

Antimicrobial Stewardship Practice in Tertiary Hospitals of North Central Region of Nigeria

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ABSTRACT

Introduction: Antimicrobials are currently the most customarily prescribed drugs in the community as well as in healthcare settings. Since their introduction into clinical practice, inappropriate use of antimicrobials and associated AMR have become challenges faced by humans. Concern has been raised about low-quality practices; profit aspirations, non-enforcement of legislation and improper knowledge of the general population about this problem. In the past two decades, this issue has become increasingly urgent and constitutes a major threat to public health.

Methods: This study was conducted to identify current aspects and patterns to antimicrobial prescribing among Medical Doctors in the Federal Medical Centre (FMC), Keffi and the University of Abuja Teaching Hospital (UATH), Gwagwalada in Nigeria. The objective for the study was to provide baseline data in the two hospitals and identify priorities for improvement. The questionnaire was targeted at 355 Medical doctors spread out as Consultants, 75; Resident doctors, 180 and House officer doctors, 100 from the two sites. Institutional Ethics Committee permission from each tertiary institution was obtained prior to the initiation of the study at site. The questionnaire interrogated several aspects of interest, demographic status, knowledge of antimicrobial classification, practical use of antimicrobials and knowledge of antimicrobial resistance.

Results: Of the one hundred and eighty questionnaires that were returned to us, one hundred and forty-two (78.88%) were returned with a signed consent page attached. Among these doctors, ninety-five were male (66.90%). As to workplace experience, 10 (7.0%) had up to 30 years of medical practice experience, Among these doctors, 40 (28.2%) are Consultants and 47 (33.1%) are House Officers, Of all the respondents, 130 (91.5%) are not aware of this NICE document, 10 (7.0%) individuals have discussed it within their units, but 4 (2.8%) individuals did not respond to the question. About 141 (99.29%) respondents accepted that antimicrobial resistance is a real threat to patient care except one (0.70%). Are you willing to participate in any clinical interventions involving antimicrobial use? One hundred and twenty-four (87.3%) doctors answered yes, 11 (7.7%) answered no, 3 (2.1%) were uncertain, while 4 (2.8%) did not respond to the question.

Conclusion: We concluded that antimicrobial stewardship is a dynamic programme, and that the tools for ASP if implemented diligently are the most effective means by which we may save ourselves from the looming disaster that AMR will cause.

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INTRODUCTION

The consequences of antimicrobial resistance (AMR) include increased treatment failure for common infections and decreased treatment options where antibiotics are vital, such as during certain post-surgical treatments (Wilcock et al., 2016). The discovery of penicillin by Alexander Fleming in 1928 and the subsequent administration of its first dose in clinical practice in 1941 marked a paradigm shift in patient care (Kimang'a, 2012). The success of antimicrobials against disease-causing microbes is among modern medicine's greatest achievements (Kimang'a, 2012). Antimicrobials are currently the most customarily prescribed drugs in the community as well as in hospital settings (Alahmadi et al., 2020). Since their introduction into clinical practice, inappropriate use of antimicrobials and associated AMR have become challenges faced by humans (Aggarwal et al., 2014). Concern has been raised about the low-quality practices; profit aspirations, non-enforcement of legislation and improper knowledge of the general population about this problem. In the past two decades, this issue has become increasingly urgent and constitutes a major threat to public health (Aggarwal et al., 2014). Earlier studies had estimated that between 20% and 50% of antibiotic use is either unnecessary or inappropriate and decreasing it is a necessary first step to curb antimicrobial resistance (Rather et al., 2017).

In 2011, WHO introduced a six-point policy package to fight against the spread of antimicrobial resistance (Cotta et al., 2014). In spite of that, microbial resistance is so widespread and fatally dangerous that it has become a worldwide problem that presents therapeutic dilemmas to physicians from all regions (Sajal et al., 2020). Antimicrobial stewardship programme (ASP) initiatives have previously been effective in changing prescribing patterns and curtailing inappropriate use of antimicrobials in hospitals (Howard et al., 2015). In order to develop these effective ASP interventions and change antimicrobial prescribing habits, it is suggested that there is a need to better understand local clinicians' underlying perceptions about antimicrobial use and the issue of antimicrobial resistance (Howard et al., 2015). Antimicrobial stewardship involves coordinated interventions or strategies to optimize antimicrobial use, ensure accessibility to effective antimicrobial therapy, improve patient outcomes and reduce AMR (Pollack et al., 2014).

