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Original Research

Knowledge, Attitudes, and Practice of Doctors in Nigeria Regarding Antimicrobial Resistance.

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Abstract

Background: Infectious disease treatment and prevention are threatened by antimicrobial resistance (AMR) globally. The knowledge and attitudes of doctors regarding AMR and the responsible use of antibiotics are critical to improving prescribing behaviours and mitigating the danger that AMR poses. This study aims to assess the knowledge attitudes and practices of doctors in Nigeria regarding AMR.

Methodology: This was an online survey of doctors in Nigeria. A 31-item self-administered questionnaire was distributed via an online forum for doctors. The questionnaire consisted of knowledge, attitudes, and practices sections. Demographic and practice data were also collected from respondents. Data were analyzed using IBM-SPSS and were mainly descriptive. Bivariate correlation was used to determine the relationship between knowledge attitudes and practices.

Results: Two hundred and fifty -two doctors completed the survey. There were 105 (42%) resident doctors who participated in the study. Good knowledge and fair knowledge of AMR were shown by 95(41%) and 146(58%) doctors, respectively. There were few respondents with good attitudes and practices: 40 (16%) and 16 (6%), respectively. A large proportion of respondents had fair attitudes and practices -204(81%) and 185(73%) respectively. The relationship between practice, knowledge, and attitude was negligible. ($r<1$, $p>0.05$).

Conclusion: Most doctors in this study showed fair to good knowledge, attitudes, and practices regarding AMR. Efforts to reduce the incidence of AMR should leverage the perceptions and behaviours of these healthcare workers.

Keywords: Antimicrobial, Resistance, Survey, Doctors, Nigeria.

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Introduction

Antimicrobial resistance (AMR) is a global problem, more so in lower and middle-income countries where the effect is difficult to combat due to limited resources. AMR has the potential to undermine the progress made in the management of infectious diseases as it reduces the effectiveness of available antibiotic therapy. Although there are few surveillance reports from Africa, the available data indicate a high prevalence of AMR in countries with these reports.[1] One report estimates that western sub-Saharan Africa had the highest AMR-attributable death rate in 2019.[2]

The World Health Organization (WHO) instituted a global action plan (GAP) against AMR that was taken up by several countries including Nigeria.[3] One objective of this plan is the optimization of antibiotic usage by the implementation of antimicrobial stewardship(AMS) programmes. Some components of AMS include surveillance of AMR, education of health workers and the populace on the effects of AMR and promotion of behavioural changes to antibiotic prescribing and dispensing. Adherence to therapeutic guidelines and delayed antibiotic prescription are some behavioural changes that may curb AMR.

In Nigeria, the timeline for setting these actions into motion, including collecting surveillance data and creating awareness of AMR among healthcare workers across all cadres, is 2022.[4] Despite this, awareness of AMR and the implementation of AMS remains low. A survey of all healthcare workers in Nigeria showed that less than half of respondents had a good knowledge of AMR and a majority still prescribed antibiotics for viral infections.[5] In another survey of in-hospital antibiotic prescriptions, less than 10% of prescriptions were guideline-compliant.[6] In Nigerian hospitals, physicians are responsible for the management of diseases and antibiotic prescription and so play a pivotal role in the implementation of AMS. Also, leveraging on the mandatory continuing medical education, physicians are better positioned to be informed about AMR and AMS. However, awareness and changes in behaviour regarding AMR and AMS among doctors remain uncertain. Assessing their awareness and practices through surveys may prove helpful in delineating areas of concern and improvement in the rollout of AMR-related activities.

The objective of our study is to assess the knowledge, attitude, and practices of Nigerian doctors regarding antimicrobial resistance and antibiotic prescription.

Methods

This study was a descriptive cross-sectional study carried out among doctors practicing in Nigeria. All doctors working and residing in Nigeria were eligible to participate in this survey. We used the Nigerian Medical Association Telegraph® social media forum to reach eligible participants. Data collection was by use of a 31-item self-administered electronic questionnaire. (Appendix I) modified from questionnaires used in an earlier study among healthcare workers in Nigeria.[5] This included 6 questions on demography including age, sex, duration of practice, specialty, level of care, and rank in the hospital. The questionnaire was further divided into four sections on knowledge attitude and practice, the barriers to reducing AMR and sources of information on AMR, and antibiotic prescription.

