was carried out in the paediatrics department of a tertiary healthcare institution in southern Nigeria. A total of 66 inpatients on admission for at least 24hours and still on admission at 8am on the day of the survey were included in the study.

Results: The results show that 34 (51.50%) patients were on at least one antimicrobial drug and this included 19 (55.80%) males and 15 (44.20%) females. The highest proportion (n=15; 44%) of these patients were admitted in the children emergency ward while the least number (n=5; 14.7%) were found in children medical ward 1. The average age of patients on antimicrobials was 53 months. Thirty-four (51.50%) patients were on at least one antimicrobial drug and this included 19 (55.8%) males and 15 (44.2%) females. The three most prescribed antimicrobials were, ceftriaxone (23.88%), aminoglycoside gentamicin (20.90%),cefuroxime (16.42%) and Ceftazidime was the least common antibiotic prescribed (1.49%). Only 10.45 % were targeted therapy (based on microbiological results) while there was missing information for 10.45% of prescriptions.

Conclusion: The findings of the study shows that it is important to initiate antimicrobial stewardship programmes within our hospital to optimize antimicrobial use to improve patient care in the hospital.

Keywords: *Point prevalence survey, antimicrobial consumption, Antimicrobial prescription, Tertiary healthcare, Nigeria*

1.0 Introduction

Antimicrobial drug resistance is a global problem which continues to threaten effective and safe treatment of infectious disease. The burden of antimicrobial resistance is majorly borne by low-income countries suchwhere there are increasing rates prevalence of multidrug resistant bacterial pathogens in both healthcare setting and in the community.[1][2]A major driver of antimicrobial drug resistance is irrational antimicrobial use which canoccur in both the community and in the health care settings.In Nigeria there are reports of irrational antimicrobial usage.[2–8] This is worrisome because particularly in healthcare settings because it can select multidrug resistant bugs which can pose a great risk to hospitalized patients especially the critically ill patients.

Antimicrobial stewardships programmes are interventions which have been developed to address irrational and inappropriate use particularly in health care centers. [9,

10]Antimicrobial stewardship programmes involve aset of activities which promote appropriate use of antimicrobials in terms of selection, dosing, route and duration of antimicrobial therapy. This programme has been adopted by many facilities worldwide and is slowly being adopted by hospitals in African countriesincluding Nigeria[11]. To successfully start and implement antimicrobial stewardship programmes, surveillanceof the current antimicrobial prescribing patterns within the hospitalis idealas thisprovidea baseline upon which the gains of the programme may be assessed.[10, 12] However this is avery challenging approach because it is time and resource consuming. An alternative approach is the use of point prevalence survey whichis a standardized toolusedto assess antibiotic consumption andto identifyproblems with prescribing.Currently a global point prevalence survey which is a web-based network for point prevalence studies across has been developed[13].It has been validated and provides asimplifiedtool foruse byhospitals from many countries worldwide to carry out surveillance of antimicrobial use, identify targets for quality improvement of antimicrobial prescribing.[14]In addition hospitals in countries with low resource and support can use this as a standardized tool for comparing antimicrobial consumption patterns across them and such data can be used for capacity building and even planning interventionson a national or regional scale [14] The current study is a point prevalence survey of the antimicrobial prescribing patterns carried out in the Paediatrics department ofthe University of Port Harcourt Teaching Hospital, Rivers state, Nigeria.

2.0 Methodology

2.1 Study design and setting

A cross sectional point prevalence survey was carried out on the 10th of March 2020 at the Paediatrics department of the University of Port Harcourt Teaching hospital, Rivers state, Nigeria. The Department has four wards which admits inpatients. These are the children emergency ward(CHEW); the special care baby unit (SCBU), Children Medical Ward 1 (CHMW1) and Children Medical Ward 2(CHMW2).

2.2 Selection Criteria

All inpatientson admission for at least 24hours and still on admission at 8am on the day of the survey were included in the study and their total numberformedthe denominator of the study. Whereas all in patients on at least oneantimicrobial agent at 8am on the day of survey were included as numerator. Additionally, patients receiving antibiotics periodically e.g. every 48hours but not receiving this antibiotic on the survey day were considered as a patients “on ongoing antimicrobial treatment”and included in the study and formed part of the numerator.All patients admitted after 8am on the day of survey were excluded from the study.

