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ORIGINAL ARTICLE

Point Prevalence Survey of Antimicrobial Prescribing in a Nigerian Hospital: Findings and Implications on Antimicrobial Resistance

Enquête sur la Prévalence Ponctuelle de la Prescription d'Antimicrobiens dans un Hôpital Nigérian: Constatations et Implications sur la Résistance aux Antimicrobiens

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ABSTRACT

BACKGROUND: **Antimicrobial resistance is a global health challenge. There is inadequate information on antimicrobial prescribing practices in many sub-Saharan African countries including Nigeria. A standardized method for surveillance of antimicrobial use in hospitals was employed to assess the antimicrobial prescribing practices in UCH, Ibadan, Nigeria.**

METHODS: **A point prevalence survey (PPS) was conducted in December 15, 2017 at the UCH Ibadan. The survey included all in-patients receiving an antimicrobial on the day of PPS. Data collected included details on the antimicrobial agents, reasons and indications for treatment as well as a set of quality indicators. A web-based application was used for data-entry, validation and reporting as designed by the University of Antwerp (www.global-pps.be).**

RESULTS: **This survey included 451 patients from 38 different wards of which 59.6% received at least one antimicrobial. The neonatal medical wards contributed the highest number of patients who received antibiotics. A total of 172 therapeutic antibiotic prescriptions were issued, mainly for Community-Acquired Infections (n=119; 69.2%). Most prescriptions for Healthcare Associated Infections (n=53) were intervention related (47.2%). Frequently used antibiotics include third generation cephalosporins (23.9%; mainly ceftriaxone); followed by combination of penicillin's (17.4%; mainly amoxicillin with enzyme inhibitor) and fluoroquinolones (16.6%). Majority, 312(69.9%)of the patients had parenteral antibiotics and only 95 (21.3%) of all antibiotic prescriptions had a documented stop or review date. Although the reason for antibiotic prescription was indicated for 413 (92.4%) prescriptions, targeted therapy was the basis for only 17 (3.8%)of these prescriptions. For surgical prophylaxis, 98.7% of all prescriptions were given for more than one day. Compliance to guidelines was non-existent.**

CONCLUSION: **Our findings showed high broad spectrum prescribing, high number of intervention related health care infections, high use of prolonged surgical prophylaxis, inexistence of local guidelines; and low utilization of laboratory facilities. Hospital related intervention should include development of antibiotic guideline and increased enlightenment on rational prescribing practices. WAJM 2020; 37(3): 216–220.**

Keywords: **Antimicrobial, Prescribing practices, Point prevalence survey.**

RÉSUMÉ

CONTEXTE: La résistance aux antimicrobiens est un défi sanitaire mondial. Les informations sur les pratiques de prescription des antimicrobiens sont insuffisantes dans de nombreux pays d'Afrique subsaharienne, dont le Nigeria. Une méthode standardisée de surveillance de l'utilisation des antimicrobiens dans les hôpitaux a été utilisée pour évaluer les pratiques de prescription des antimicrobiens à UCH, Ibadan, Nigeria.

MÉTHODES: Une enquête de prévalence ponctuelle (PPS) a été menée le 15 décembre 2017 à l'UCH Ibadan. L'enquête a porté sur tous les patients hospitalisés recevant un antimicrobien le jour de l'enquête de prévalence ponctuelle. Les données recueillies comprenaient des détails sur les agents antimicrobiens, les raisons et les indications du traitement ainsi qu'un ensemble d'indicateurs de qualité. Une application web a été utilisée pour la saisie, la validation et la communication des données, telle que conçue par l'Université d'Anvers (www.global-pps.be).