The total score for knowledge was calculated as the sum of scores for each answer in that section with a maximum score of 20. The score for each right answer was one. The total score for attitude was the sum of the scores for each item in the attitude scale which comprised of 5-point Likert response scales as well as dichotomous responses. The maximum possible score in the attitude section was 5. The total score in the practice section was the sum of the scores for each item in that section which included both “yes/no” and a 5-point Likert scale response format ranging from 1 (strongly disagree) to 5 (strongly agree). The maximum score on the practice section was 18.

For the categorization of total scores in all sections, the total scores were converted to percentages. A score of ≥ 80% in each section was categorized as good, 50-79.9 % as fair, and less than 50% as poor.

Data was stored in Microsoft Excel and analyzed using IBM- SPSS version 22. Continuous variables were summarized using mean and standard deviation and differences were analyzed using student's t-test. Categorical variables were summarized as proportions and differences were assessed using Chi-square tests. The association between knowledge, attitude, and practice was determined by bivariate correlation. A p-value of < 0.05 was considered statistically significant.

Ethical approval was provided by the research and ethics committee of the Jos University Teaching Hospital, Jos Nigeria. All data were treated as confidential and anonymized.

Results

There were 252 respondents who completed the survey. The mean (SD) age of respondents was 38(8) years, and the mean (SD) duration of medical practice was 11(8) years. Other demographic characteristics are shown in Table 1. The subject of AMR in their medical practice was regarded as highly relevant by 208 (82%) respondents and moderately and rarely relevant by 37(15%) and 7 (3%) respondents, respectively.

Table 1: Demographic characteristics of respondents

Variable	n	%
Sex		
Female	57	22.6
Male	193	77.6
Prefer not to say	2	0.8
Rank		
Consultant	72	28.6
Resident	104	41.3
Medical Officer	55	21.8
House officer	15	5.6
Other	6	2.4
Place of medical practice		
Primary	5	2.0
Secondary	42	16.7
Tertiary	196	77.8
Private	9	3.6
Duration of practice		
0-9 years	113	44.8
≥10 years	139	55.2
Frequency of antibiotic prescribing		
Low (< once /week)	13	5.2
Moderate (1-5 times/week)	67	26.6
High (≥ once /day)	172	68.2
Departments		
Internal Medicine	88	34.9
Surgery	29	11.5
Paediatrics	14	5.5

Obstetrics and Gynaecology	11	4.4
Family medicine	33	13.1
Community Medicine	12	4.8
Dentistry	5	2.0
Pathology	17	6.7
Others	43	17.1
Knowledge Score		
Good	104	41
Fair	146	58
Poor	2	1

Knowledge

Regarding knowledge of AMR, the mean score was 74 (11%) with only 2 (1%) respondents scoring less than 50% in total. One hundred and seventy-eight (71%) of respondents thought that antibiotic resistance occurred when the body becomes resistant to antibiotics, and they no longer worked as well. 248 (98.4%) and 246(97.6%) respondents agreed that many infections were becoming increasingly resistant to antibiotics and that AMR makes it increasingly difficult to treat infections, respectively. The number of respondents who agreed that the prescription of antibiotics with overly broad-spectrum coverage contributed to AMR and that AMR was only a problem for those who took antibiotics regularly were 215 (85%) and 18(7%), respectively. Two hundred and thirty-nine respondents agreed that antibiotic-resistant bacteria could be transferred from person to person and 249(99%) agreed that resistant infections could make procedures such as surgery, organ transplants, and cancer treatment much more dangerous. Figure 1 shows the response of participants to the question on sectors that should be targeted to curb AMR. Figure 2 shows the doctors' response to the knowledge question on actions that could reduce the spread of AMR. There was no statistical difference between the mean knowledge score for those who had practiced medicine for 10 years or more and those who had practiced for less than 10 years (70±11% vs. 68±11%, t=-1.94, p=0.053). There was also no difference in the mean scores for knowledge for those who had received formal teachings on AMR and those who had not (70±11% vs. 69±11%, t=0.18, p=0.91). There was no significant difference in mean scores for knowledge between levels of health centres.