The term 'antimicrobial stewardship' was first coined in 1997 to describe a collection of strategies, policies, guidelines or tools that could improve antimicrobial prescribing with the aim of decreasing antimicrobial resistance and use (Nnadozie et al., 2021).

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Antimicrobial stewardship refers to a coordinated approach to ensure optimal prescribing and is a key component of a national strategy for combating antibiotic-resistant bacteria (Chavada et al., 2017). Since antibiotics are the most commonly prescribed drugs in hospitals and their use is one of the important factors for the development and spread of resistance in the hospitals, an audit of their susceptibility patterns is important in the implementation of rational empirical antibiotic strategy (Kimang'a, 2012). This is due to the ageless battle against microbes, especially bacteria which has increasingly led to resistance to almost all antimicrobials available. The objective for the study is to provide baseline data in the two hospitals and identify priorities for improvement. The need to identify areas for improvement in the health institutions is vital (Alahmadi et al., 2020). This information will be useful for spearheading advocacy, establishing policy, developing interventions, and evaluating efforts for AMR containment among our medical doctors. Also, this survey will offer an opportunity to identify targets for quality improvement of antibiotic prescribing. The study did not evaluate the appropriateness of the type or estimate of antimicrobial used in treating a presumed diagnosis.

MATERIALS AND METHODS

This study was conducted to identify current aspects and pattern to antimicrobial prescribing among Medical Doctors in Federal Medical Centre (FMC), Keffi and University of Abuja Teaching Hospital (UATH), Gwagwalada in Nigeria. Designing and evaluating the effectiveness of doctor-focused interventions requires quantifying the knowledge and behaviours associated with antimicrobial use in the facility. This study is a cross-sectional, questionnaire-based survey which was undertaken in two separate tertiary hospitals in the North Central area of Nigeria. The questionnaire used, was developed by modifying earlier ones published by various authors (Cotta et

al., 2014; Howard et al., 2015; Wilcock et al. 2016; Rather et al., 2017).

The questionnaire gathers information on knowledge, attitude, and practice of the medical doctors on prescribing antimicrobials.

The questionnaire (see attached) was targeted at 355 Medical doctors spread out as Consultants, 75; Resident doctors, 180 and House officer doctors, 100 from the two sites. The distribution of the questionnaire was to all attendees of clinical meeting in their various units during one of their departmental clinical meetings. Only those who accepted, signed, and returned the questionnaire with the attached consent form were included in the study.

Institutional Ethics Committee permission from both tertiary institutions was obtained prior to the initiation of the study. No participant was charged the cost of any aspect of the study. Only volunteers who completed the questionnaire were included and only for this study purposes. Doctors were asked to complete the questionnaire anonymously. The response to the questionnaire was optional.

The questionnaire interrogated several aspects of interest, demographic status, knowledge of antimicrobial classification, practical use of antimicrobials and knowledge of antimicrobial resistance.

Demographic data like the age, address, gender, status was included in the first part of the questionnaire.

The second part of the questionnaire addressed knowledge about classification of antimicrobial, antimicrobial usage, and antimicrobial resistance. This was analyzed using a true/false questions and results were tabulated.

The third part of the questionnaire analyzed the practices in the use of antimicrobials. These questions were analyzed using a 5-point Likert scale with responses ranging from strongly agree to strongly disagree.

The fourth part of the questionnaire addressed questions on self-reported practices regarding antimicrobial resistance. This was also assessed using a Likert scale ranging from always to never.

To simplify the analyses, we reduced the five-point response options of the Likert scale into three, such as true/false/uncertain, agree/disagree/uncertain, or yes/no/uncertain.