RÉSULTATS: Cette enquête a porté sur 451 patients de 38 services différents, dont 59,6 % ont reçu au moins un antimicrobien. Les services de médecine néonatale ont fourni le plus grand nombre de patients ayant reçu des antibiotiques. Au total, 172 ordonnances d'antibiotiques thérapeutiques ont été délivrées, principalement pour des infections acquises dans la communauté (n=119 ; 69,2 %). La plupart des prescriptions pour les infections associées aux soins de santé (n=53) étaient liées à une intervention (47,2 %). Les antibiotiques les plus fréquemment utilisés sont les céphalosporines de troisième génération (23,9 %, principalement la ceftriaxone), suivies par les combinaisons de pénicilline (17,4 %, principalement l'amoxicilline avec un inhibiteur enzymatique) et les fluoroquinolones (16,6 %). La majorité, 312(69,9%) des patients ont reçu des antibiotiques par voie parentérale et seulement 95 (21,3%) de toutes les prescriptions d'antibiotiques avaient une date d'arrêt ou de révision documentée. Bien que le motif de la prescription d'antibiotiques ait été indiqué pour 413 (92,4 %) ordonnances, le traitement ciblé n'a été à la base que de 17 (3,8 %) de ces ordonnances. Pour la prophylaxie chirurgicale, 98,7 % de toutes les prescriptions ont été données pour plus d'un jour. La conformité aux directives était inexistante.

CONCLUSION: Nos résultats ont montré un nombre élevé de prescriptions à large spectre, un nombre élevé d'infections liées aux soins de santé, un recours élevé à la prophylaxie chirurgicale prolongée, l'inexistence de lignes directrices locales et une faible utilisation des installations de laboratoire. Les interventions hospitalières devraient inclure l'élaboration de lignes directrices sur les antibiotiques et une meilleure connaissance des pratiques de prescription rationnelles. **WAJM 2020; 37(3): 216–220.**

Mots clés: Antimicrobien, Pratiques de prescription, Enquête sur la prévalence ponctuelle.

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Abbreviations: PPS, Point Prevalence Survey.

INTRODUCTION

Antimicrobial agents play a major role in modern healthcare especially in the hospital setting.[1] The irrational use of these agents has led to the development of antimicrobial resistance (AMR),which is considered a significant global health challenge.[2] This is due to the spread of multidrug resistant (MDR) micro-organisms around the world with resultant illnesses leading to prolonged hospital stay, increased cost of treatment and increased morbidity and mortality.[3] Infections by MDR microorganisms require treatment with more expensive antimicrobial agents and consequent increased duration of treatment or hospitalised care, thus leading to an overall increase in healthcare costs. Antimicrobial misuse is facilitated in developing countries, including Nigeria, by their availability over the counter, without prescription. Additionally, self-medication is a common practice in our environment where patients often get antimicrobials without prescription and in some instances; some patients seek their first-line of treatment from traditional healers who provide them with herbal combinations for the treatment of infections.

The global AMR crisis has been attributed to overprescribing of antimicrobial agents, incorrect prescription with wrong dosage, noncompliance with the course of treatment, low-quality antibiotics, poor infection prevention and control practices in healthcare settings among others.[4] Core contributors to AMR include inappropriate use of antimicrobials and lack of surveillance systems.[3,5]

The development of AMR can be curbed by the adoption of antimicrobial stewardship which promotes rational and appropriate antimicrobial use. Information on the antimicrobial prescribing practices is required prior to the implementation of an antimicrobial stewardship program.[6] There is dearth of published data on antibiotic consumption and prescription practices in most sub-Saharan African countries, including Nigeria thus impeding the successful development and implementation of antimicrobial stewardship programmes.

Point prevalence surveys are established surveillance methods and the Global Point Prevalence Survey of antimicrobial consumption and resistance (G-PPS) has become an accepted tool to monitor antimicrobial prescribing practices and multi-drug resistance worldwide.[5] The limitation of the PPS method is that it cannot be used to assess optimization of antibiotic therapy such as the initiation, the duration or the discontinuation of antibiotics. The aim of this study was to determine the patterns and prevalence of antimicrobial prescribing in a tertiary hospital in Nigeria.