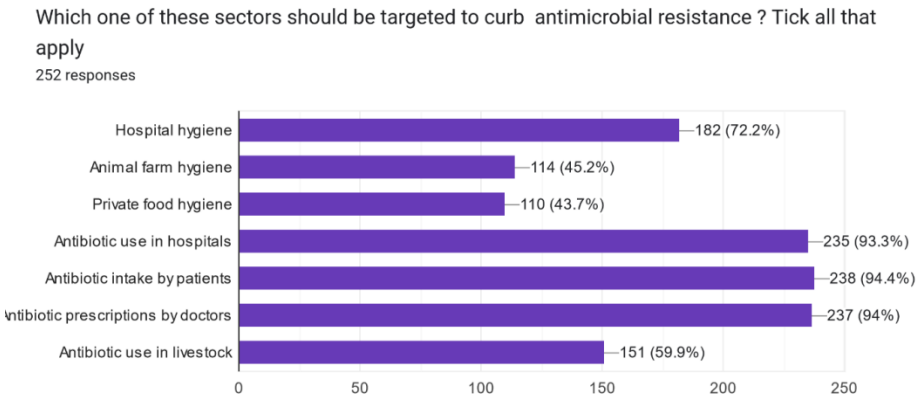

Figure 1: Responses to the questions on sectors to be targeted to curb antimicrobial resistance in percentages

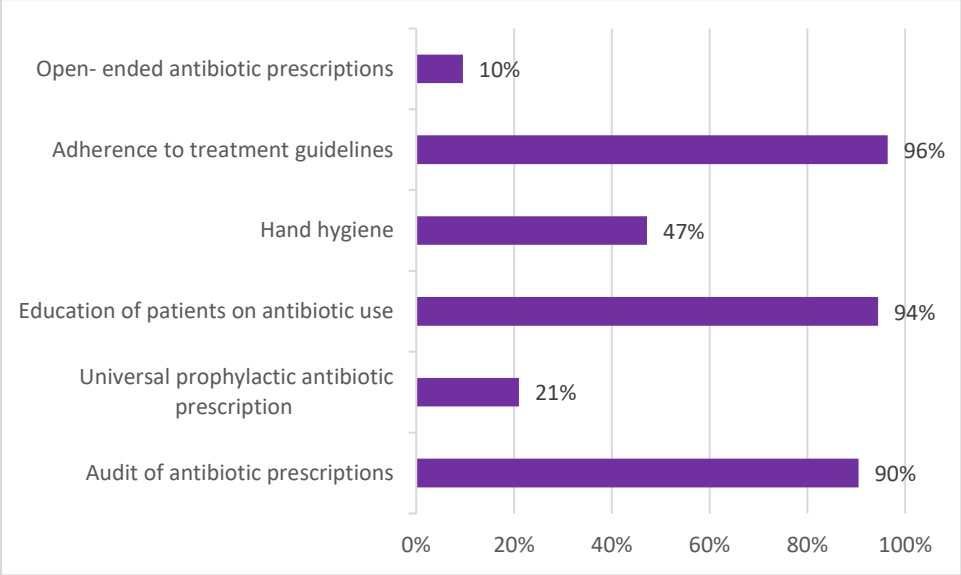

Figure 2: Doctors 'response to actions that could reduce the spread of AMR in hospitals in percentages.

Attitude

The mean (SD) percentage score for attitudes regarding AMR was 69% (10%). Good and fair attitudes towards AMR were shown by 40(16%) and 204 (81%) respondents, respectively. One hundred and ninety-five (77.4%) respondents believed that their prescribing behaviour influenced AMR in their region, and 169 (67.1%) would not prescribe antibiotics without a laboratory diagnosis; however, 54(21.4%) and 55(21.8%) doctors would prescribe antibiotics to be on the safe side and when further diagnostic tests were expensive, respectively. The attitudes of participants towards the prescription of antibiotics for common symptoms such as fever, sore throat, and body aches are shown in Table 2. There was a negligible association between attitudes and practice (r=0.09, p=0.18) or knowledge and practice (r=0.09, p=0.17).

Condition	Strongly Agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
Lower abdominal pain	11(4.4)	69(27.4)	108(42.9)	46(18.3)	18(7.1)
Urethral discharge	110(43.7)	120(47.6)	17(6.7)	5(2.0)	0(0)
Toothache	13(5.2)	69(27.4)	99(39.3)	54(21.4)	17(16.7)
Diarrhoea	11(4.4)	63(25.0)	100(39.7)	61(24.2)	17(6.7)
Cold and flu	2(0.8)	18(7.1)	101(40.1)	88(34.9)	43(17.1)
Body aches	2(0.8)	5(2.0)	82(32.5)	97(38.5)	66(26.2)
Fever	20(7.9)	63(25.0)	112(44.4)	45(17.9)	12(4.8)
Skin rash	8(3.2)	35(13.9)	107(42.5)	79(31.3)	23(9.1)
Sore throat	38(15.1)	123(48.8)	65(25.8)	19(7.5)	7(2.8)
Headache	2(0.8)	5(2.0)	107(42.5)	80(31.7)	58(23.0)

