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SERVICES FOR SCIENCE AND EDUCATION

Knowledge of Antimicrobial Stewardship Actions Among Out Patients at The Maitama District Hospital, Maitama, Abuja, Nigeria

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ABSTRACT

Background: Antimicrobial stewardship programs primarily aim identify solutions to curb antimicrobial resistance (AMR). It helps to optimize antimicrobial use to improve patient outcomes, ensure cost-effective therapy, and reduce adverse sequel of antimicrobial use (including antimicrobial resistance) among residents, hospitalized patients, the public, and agricultural professionals. This study aims to assess the knowledge of antimicrobial stewardship actions among outpatients attending Maitama General Hospital, Abuja.Nigeria Methods: This was a descriptive cross-sectional study done between June and November, 2022 among 423 outpatients using Multistage sample technique. Data was collected using interviewer-administered structured questionnaire and analysed using the IBM SPSS 28 (Statistical Package for the Social Sciences). Ethical approval was granted by Bingham University Teaching Hospital, Ethics committee, Jos, Plateau State. Results: The level of knowledge about solutions to curb AMR (Antimicrobial stewardship) between male and female respondents showed 179 (44.75%) of female respondents had good knowledge, 28 (7.0%) had fair knowledge and 21 (5.25%) had poor knowledge. Of all the male respondents, 132 (33.0%) had good knowledge,12 (3.00)% had fair knowledge and 28 (7.00%) had poor knowledge. Summarily, 311 (77.75%) had good knowledge of antimicrobial stewardship, 40 (10.00%) had fair knowledge of antimicrobial stewardship and 49 (12.25%) had poor knowledge of antimicrobial stewardship. Conclusion: Majority of clients had good knowledge of antimicrobial stewardship actions, but this can be improved by planning and implementing more antimicrobial stewardship (AMS) sensitization activities in communities and among patients in the hospitals. Health care workers should have continuous professional development (CPD) training on AMS.

Keywords: Antimicrobial stewardship (AMS), Antimicrobial resistance (AMR), Antimicrobial use (AMU), knowledge

INTRODUCTION

Antimicrobial resistance is described by the World Health Organization (WHO) as a biological phenomenon that occurs when microorganisms (bacteria, fungi, viruses, or parasites) evolve in response to antimicrobials. This mutation makes the bacteria resistant to the previously fatal antimicrobial[1,2]. When microorganisms develop resistance, they can tolerate antimicrobial drugs such as antibiotics, antivirals, antifungals, and antimalarials. Resistance causes the capacity to treat numerous infectious diseases to become less effective, resulting in treatment failure, increased healthcare costs, and even mortality[3].AMR is a broad term that includes resistance to all antimicrobial agents; nevertheless, the focus of this paper is on antimicrobial stewardship. Antibiotics are among the most regularly used treatments in the world and are extremely important to global health; nonetheless, their long-term usefulness isjeopardized by the development of resistance. The excessive and unnecessary use of antibiotics has been reported as the main cause of antibiotic resistance[4,5,6]. Resistance develops as a result of selection pressure, which happens when antimicrobial agents apply"selection pressure" by eliminating susceptible bacteria, allowing resistant microorganisms to live and grow. Resistance is classified into two categories. The first is intrinsic (or innate) resistance, andthe second is acquired resistance[7,8,10] . Policy makers and experts have described antimicrobial stewardship programs as effective methods of preventing antimicrobial resistance[7,9,10] .

Antimicrobial stewardship programs for the public, including but not limited to health care institutions, schools (public, private, high school, and colleges) in the Abuja municipal council, are among the approaches to reduce AMR[11]. Antimicrobial stewardship is a coordinated program that promotes the appropriate use of antimicrobials (including antibiotics) and may employ any of several individual strategies to lower healthcare costs, improve patient outcomes, reduce microbial resistance, and slow the spread of infections caused by multi drug-resistant organisms[1,12,13]. Good antimicrobial stewardship in humans has additional benefits to resistance control as it improves infection treatment success and reduces antimicrobial therapy side effects like toxicity. Ensuring the most appropriate use of antimicrobials is critical in promoting patient safety as well as current and future generations' health and well-being.To ensure the fight against AMR, it should be a national public health issue of high significance so that wise administration of these medicines can considerably increase patient safety while also ensuring antibiotics' long-term viability and lowering catastrophic health-care expenditures[3,4]. Measures to combat antimicrobial resistance have been highlighted, including raising community (Residents, prescribers, and patients) awareness about AMR to encourage behavior change, ensuringthat sufficient and essential antimicrobial agents are available, providing tools to rapidly diagnose, detect pathogens, and test their antimicrobial susceptibility, and encouraging vigorous Water, Sanitation and Hygiene (WASH) and Infection Prevention and Control (IPC) measures such as proper hygiene, immunization, and antimicrobial stewardship[3,4]. The World Health Organization (WHO) devised a worldwide action plan based on the "One Health" concept totackle AMR, which was accepted by the 68th World Health Assembly in May 2015 to curb the spreadof AMR[1,3,4] .