RESULTS

Of the one hundred and eighty questionnaires that were returned, one hundred and forty-two (78.88%) were returned with a signed consent page attached. Among these doctors, ninety-five were male (66.90%), forty-four (30.98%) were female, three (2.11%) did not indicate their gender (see Table 1 attached). The median age of responding doctors was 35 years, with a minimum age of 24 years and maximum age of 59 years, sixteen (11.26%) people did not indicate their ages. The age range of 24-39 years formed the largest (54.9%) age group, made of 73 doctors, compared to 48 (33.8%) in the upper age range of 40-57 years. As to workplace experience, 10 (7.0%) had up to 30 years of medical practice experience, 15 (10.6%) had up to 20 years of medical practice experience, 42 (29.6%) had up to 10 years of medical practice experience, while 69 (48.6%) had less than 10 years of medical practice experience. Among these doctors, 40 (28.2%) are Consultants, 47 (33.1%) are House Officers, 36 (25.4%) are Resident doctors, while 16 (11.3%) are Medical Officers. Among these the various specialties contribution were Obstetrics and Gynaecologists 35 (24.6%) individuals, Paediatrics 27 (19.0%) individuals, Internal Physicians 13 (9.2%) individuals, Orthopaedic Surgeons 11 (7.7%) individuals, Radiology 8 (5.6%) individuals. The other specialists contributed 5 (3.5%) a smaller number of individuals, 22 (15.5%) individuals did not indicate their specialty.

There are more male (66.9%) than female (31.0%) medical doctors in our health facilities (see table 1 below). Many of the medical doctors surveyed are House officers (33.1%), whose only knowledge of antimicrobial use is what the more senior medical doctors (65.0%) practice (as shown in table 3 below)

Table 1: Distribution of medical doctors surveyed based on gender.

Gender	Frequency	Percentage
Female	44	31.0
Male	95	66.9
Not indicated	3	2.1
Total	142	100.0

Many (48.6%) of the medical doctors surveyed had less ten years of practice. This group relies more on

the directives of the more experienced medical doctors (7.0%) who make up the least number (as

shown in table 2 below). As shown in figure 1 below, only 20% of medical doctors surveyed indicate they collect baseline specimen for

laboratory investigation of microorganisms before they start empirical antimicrobial treatment for the patient.

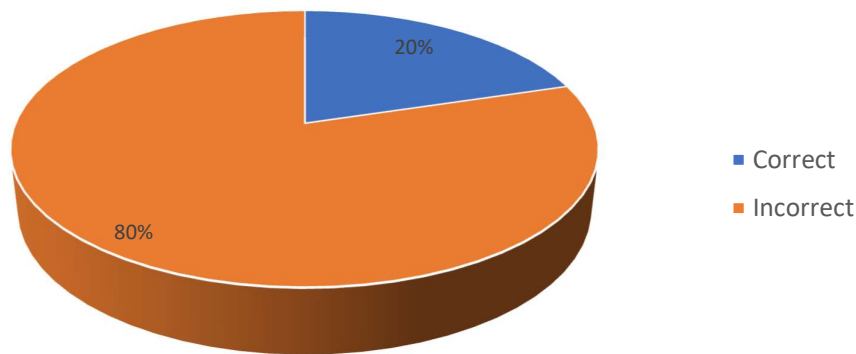
Table 2: Distribution of medical doctors surveyed based on years of practice.

Duration since graduation (years)	Frequency	Percent
<=10	69	48.6
11-20	42	29.6
21-30	15	10.6
31-40	10	7.0
Subtotal	136	95.8
Not indicated	6	4.2
Total	142	100.0

Table 3: Distribution of medical doctors surveyed based on professional status.

Current status	Frequency	Percent
Not indicated	3	2.1
Consultant	40	28.2
House Officer	47	33.1
Medical Officer	16	11.3
Resident doctor	36	25.4
Total	142	100.0

Figure 1: Distribution of correct prescription among medical doctors surveyed.



We asked to find out 'whether our medical doctors were aware of the NICE document "Antimicrobial Stewardship: Systems and Processes for Effective Antimicrobial Medicine Use". Below in figure 2 is the summary of the mean responses across the various domains that were surveyed.

Of all doctors surveyed, 130 (91.5%) are not aware of this NICE document, 10 (7.0%) individuals have discussed it within their units, but 4 (2.8%) individuals did not respond to the question. About 141 (99.29%) respondents accepted that antimicrobial resistance is a real threat to patient care except one (0.70%).

When asked 'whether there was a perceived increase in cases of antimicrobial resistance in patients over the past 3 years or so?' Eighty-three (58.5%) doctors answered yes, 23 (16.2%) answered no, while 36 (25.4%) individuals were uncertain.

Asked 'do you consider the potential for antimicrobial resistance when coming to a decision whether to prescribe an antimicrobial or not?' One hundred and thirty-three (93.7%) answered yes, 7 (4.9%) answered no, 1 (0.7%) was uncertain and 1 (0.7%) did not respond to the question.