Table 2: Showing the choice of antibiotics for different conditions among participants

Practice

Practice was fair for 185(73%) respondents and good for 16(6%) respondents Although 152 (60.3%) respondents said they did not practice delayed antibiotics prescription, 48(18.8%) respondents rarely or never waited for laboratory evidence before the antibiotic prescription. Three (1.2%) respondents reported that they always waited for a laboratory diagnosis of infection before prescribing antibiotics. There were 191 respondents who used clinical practice guidelines for prescribing antimicrobials. Of these, 118(61.8%) respondents reported the use of WHO guidelines, and 118(61.8%) respondents reported the use of local or hospital guidelines (multiple responses). One hundred and fifty-seven (62.3%) respondents reported that there were no restrictions to antimicrobials available for use at their centre and 158(62.7%) had rarely or never reported antimicrobial resistance in their department or hospital. Teachings on AMR had occurred on one or more occasions for 144(57.1%) respondents in the past year. The relationship between years of practice ($x=0.99$, $p=0.32$), exposure to lectures on AMR ($x=2.32$, $p=0.13$) and delayed antimicrobial prescription was not statistically significant. The association between the use of guidelines ($x=5.37$, $p=0.07$), duration of practice, and frequency of AMR teaching sessions ($x=1.87$, $p=0.39$) was also not statistically significant.

Barriers and sources of information

Figure 3 shows the doctors' response to what they considered barriers to the control of AMR. Twelve (4.8%) respondents added that the prescription of antibiotics by unlicensed practitioners was also a barrier to reducing AMR.

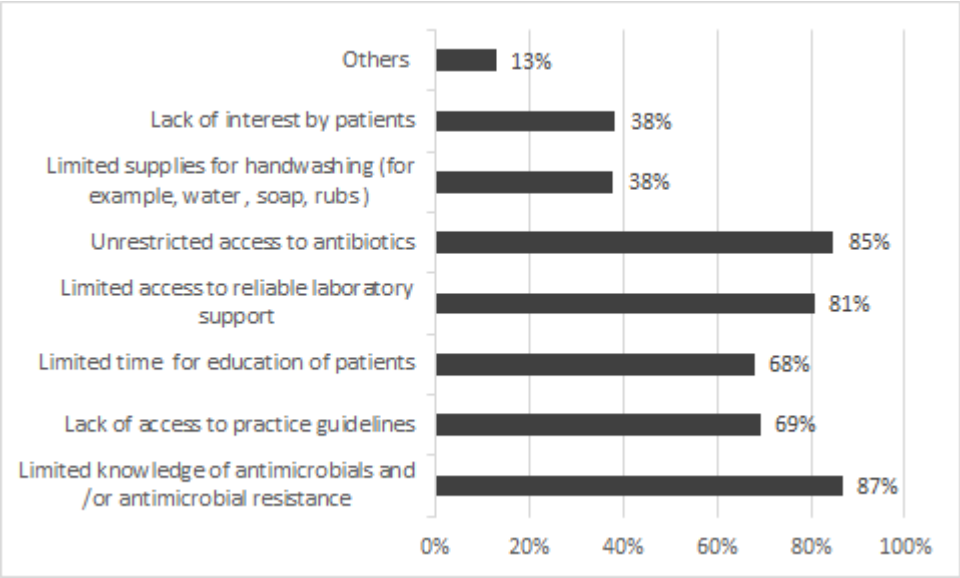

Figure 3: Response to question on barriers to reduction of AMR in percentages. A multiple-response question.