2.3 Data collection

The Point-prevalence survey (PPS)was organized in line with Global point prevalencepatient-based protocol for PPS of HAI and antimicrobial use in hospitals [13]The protocol of the Global-PPSis available on the Global-PPS website (www.global-pps.com).

2.4 Data analysis

The data collected was inputted into an MS Excel spreadsheet. All data was summarized using the frequencies and percentages as appropriate.

2.5 Ethical Consideration

Ethical approval to carry out the study was obtained from the Research and Ethics Committee of the University of Port Harcourt Teaching hospital. A written informed consent was obtained from the parents/legal guardians of the patients whose information were collected in the course of the study.

3.0 Results

Demographic distribution of selected patients

A total of 66 patients were included in the study, 34(51.5%) patientswere at on at least on one antimicrobial drugand this included 19 (55.8%) males and 15 (44.2%) females. The highest proportion (n=15; 44%) of these patients were admitted the children emergency ward while the least number (n=5; 14.7%)were found inchildren medical ward 1. The average age of patients on antimicrobials was 53months.

Antimicrobial utilization

Sixty-sevendifferent antimicrobial prescriptions were noted. Indications forantimicrobial prescriptions were documented 97% of the time (Figure 1). Antimicrobials were mostly prescribed forcommunity acquired infections (90%)while health care associated infectionsaccountedfor2% of antimicrobial prescriptions. The most common indications for antimicrobial prescriptions were Sepsis, malaria and CNS infections and these accounted for16.67%, 12.12% and 9.09% of prescriptions respectively. On the other hand, the least common indications wereProph BJ (1.5%), Pyrexia of unknown origin (1.5%), Tuberculosis (1.5%), prophREsP (1.5%) as shown in Figure 2s.