Antimicrobial stewardship intervention programs, according to Barlam et al. [14], are techniques to enhance patient outcomes, reduce adverse events like as nosocomial infections, increase

antibiotic susceptibility rates, and ultimately optimize resources[14].An executive order requiring a strategic, coordinated, and continuous effort to identify, prevent, and control antibiotic resistance, known as "Combating Antibiotic-Resistant Bacteria," was issued in 2014 by President Obama[15,16] which led to the establishment of the U.S. National Strategy for Combatting Antibiotic-Resistant Bacteria and the U.S. National Action Plan for Combatting Antibiotic-Resistant Bacteria calling for federal agencies to work together to improve resistance detection, slow the emergence and spread of resistance, improve antibiotic use and reporting, advancethe development of rapid diagnostics, improve infection control measures, and accelerate research onnew antibiotics and antibiotic alternatives[16].

The Centers for Disease Control and Prevention (CDC) created antibiotic stewardship programs (ASPs) projects in conjunction with the World Health Organization (WHO) and the United Nations (UN). The projects intend to invest in national infrastructure in order to detect, respond to, contain, and prevent resistant illnesses in healthcare settings, food, and communities (CDC, 2019)[16,17]. The overallgoals of ASPs are (a) to detect, respond to, and contain resistant diseases; (b) to prevent the spread ofresistant illnesses; and (c) to boost novel treatment and diagnostic techniques (CDC, 2019)[16,17] . AMR stewardship programs will help optimize antimicrobial use to improve patient outcomes, ensure cost-effective therapy, and reduce adverse sequel of antimicrobial use (including antimicrobialresistance) among residents, hospitalized patients, the public, and agricultural professionals.

There is a high rate of antimicrobials misuse which needs to be stopped, so as to combat AMR anddelaying further emergence and spread of resistance[18,19.] It incorporates a broad array of clinical measures aimed at reducing the overuse of antimicrobial drugs.

AMR- related activities are being coordinated by the Nigeria CDC through an AMR technical working group and National steering committee with membership from all the relevant ministries i.e.,the Federal Ministry of Health, the Federal Ministry of Agriculture and rural development, and the federal ministry of Environment. The Technical Working Group created a SWOT analysis for AMR prevention and control in the nation since there was a lack of antimicrobial stewardship in both the public and private sectors. They also promoted the adoption of current treatment guidelines to ensure responsible use in both humans and animals, as well as promoting the best practices for prescribing and dispensing antibioticsto both humans and animals. These actions are all part of the strategic intervention to increase ASP[20]. In Nigeria, attention is increasingly being paid to antimicrobial stewardship. There have been ongoing institutional (government and regulatory side) and individual interactions on enlightenment efforts online and offline, within hospitals, and in communities. The National Standard Treatment Guidelinesand National Drug Policy are now available in hospitals and are used in the treatment of patients, despite the low implementation of ASP. It has been shown that if facilities start educating prescribers about the best ways to prescribe, adverse reactions to antibiotics, and AMR, through seminars, as well as patients, through posters and verbal counseling during consultations, can reduce antimicrobial misuse and thus, resistance[21,22] . The study's results indicate that antibiotic stewardship programs might be implemented in the public sector and improve antibiotic consumption without having any negative consequences. [22] . This study focuses on the patients who attended clinic in a government owned hospital in Abuja, and it assesses the knowledge of antimicrobial stewardship activities among residents in the Abuja, Nigeria.

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METHODS

One of the biggest government-owned hospitals in Abuja, Maitama District Hospital, served as the site of this study. It is a two-story, 101-bed hospital which offers outpatient services in addition to surgical, medical, pediatric, obstetric, and gynecology care. It also offers laboratory, X-ray, and accident and emergency services[23]. The first level of the hospital houses in-patients, including VIP wards, male and female adult patients, and children wards, post-natal, and surgical wards, the inpatient pharmacy, and the operating room. The second floor situates the administrative offices and health records[23]. The Maitama District Hospital (MDH) has a large patient load (an average of more than 1,500 general outpatient visits per month, or 160 per clinic day). A daily average of 160 patients come to the GOPD with a variety of symptoms and illnesses, including hypertension cases, typhoid and malaria, diabetes, STDs, ulcers, and more. Because the ENT and GOPD clinic is open on Mondays and Fridays, these days see the most patients. Additionally, it attends to patients from all wards within Abuja Municipal Area Council (AMAC) and other area councils in the FCT[23]. The hospital is located in AMAC of Abuja-FCT. Federal Capital Territory(FCT) has atotal population of 2,702,443 [24,25] It is bounded by Niger, Nasarawa, Kogi, and Kaduna States[25,26]. The area council is a home to a number of indigenous peoples includingthe Habe, Gbagyi, Gwandara, Gade, Basa, Hausa, and Fulani[27,28] .