Doctors' responses to the source of information on antimicrobial resistance and antibiotic prescription are shown in Figure 3. Seventy (28%) respondents said that digital information sites were a source of information

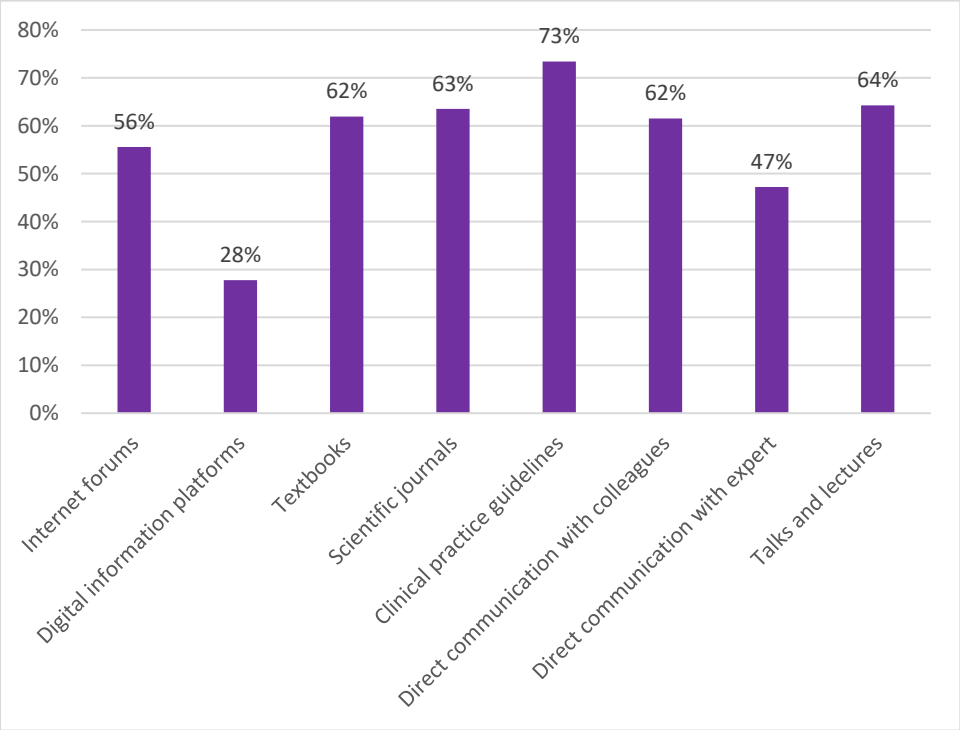

Figure 4: Sources of information on antimicrobial resistance and antibiotic prescription in percentages.

Discussion

In this online survey among medical doctors practising in Nigeria, knowledge, attitudes, and practices were fair to good regarding AMR and there was no relationship between knowledge and attitudes with practice. In general, attitudes toward an antibiotic prescription for common ailments were appropriate with most respondents unwilling to prescribe antibiotics unless indicated; however, less than half of respondents reported that they practiced delayed antimicrobial prescription. The majority of our respondents agreed that the subject of AMR was highly relevant to their practice, and this consisted of a large proportion of doctors who frequently prescribed antibiotics. Our findings are similar to the findings of studies of healthcare workers in other parts of the world.[5,7] In surveys in US and Peru, 65% and 22%of physicians who prescribed antibiotics, strongly agreed that antibiotic resistance was a problem in their practice. [8,9] The contrast between our study result and those from the US and Peru may be related to the systematic restrictions placed on antibiotic prescriptions in those countries.

The mean score for knowledge of AMR was fair with almost all participants scoring more than 50%. Participants consisted of doctors in the tertiary health centres where doctors are trained and opportunities for formal exposure to AMR activities may occur as part of training. This could explain the preponderance of fair to good knowledge among respondents. However, this mean score was lower than seen among healthcare workers in Nigeria, and Peru.[5,9] Although more than half of respondents had received at least one formal talk on AMR in the last year, this was not associated with improvement in scores in our study. An explanation for this may be that information on AMR was inadequate as has been seen among junior doctors in France and Scotland.[10] However, there were deficiencies in the knowledge base – outside of the hospital, most respondents were unaware that animal hygiene and private food hygiene could be targeted to reduce AMR. Also, less than half of respondents thought hand hygiene could reduce AMR in hospitals. This was comparable to a study in Nigeria where only 21% of doctors agreed that hand washing could reduce AMR.[11] In contrast, two-thirds of junior doctors in Greece considered poor hand hygiene a source of AMR.[12] Hand hygiene is one of the important strategies for the prevention and control of hospital-acquired infections and AMR.[13,14,15]

Regarding attitudes, more than three-quarters of respondents believed that their prescribing behaviour affected AMR and more than two-thirds of the respondents believed that a laboratory diagnosis should be made before antibiotics could be prescribed. Their attitude toward prescribing drugs for common symptoms was good. Less than a tenth of respondents agreed that antibiotics should be prescribed for a common cold and about a quarter agreed that antibiotics should be prescribed for diarrhoea. A different response was observed in Cambodia where 86% and 36 % of respondents would prescribe antibiotics for a cold and diarrhoea, respectively.[16] However, more than half of the respondents agreed that antibiotics should be prescribed for a sore throat. This is similar to findings from another study in Nigeria.[5] Perhaps this is related to the perception that a sore throat is a symptom of bacterial pharyngitis. This perception is especially important in the care of pediatric-aged patients as bacterial pharyngitis may result in rheumatic heart disease or glomerulonephritis over time. Paediatricians in this study made up a small percentage of respondents and therefore, cannot explain this finding.