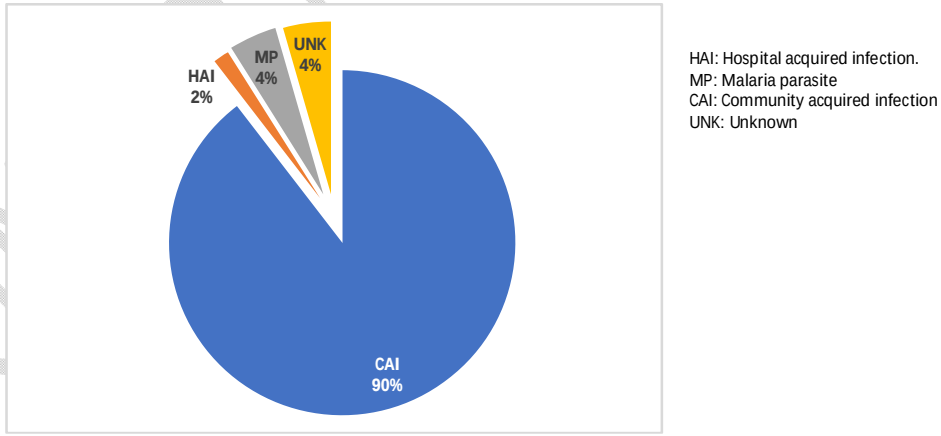


Figure 1: Indications for antimicrobial prescriptions

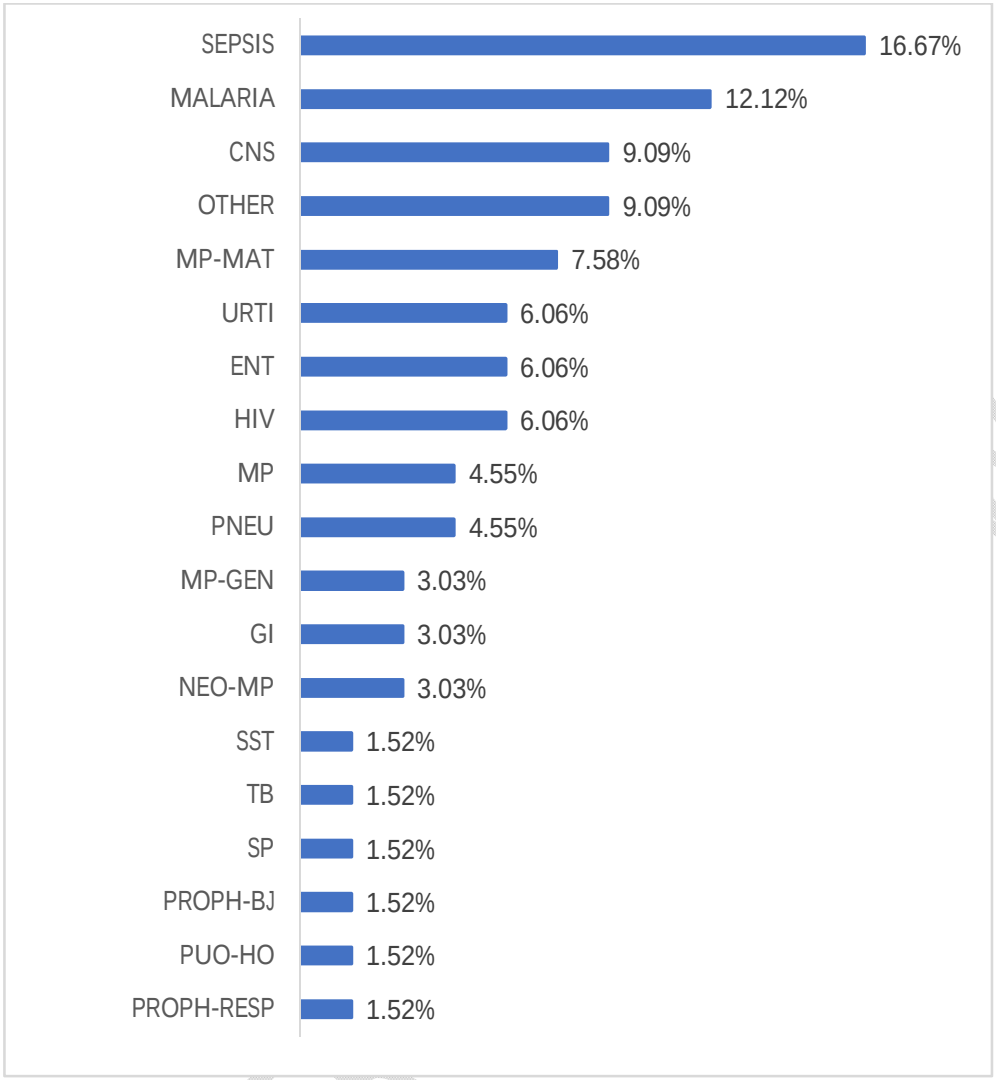


Figure 2: common indications for antimicrobial prescriptions

The most prescribed antimicrobials were, ceftriaxone (23.88%), aminoglycosidegentamicin (20.90%)andcefuroxime (16.42%)Ceftazidimewas the least common antibiotic prescribed (1.49%).The antimalarials, Artesunate, accounted for 10% ofprescriptionswhile the Antiretrovirals fixed dose combination TDF/3TC/DTGmade up 1.49% of prescriptionsand the antitubercular drug Isoniazidwasseen in 1.49% of prescriptions (Figure 3).