This was a descriptive, cross-sectional design done among clients attending Maitama district Hospital Abuja's General Out-Patient Clinic for care, assistance, and treatment. The study was done between June and November, 2022. The sample size for this study was calculated using Cochran's formula[29], which is Z^2pq/e^2 (Formula for Population Greater Than 10,000). At a 95% confidence level, we predicted that 50% (0.5) of the community's population (18 and older) were aware of antibiotic usage and resistance, with a marginal error (absolute precision) value of 0.05. The sample size for adults was 384, and an additional 10% was added to account for residents who declined to participate or provided insufficient information during the interview, resulting in a sample size of 423. Because it was unknown how common it was for residents to be aware of AMU and AMR in this study population, 50% was utilized to determine the sample size.

$$n= \mathbf{Z^2Pq/e^2}$$

n = the desired sample size
Z = the standard normal deviate usually set at 1.96 which corresponds to a 95% confidence level.P = prevalence of residents (18 and above) = 50%
q = 1-P
E = degree of accuracy desired, set at 0.05. Therefore $N = 1.96^2 *(0.5) *(0.5) /0.005^2$

Thus, the minimum sample size obtained for this study population was 384

Thus, including 10% was 423.

A multistage sampling technique was adopted for this study as folows;

- Stage 1: Choosing the AMAC wards. Maitama district was chosen from a list of the five districts in the AMAC, namely Asokoro, Garki, Karu, Maitama, and Wuse, using simple random sampling and balloting without replacement.
- Stage 2: Choosing a general hospital from the Maitama District. As the only general hospital in the district, Maitama District Hospital was chosen.

- Stage 3: Participant Selection; Using the patient number as a list, all eligible adult patients identified in the waiting room of the outpatient clinic before the start of consultation were systematically recruited into the study, one in every two individuals who came to the Maitama hospital general outpatient clinic seeking care. Eight hundred (800) patients were expected basedon the average weekly attendance at Out patient department (OPD), so 20 people were interviewed daily giving a sampling interval of 2 (i.e., formula K= N/n was used, whereby N=the total number of patients attending OPD per week and n=the estimated sample size. K = 800/423, K = 1.89 which was approximated to two (2). Then, systematic sampling technique was carried out as follows: Simple random sampling was done for the first two patients in the waiting room to get the startingpoint. Thereafter, every 2nd patient was selected and recruited into the study if consent was given until the required sample size was obtained

Inclusion Criteria:
The criteria for eligibility for the study included; adults (18 years and above) visiting the OPD as patients.

Exclusion Criteria:
Clients who were very sick and could not understand the study, mentally impaired clients, and those not willing to participate were excluded from the study. Informed consent was obtained from all of the eligible participants.

Data was collected from consenting participants through a questionnaire structuredin an open-ended manner and self-administered. Questions consisted of some solutions intended to curb AMR. Definition and measurement of the outcome variables for knowledge of antimicrobial stewardship.

Good Knowledge:
Respondents who have heard about any or all of these terms; antimicrobial stewardship, or mentions any aspect that connotes antimicrobial stewardship or gets the right definition. Respondents who give answers correctly to the following people using only antimicrobials prescribed by a doctor or pharmacist, not keeping antimicrobials and use them later for other illnesses, Hand washing is important to the control of antimicrobial resistance, parents ensuring children's vaccinations are up to date, Farmers should give fewer antimicrobials to food- producing animals,

Doctors should only prescribe antimicrobials when needed, Governments should reward the development of new antibiotics, Lab tests (Antimicrobial susceptibility test) should be performed before antimicrobials prescription, Workforce training especially proper training of Lab personnel and epidemiologists for AMR surveillance, Lab capacity (Ability) to test should be developed by the government, Everyone needs to take responsibility for using antimicrobials responsibly.

Poor Knowledge:
Respondents who have not heard about any of the terms, or the definition and whodo not realize components listed in antimicrobial stewardship.

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Average Knowledge:
Respondents who have heard about some of the above terms and are aware of the definition and some of the risk factors.

To compute these outcome variables, respondents' responses to questions asked were scored as "correct" or "incorrect" and transformed as "1" or "0", respectively.

The correct responses to questions in each category were added to give the general knowledge score for each of the outcome variables. Respondents scoring above the cut-offs in each thematic area assessed were regarded as satisfactory while those with scores below were considered to have an unsatisfactory knowledge level.