Asked 'whether one can identify a case of antimicrobial resistance in a patient?' One hundred and seven (75.4%) answered yes, 22 (15.5%) answered no, 11 (7.7%) uncertain, while 1 (0.7%) person did not respond to this question. In view of

this, the question was asked, 'do you insist to obtain microbiology clinical samples before prescribing antimicrobials?' Forty-six (32.4%) doctors answered yes, 93 (65.5%) individuals answered no, 3 (2.1%) were uncertain.

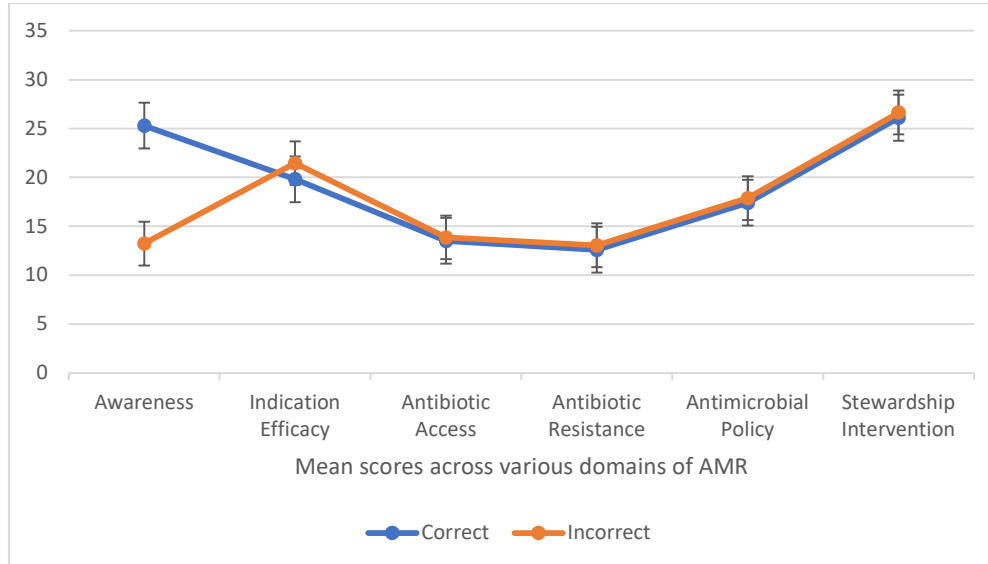


Figure 2: Summary of antimicrobial knowledge among medical doctors surveyed.

'Do you think doctors in your unit should be changing their approach so that they are more prudent' with prescribing antimicrobials?' Eighty-seven (61.3%) individuals answered they could do a little better, 8 (5.6%) individuals answered, they are concerned they are too restrictive with their prescribing of antimicrobials, 25 (17.6%) answered their prescribing seems alright, 16 (11.3%) answered they could do a lot better at reducing their prescribing, 6 (4.2%) individuals did not respond.

We then asked whether, "in general do you think you are too liberal in prescribing antimicrobials?" Forty-two (29.6%) doctors answered yes, 94 (66.2%) answered no, while 6 (4.2%) were uncertain.

When asked, "During patient treatment, when an antimicrobial treatment fails, what is your next line of action?" Seventy-one (50.0%) of the responding doctors will then ask for laboratory culture and sensitivity test to be carried out, 41 (28.9%) will rather change the antimicrobial to another type, 13 (9.2%) will invite the Microbiologist to review the patient, unfortunately 17 (12.0%) of the doctors did not respond to the question.

The doctors were also asked about indications for antimicrobials and how effective the use is. They were asked, are common colds and diarrhoea cured more quickly with antimicrobials? Among

the doctors, 7 (4.9%) answered yes, 127 (89.4%) answered no, 3 (2.1%) were uncertain, while 5 (3.5%) did not respond to the question.

Are antimicrobials always effective against bacteria? Among the respondents 53 (37.3%) answered yes, 78 (54.9%) answered no, 6 (4.2%) were uncertain, while 5 (3.5%) did not respond.

Are antimicrobials effective against viruses? Among the respondents 2 (1.4%) answered yes, 134 (94.4.1%) answered no, 2 (1.4%) uncertain, while 4 (2.8%) did not respond.