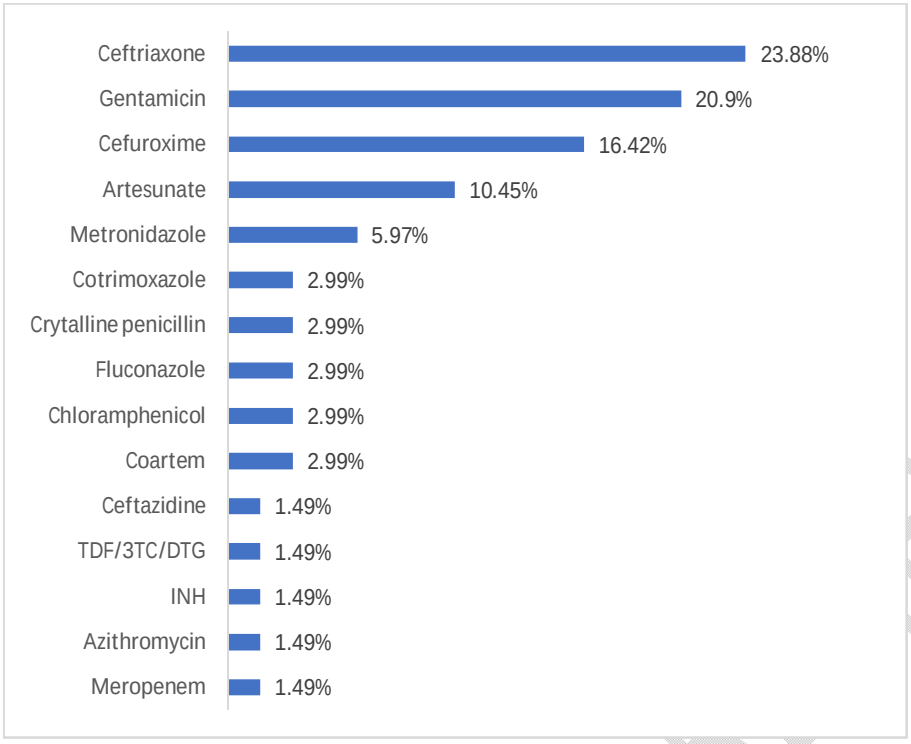
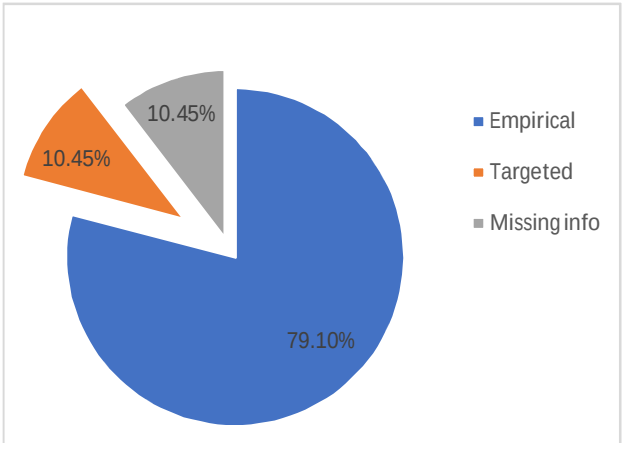


Figure 3: Distribution of Antimicrobials prescribed

Ceftriaxone was mostly prescribed for sepsis(42.86%), medical prophylaxis and it wasprescribedas a single unit dose of 1g in 37% of all ceftriaxone prescriptions.cefuroxime was prescribed mainly for sepsis (36.36%), surgical prophylaxis (9.0%)and upper respiratory tract infection (9.0%). Gentamicin was mostly prescribed for sepsis, medical prophylaxis.

Quality indicators

Figure 4 shows that majority (79%) of antimicrobial prescribing were done empirically; while only 10.45 % were targeted (based on microbiological results) while there was missing information for 10.45% of prescriptions. Information about whether the empirical treatment was based on report of biomarkers of infection from other investigations (white blood cell counts, C-reactive protein, ESR) were availablein only 24% of cases (Figure 5).Figure 6 shows that stop dates for antimicrobials were indicated in only 18% of cases with the reason for the stop date specified 97% of the time. Information on the use of guidelines were not available.