METHODS

A point prevalence survey (PPS) was conducted in December 15, 2017 at the University College Hospital (UCH) Ibadan, Nigeria, an 850 bedded tertiary healthcare facility with an average of 2,000 in-patient admissions per month. The survey included all in-patients receiving at least one antimicrobial on the day of PPS. Eligible patients should have been admitted to the ward for at least 24 hours before the survey and still be on admission at 8 am on the day of the survey. Data from the study were anonymised and direct patient contact was not required hence patient consent was not needed. Each patient's record was assigned a unique survey number which was automatically generated. Data collected included age, gender, antimicrobial agents, number of doses per day, route of administration, indications for treatment and documentation of indication, stop or review date of prescription, microbiological data and compliance with prescribing guidelines. The denominator used included the total number of patients on admission. A web-based application designed by the University of Antwerp [www.global-pps.be] was used for data-entry, validation and reporting. The survey was conducted by resident doctors in the department of Medical Microbiology, University College Hospital, Ibadan under the supervision of the lead author. Ethical approval was obtained from the Joint University of Ibadan/University of College Hospital Ethics Committee (UI/EC/19/0247).

RESULTS

This survey included a total number of 451 patients from 38 different wards of the hospital.A total of 269 (59.6%) of the 451 patients involved in the survey were on at least one antimicrobial. Majority, 426 (95.1%) were on antibacterial while 18 (4%) were on antimalarial and 3(0.7%) on antifungal agents.The age of the patients ranged from 1 day to 88 years. One hundred and thirty-two (49.1%) of the patients were males while137 (50.9%) were females. The adult surgical wards accounted for the highest number of patients, (n= 221; 49.0%), of which 115 (52.0%), received antibiotics. The paediatrics medical, intensive care, adult medical, and paediatrics surgical wards accounted for the highest rate of antimicrobial prescriptions with values of 86.1%, 69.2%, 59.8% and 54.5% respectively (Figure 1). A total number of 172 therapeutic antibiotic prescriptions were issued with 69.2% (119) for community-acquired infections (CAI). Most prescriptions for healthcare associated infections (n=53) were intervention related (47.2%). Third generation cephalosporins (23.9%; mainly ceftriaxone); followed by combination of penicillins (17.4%; mainly amoxicillin-clavulanate) and fluoroquinolones (16.6%) accounted for the highest number of prescriptions. The most frequently prescribed antimicrobials were ceftriaxone, metronidazole, amoxicillin-clavulanate, ciprofloxacin and gentamicin and these accounted for 15.6%, 14.6%, 11.6%, 9.1% and 8.6% respectively (Figure 2). Majority, 312 (69.9%) of the patients had parenteral antibiotics and only 95 (21.3%) of all antibiotic prescribed had a documented stop or review date. On the adult surgical ward, surgical prophylaxis was the indication for antimicrobial use in 98.7% of patients and all surgical prophylaxis were given for more than one day.

Although the reason for antibiotic prescription was indicated for 413 (92.4%) prescriptions, targeted therapy was employed in only 17 (6.3%) patients while 252 (93.7%) were empirically placed on antimicrobials. The use of antimicrobials in 10 (2.2%) of the patients was based on results of biomarkers (C-reactive protein). Compliance to antibiotic prescription