Is it necessary to prescribe antimicrobials for ear pain for children 3-6 years old? Among the respondents 16 (11.3%) do not know, 45 (31.7%) answered no, 71 (50.0%) answered yes, while 10 (7.0%) did not respond to the question.

Is it necessary to prescribe antimicrobials for diarrhoea? Among the respondents, 24 (16.9%) answered yes, 109 (76.8%) answered no, 3 (2.1%) were uncertain, while 6 (4.2%) did not respond to the question.

Is it necessary to prescribe antimicrobials for fever? Among the respondents, 27 (19.0%) answered yes, 105 (73.9%) answered no, 6 (4.2%) were uncertain, while 4 (2.8%) did not respond to the question.

They were also asked about access to antimicrobial. 'Is it good to keep leftover antimicrobials at home in case of future need?' Twelve (8.5%) answered yes, 123 (86.6%)

answered no, 2 (1.4%) of our medical doctors were uncertain, while 5 (3.5%) did not respond to the question.

'Would it be good to be able to purchase all antimicrobials without prescription?' Four (2.8%) answered yes, 131 (92.3%) of the doctors answered no, 1 (0.7%) of the doctors was uncertain, while 6(4.2%) doctors did not respond.

They were asked, 'would it be good if antimicrobials are purchased only on registered doctor's prescription?' Majority of doctors 133 (93.7%) answered yes, 3 (2.1%) answered no, 1 (0.7%) of the doctors was uncertain, while 5 (3.5%) doctors did not respond.

'If the patient feels well after starting antimicrobial treatment, can they stop taking the prescribed antimicrobial drug?' Five (3.5%) doctors answered yes, 131 (92.3%) answered no, while 6 (4.2%) did not respond to the question.

'Can humans become resistant to antimicrobials?' Seventy-one (50.0%) of the surveyed doctors answered yes, 56 (39.4%) answered no, 11 (7.7%) doctors were uncertain, while 4 (2.8%) did not respond.

'Can Bacteria become resistant to antimicrobials?' One hundred and thirty (91.5%) doctors answered yes, nine (6.3%) answered no, while 3 (2.1%) did not respond to the question.

'Do Doctors take time to explain to the patient information on antimicrobial use?' Forty-seven (33.1%) of doctors answered yes, 76 (53.5%) of them answered no, 12 (8.5%) of the doctors were uncertain, while 7 (4.9%) did not respond to the question.

Doctors were asked 'what minimum and maximum duration they would prescribe an antimicrobial to treat any single cause?' Seventy-seven (54.2%) doctors stated 5 and 7 days, 36 (25.4%) stated 7 and 42 days, 8 (5.6%) stated 3 and 21 days, 11 (7.7%) did not respond, while 10 (7.0%) stated different other durations.

Doctors were asked 'whether there is a need for a hospital policy on antimicrobial prescribing and antimicrobial resistance?' One hundred and thirty-six (95.8%) doctors answered yes, 4 (2.8%) answered no, 1 (0.7%) did not know, while 5 (3.5%) did not respond to the question.

They were asked, 'is there any hospital policy on antimicrobial prescription in your hospital?' Twenty-five (17.6%) answered yes, 49 (34.5%) answered no, 64 (45.1%) doctors were uncertain, while 5 (3.5%) did not respond to the question.

'Does antimicrobial resistance affect patients under your care?' Ninety (63.4%) doctors answered yes, 28 (19.7%) answered no, 19 (13.3%) doctors

were uncertain, while 5 (3.5%) did not respond to the question.

'Is there any antimicrobial prescription that is inappropriate?' One hundred and twenty-one (85.2%) doctors answered yes, 6 (4.2%) answered no, 8 (5.6%) were uncertain, while 7 (4.9%) did not respond to the question.

'Will improving antimicrobial prescription in a hospital help decrease antimicrobial resistance?' One hundred and twenty-nine (90.8%) doctors answered yes, 3 (2.1%) answered no, 4 (2.8%) were uncertain, while 6 (4.2%) did not respond to the question.

Questions were asked about a proposed antimicrobial stewardship intervention and willingness to participate in it.

'Should a formal policy for use of antimicrobials be introduced in your hospital? One hundred and thirty-seven (96.5%) doctors answered yes, 2 (1.4%) answered no, 1 (0.7%) was uncertain, while 2 (1.4%) did not respond to the question.