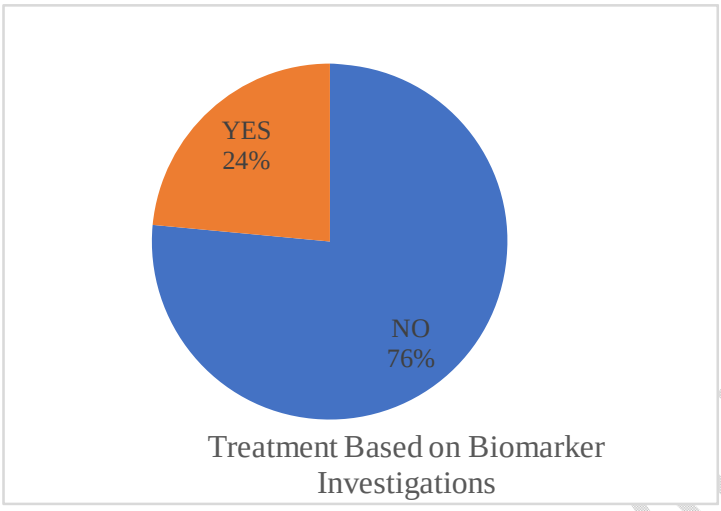


Figure 5: Treatments based on Biomarker investigations

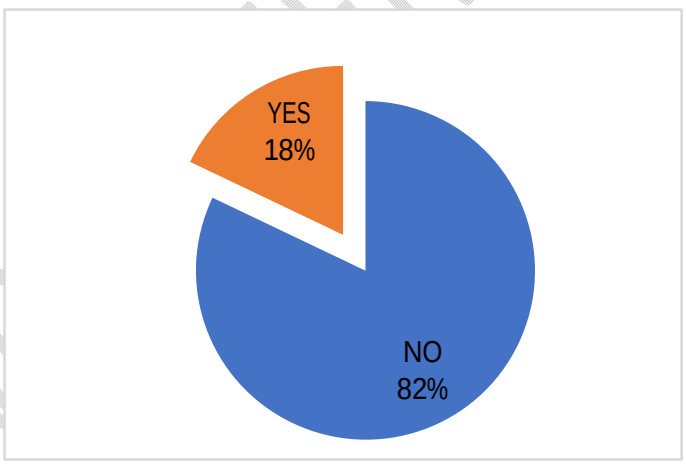


Figure 6: Distribution of prescriptions where stop dates were indicated

4.0 Discussion

Our study is a pilot study, the first of its kind in our facility and to our knowledge the first in southern Nigeria. Findings that will form the basis of further studies in our facility.The study shows that the rate of antimicrobial consumption in the paediatric unit of our hospital is highwithover half (51.50%) of admitted patients taking antimicrobials on the day of survey. This finding islower than the rates of59.60%[15]; 68.30%[16] 78.20%[17]; recorded inother Nigerian studies.The relatively lower percentage seen in our study could be because it is a

pilot study which excluded other wards in the hospital.A larger study involving other wards in the hospital is therefore important to ascertain the antimicrobial consumption rate of the entire hospital because antimicrobial resistance has been linked to antibiotic consumption with higher rates in the formerdriving increases in the later.

However, comparing our findingswith other studies doneamong the paediatric population prevalence of antimicrobialwas 79.5 % in Northern Nigeria[18];49.7% in south Africa.[19]; and90% inin Pakistan[20]. A study done in Europe using arecorded a slightly lower rate of 36.7% but this was carried out using a slightly different methodology[21].These goes to show that antimicrobials are commonlyconsumed by paediaricpatients. It is possible that this is so because they are a vulnerable population that are prone to infection which if left untreated can be very life threatening.

We further observed that the mostantimicrobial prescriptions were done empirically and very few patients received treatments based on microbiological results and infectionbiomarker data. This finding is a common theme from Nigerian studies [15, 17, 18, 22, 23].This probably stems from the underutilization of microbiological services by physiciansin Nigeria.Poor access to quality laboratory and lack of confidence in the qualityreports have been identified as reasons for the this[24]. It is therefore necessary to strengthen microbiological lab services in Nigeria as this plays an important role in antimicrobial stewardship and the fight against AMR.

In our study, antibiotics were the most prescribed antimicrobials.The third-generation cephalosporinceftriaxone,wasthe most prescribed drugfollowed closely by cefuroxime a second-generation cephalosporin. Ceftriaxone is the most prescribed antimicrobials in other Nigerian studies.[15, 17, 18]. The third generation cephalosporins belong to the watch group in the “AWARE” classification of antibiotics and should not be prescribed indiscriminately. In contrast GPPS from other African countries report that antibiotics in the access group ofAWARE were more commonly prescribed [25]. The widespread use of third generation cephalosporins in Nigerian hospitals is worrisome aspressure from this drughas led to the emergence of resistant bacteria, particularly gram-negative bacteriaexpressing extended beta lactamases; an epidemic that has been described in many Nigerian studies.[26]

In terms of the quality indicators for antimicrobial prescribing, it was observed that there was a high frequency of documentation of indications for antibiotic prescription. Such high frequencies were noted in other Nigerian studies. [15, 18]. However the survey noted that stop/review dates for antibiotics were not usually documented. This suggests that antibiotics were given far longer than required which can lead to emergence of drug resistance and increase financial burden to the patient.

5.0 Conclusion

Our study shows that antibiotic prescribing patterns in our hospital is suboptimalespecially with regards to choice of antibiotics and review of prescriptions. It is therefore important to carry out a hospital wide survey to determine whether this pattern is replicated in other watds in the hospital. It is also very important to initiate antimicrobial stewardship programmes within our hospital to optimize antimicrobial use to improve patient care in the hospital.

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