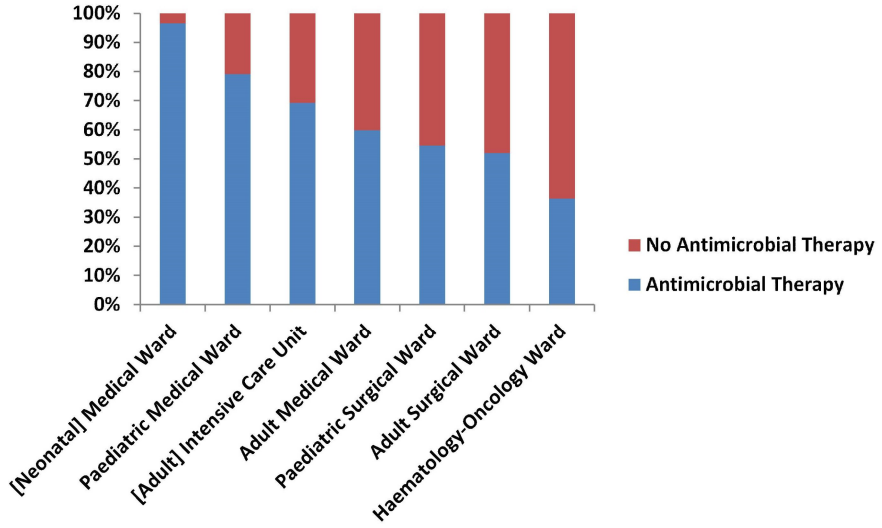

Fig. 1: Prevalence of Antimicrobial Prescription by Ward

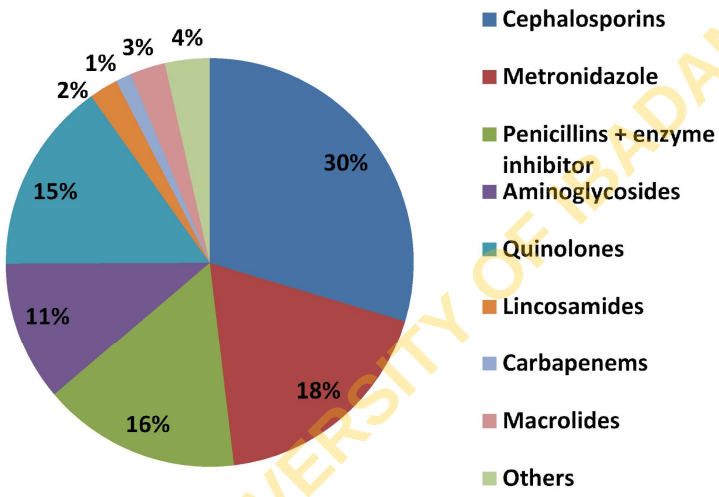

Fig. 2: Classes of Antimicrobials Prescribed

Table 1: Indications for Antibiotic Prescription

S/No	Indication	Frequency	Percentage (%)
A	**Therapeutic**		
	CAI	119	69.2
	HAI	53	30.8
	Total	172	42.3
B	**Prophylaxis**		
	Medical	75	29.9
	Surgical	176	70.1
	Total	251	56.1
C	**Indication not specified**	7	1.6
	Grand Total	**430**	**100.0**

CAI, community acquired infections; HAI, hospital acquired infections

guidelines was non-existent as there was no established local antibiotic guideline (Table 2).

Table 2: Quality Indicators of Antimicrobial Prescription

Indicator	Number	Percentage (%)
Reason in notes	413	92.3
Stop/review date	97	36
Targeted therapy	17	3.8
Biomarkers	51.8	

DISCUSSION

To the best of our knowledge, this is the first time such a comprehensive antimicrobial point prevalence survey has been undertaken in our hospital, in spite of being the first tertiary health care facility in Nigeria. Our findings showed that majority, 269 (59.6%) of the patients involved in the survey were on at least one antimicrobial agent. This is significant and worrying as upsurge in levels of antimicrobial resistance (AMR) is strongly associated with inappropriate prescribing and consumption of antibiotics.[7–10] Community based antimicrobial prescription has also contributed significantly to the rising trend of antimicrobial resistance in our environment thus necessitating national functional regulation of antimicrobial prescription.

A similar PPS conducted about the same period in Lagos, Nigeria showed a slightly higher antimicrobial consumption rate of 69.7%,[11] possibly due to the increased level of awareness on antimicrobial stewardship in our institution. Both statistics fall within the previously cited antibiotic prescription range for African countries, which is 27·8–74·7%.[8–10] These high rates of antimicrobial prescribing in Nigeria far outweight the estimated worldwide average of 34.7%[4] and also vary from the much lower rates reported in the European Union (EU) and the United States (US).[12,13] Clearly, in order to eliminate the poor prescribing practices in our hospital, we need to initiate and embrace antimicrobial stewardship as it is done in hospitals in Europe and the US.