'Should a policy that limits the prescription of selected antimicrobials to certain clinical indications via an approval process be introduced in your hospital?' One hundred and twenty-three (86.6%) doctors answered yes, 13 (9.2%) answered no, 4 (2.8%) were uncertain, while 2 (1.4%) did not respond to the question.

'Should local antimicrobial guidelines and protocols be introduced in your hospital?' One hundred and thirty-six (95.8%) doctors answered yes, 2 (1.4%) answered no, 1 (0.7%) was uncertain, while 2 (1.4%) did not respond to the question.

'Should a computer application which determines selection and duration of antimicrobial therapy for patients be introduced in your hospital?' One hundred (70.4%) doctors answered yes, 21 (14.8%) answered no, 17 (12%) were uncertain, while 4 (2.8%) did not respond to the question.

'Should a committee consisting of a specialist physician and a pharmacist provide individualized antimicrobial prescribing advice and feedback be introduced in your hospital?' One hundred and nineteen doctors answered yes, 12 (8.5%) answered no, 6 (4.2%) were uncertain, while 5 (3.5%) did not respond to the question.

'Are you willing to participate in any clinical interventions involving antimicrobial use?' One hundred and twenty-four (87.3%) doctors answered yes, 11 (7.7%) answered no, 3 (2.1%) were uncertain, while 4 (2.8%) did not respond to the question.

DISCUSSION

This study was conducted to provide further insights into the status quo of AMS and to identify

potential areas for continuing prescription improvement in our local environment. In this survey carried out among medical doctors in tertiary levels of healthcare system, we interacted with 142 individuals. Ninety-five (66.9%) were male, while 44 (30.9%) are female. The median age for them is 35 years of age, with the age range of 24-39 years forming the largest (54.9%) group. Sixty-seven (47.2%) of them had more than 10 years of practice experience while, 69 (48.6%) had less than 10 years practice experience. The specialty that contributed the most number, 35 (24.6%) of doctors is Obstetrics and Gynaecology. Antimicrobial prescribing is one area where the forces of prescriber knowledge, patient expectations, the prescriber's perceptions of these expectations, and culture all collide (Zhou & Ma, 2019) It is reassuring that a significant (99.29%) of respondents to our survey agreed that antimicrobial resistance is a threat. As it is argued that one challenge in reducing antibiotic use is the disconnect between individual behaviour and population-level resistance (Wilcock et al., 2016). Worldwide, the prevalence of antimicrobial resistance limits the therapeutic options for treatment of infections and increases the social benefit from disease prevention (Pulcini et al., 2015).

It is unfortunate that 91.5% (130) of our doctors are not aware of a NICE policy document that guides antimicrobial prescription despite the significance of these group of drugs to patient care. In other words, Clinicians feel free to prescribe antimicrobials casually (Cabana et al., 1999). Doctors practice on antimicrobial prescription is detached from their theoretical declaration. Most of the antimicrobial prescription offered to patients is based on a 'gamble'. And even when the antimicrobial is perceived to fail another antimicrobial can be substituted just like that without a scientific basis or seeking for specialist assistance. None of the hospitals' clinics has a local antibiogram document to assist doctors choose an antimicrobial. We believe there is a large unmet need of providing practice guidance to practicing medical doctors regarding antimicrobial prescription, most of the knowledge currently used by them is based on 'informal' education and self-directed learning (Jana et al., 2016).

Laboratory Scientist working on the bench are a very important backbone for service laboratories' day to day bench analysis, but to assume that these laboratory bench results can then be interpreted correctly by any person for any patient even when there are Clinical Microbiologist at hand to assist in making a review.

For this reason, a proper design and promotion of ASP in our health institutions while ensuring fulfilled policy requirements, satisfactory improved patients' treatment outcome, and effectively controlling medical expenditure will constitute an important goal for a future study. There is a need to hold Clinical Microbiologist more accountable for antimicrobial prescriptions in our health institutions and this cannot be overemphasized.

CONCLUSION

We concluded that ASP as a dynamic programme, must be instituted as a system composed of a series of stewardship policies and measures that are designed to promote adequate use of antimicrobials, improve patient outcome. It will help reduce AMR transmission, control medical expenditure, which covers technical support, policy and stewardship planning, AMR surveillance and containment, etc., that are needed to ensure adequate use of antimicrobials and control of infections. These tools for ASP if implemented diligently are the most effective means by which we may save ourselves from the looming disaster caused by AMR.

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