Delayed antibiotic prescription, the practice of deferring antibiotic prescription for an infection until it is necessary, and a proven strategy for reducing antibiotic use, especially with respiratory tract infections,[17] were practiced by 4 out of 10 doctors in this study. Among general practitioners in Germany, less than a

third of doctors practised delayed antibiotic prescriptions for respiratory infections.[18] Our observation also differed from what was seen among healthcare workers in Nigeria where about two-thirds of respondents often or very often practiced delayed antibiotic prescription.[5] Differences in our sample composition and individual experiences with patients with infections may explain this contrast in our observations. Also, our question was framed differently -we asked if delayed antibiotic prescribing was practiced or not, and in their study frequency of practice was asked. Factors such as the logistics of getting a prescription filled after the patient has left the hospital and the patient's demand for treatment of symptoms may have also contributed to the reluctance to pursue this practice by respondents in our study.

The majority of doctors in our study engaged in good practices regarding antibiotic prescription although institutional guidance on AMR and antibiotic prescription seemed lacking. About four out of five respondents waited for a laboratory diagnosis before antibiotics were prescribed and prescriptions were often made using clinical practice guidelines. Local practice guidelines were used by more than half of the respondents. More than half of respondents reported no restrictions to the use of antibiotics at their centre and about the same number did not report AMR. This highlights the inadequacies in antimicrobial stewardship programs in Nigeria as described by Fadare et al in their study on antimicrobial stewardship programmes in tertiary hospitals in Nigeria.[19] In their study, only one out of 17 hospitals routinely monitored antimicrobial use. Similarly, in another study among physicians in tertiary hospitals, antibiotic stewardship programmes were absent in all of the hospitals included. [11] In addition to the absence of antibiotic stewardship programs in hospitals, a culture of reporting AMR seems to be lacking- less than a fifth of our respondents ‘always’ or ‘often’ reported the occurrence of AMR.

Limited knowledge about AMR and antimicrobials, unrestricted access to antibiotics, and limited access to laboratory services for diagnosis were considered the most important barriers to reducing AMR. For our respondents, clinical practice guidelines were the most common source of information about AMR and antibiotic prescription. This is similar to findings in other countries.[12,10,20,10,21] Other common sources of information included talks and lectures, scientific journals, textbooks, and direct communication with colleagues. Internet fora and digital platforms were not common sources of information for most respondents.

There is a need to strengthen AMR information among doctors since a large portion of the responsibility of prescribing antibiotics safely lies with them. They are also well-positioned to disseminate AMR information to other members of the healthcare workforce. Already, from our study, doctors show a willingness to propagate information - four in five doctors teach the rest of the medical team about AMR. This may provide an efficient and effective means of transmitting information to other cadres of the health team. Antibiotic stewardship programmes should be instituted and encouraged in hospitals with provisions made for easy access to prescription guidelines adapted to local experience. Measures of infection prevention and control such as hand washing should also be supported in hospitals.

A limitation of our study is the response from 20% of registered doctors hence, our study may not be reflective of all doctors in Nigeria. Although the study utilized a digital platform intended to be accessible by all doctors practising in Nigeria, not all doctors are active on the platform. One strength of the study is that forms were distributed electronically allowing for a wider coverage than in paper format. Using self-administered questionnaires reduced self-representation bias. The survey was available to doctors from all

over the country irrespective of the centre of practice and explored more practical aspects of antibiotic prescribing.

In conclusion, our study showed gaps in knowledge of AMR among doctors in Nigeria, good attitudes, and a willingness to improve antibiotic prescribing and reduce AMR. Improving the information on AMR available to Nigerian doctors remains an important strategy for combatting AMR. Supporting infection prevention and control measures as well as instituting antibiotic stewardship and prescription measures in health centres are also integral to reducing AMR.

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