Comparable with previous reports from other parts of Africa, the antimicrobial prescribing rates in the neonatal and paediatric units were the highest.[9,14,15] These high rates of antimicrobial consumption might be related to the existing high rates of multidrug resistant healthcare-associated infections in these units.[14,15] Unfortunately, we do not have reliable information on the magnitude of such infections in our own hospital and there is a need to urgently address this. The complex interplay of inadequate diagnostic facility, poor medical care and poor infection prevention and control practices in hospitals, contributes to increasing burden of multidrug resistant infections coupled with high antimicrobial consumption rates. At present there is little awareness or utilization of the recently developed national treatment guidelines for antimicrobial use in infectious diseases.[16] Most Institutions have thus developed local antibiograms to guide rational prescription of antibiotics.

In this survey, third generation cephalosporins, mainly ceftriaxone, were the most commonly prescribed.The second and third most commonly prescribed antibiotics were metronidazole and combinations of penicillins with a β-lactamase inhibitor. This is not surprising considering that the third generation cephalosporins are the most frequently used antibiotics for empirical therapy among hospitalized patients in our environment. The frequent use of ceftriaxone has also been previously reported in Asia, Latin America, and southern and eastern Europe for both community-acquired and healthcare-associated infections.[17] There is need to assess the appropriateness of the cephalosporins and combinations of penicillins with a β-lactamase inhibitor reported in the current study as inappropriate consumption of broad spectrum antibiotics is a key factor in promoting AMR.[18] We observed a prolonged use of antibiotics for surgical prophylaxis, which further emphasizes the need to promote appropriate use of antibiotics in our hospital. This is most likely because of the failure to indicate stop or review dates in patients' treatment plan.

To identify some selected problems with antibiotic prescribing, we investigated four indicators of quality antibiotic prescribing. Firstly, the high frequency of documentation of indication for antibiotic prescription was observed and secondly, majority did not include stop or review dates in case notes. This would indicate that some patients were probably placed on antibiotics for longer than the usual expected duration of usage. The observed 92.3% frequency of documentation of the reason for prescription was far higher compared with what obtained in hospitals in Eastern (64%) and Southern (70%) Europe and other parts of Africa (70%), and Asia (73%).[17] Documentation of the reason for prescription allows for communication of diagnosis and treatment among clinicians and other health-care providers, and ensure proper follow up plans such as implementation of de-escalation as at when due. It would most likely also eliminate unnecessary antibiotic prescriptions.

Targeted therapy was observed in less than 10% of patients as well as low rate of utilization of biomarkers to determine the need for antibiotics. Correct diagnosis and treatment planning necessitate the utilization of clinical microbiology laboratory services. The suboptimal utilization of the microbiology laboratory contributes to inappropriate antimicrobial prescription as improved laboratory services have been associated with better prescribing practices.[19,20] The fourth quality indicator referred to the use of biomarkers as predictors of the need for antibiotics. Similar to the observed low targeted therapy, the request for biomarkers was also quite low. The non-existence of, and consequent non adherence to any antibiotic guidelines precludes the inclusion of this quality indicator on the table. Development and adherence to local antibiotic guidelines ensures improved clinical outcomes such as; mortality, treatment duration, and length of hospital stay. This observation formed the basis for targeted key interventions such as establishment of an antimicrobial stewardship committee and sensitization of the hospital community in a hospital wide Grand round. The effects of such interventions are currently being measured with repeated point prevalence surveys. The current study provides baseline information on prescribing practices and calls for an urgent core stewardship intervention in our hospital. Additionally, there is an urgent need to develop a functional local antibiotic guideline for empirical therapy.

Declarations

Conflict of Interest

The authors have no conflict of interest to declare in the work.

Competing Interest

The authors do not have any competing interest to declare.

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