A total of eleven (11) questions with True/False answers were used to assess knowledge of antimicrobials stewardship i.e., solutions to curb antimicrobial resistance and the respondents' knowledge was graded with a score of one for correct answer and zero for incorrect answer.

As there were eleven items in this section, the total knowledge score can be between zero to eleven points, based on this the total knowledge score was categorized into "Sufficient/Good Knowledge i.e., ≥ 6 correct answers", "Moderate/Fair" (3-5 correct answers), and "Poor Knowledge" (< 3 correct answers) Responses of "Do not know" were counted as incorrect,and no points were given. The total knowledge score was the sum of all the correct answers provided by the respondent. Mean knowledge score (%) was calculated and divided into three categories: poor(<60%), fair (60-80%), and good (>80%) level.

The data generated in this study was analyzed using the IBM SPSS 28 (Statistical Package for the Social Sciences) computer software (IBM SPSS Inc. 2021).

For bivariate analysis, the chi-square test (χ 2) was used to assess associations between independentand dependent variables at 95% Confidence Intervals (95% CIs). At this point, any p-value less than 0.05 was considered statistically significant. Ethical approval was granted by the Bingham University Teaching Hospital Ethical Research Committee. Approval and Permission from Maitama district hospital, Abuja was gotten before thecommencement of this study.

RESULTS

Table 1: Knowledge of antimicrobial stewardship actions (I.e Solutions to curb antimicrobial Resistance) among respondents

Statements	Response option	Gender	Correct response n (%)	Incorrect response n (%)	Total (%) N=400
People should use antimicrobials only when they are prescribed by a doctor or pharmacist	True	Female	210 (52.5%)	18 (4.5%)	228 (57%)
		Male	145 (36.25%)	27 (6.75%)	172 (43%)
People should not keep antimicrobials and use them later for other illnesses	True	Female	175 (43.75%)	53 (13.25%)	228 (57%)
		Male	114 (28.5%)	58 (14.5%)	172 (43%)
Farmers should give fewer antimicrobials to food-producing animals	True	Female	122 (30.5%)	106 (26.5%)	228 (57%)
		Male	75 (18.75%)	97 (24.25%)	172 (43%)
Parents should make sure all of their children's vaccinations are up to date	True	Female	207 (51.75%)	21 (5.25%)	228 (57%)
		Male	151 (37.75%)	21 (5.25%)	172 (43%)
Hand washing is important to the control of antimicrobial resistance	True	Female	176 (44%)	52 (13%)	228 (57%)
		Male	109 (27.25%)	63 (15.75%)	172 (43%)
Doctors should only prescribe antimicrobials when they are needed	True	Female	201 (50.25%)	27 (6.75%)	228 (57%)
		Male	141 (35.25%)	31 (7.75%)	172 (43%)
Governments should reward the development of new antibiotics to pharmaceutical companies	True	Female	167 (41.75%)	61 (15.25%)	228 (57%)
		Male	124 (31%)	49 (12.25%)	172 (43%)
Lab tests (Antimicrobial susceptibility test) should be performed before antimicrobialsprescription	True	Female	180 (45%)	48 (12%)	228 (57%)
		Male	127 (31.75%)	46 (11.5%)	172 (43%)
Workforce should be developed through proper training of Lab personnel and epidemiologists for AMR surveillance	True	Female	166 (41.5%)	62 (15.5%)	228 (57%)
		Male	133 (33.25%)	39 (9.75%)	172 (43%)
Lab capacity (Ability) to test should be developed by the government	True	Female	185 (46.25%)	43 (10.75%)	228 (57%)
		Male	134 (33.5%)	38 (9.5%)	172 (43%)
Everyone needs to take responsibility for using antimicrobials responsibly	True	Female	200 (50%)	28 (7%)	228 (57%)
		Male	142 (35.5%)	30 (7.5%)	172 3%)

Knowledge of Antimicrobial Stewardship Actions (I.e Solutions to curb antimicrobial Resistance) Among Respondents

On assessing the responses of participants on the solutions to curb AMR, 88.75% (52.5% female and 36.25% male) believe that People should use antimicrobials only when they are prescribed

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by a doctor or pharmacist, and 72.25% (43.75%,28.5% female and male respectively) agree that People should not keep antimicrobials and use them later for other illnesses.

Half 49.25% (30.5% female and 18.75% male) responded correctly to the statement ''Farmers should give fewer antimicrobials to food-producing animals'', while 50.75% responded False or that they didn't know. 89.5% (51.75%, 37.75% female and male) correctly believe that Parents should make sure all of their children's vaccinations are up to date; with 71.25% (44%, 27.25% female and male) in agreement that Hand washing is important to the control of antimicrobial resistance.

85.5% (50.25%, 35.25% Female and male) responded correctly to the statement ''Doctors should only prescribe antimicrobials when they are needed, while 72.75% (41.75 % female and 31% male) agree that Governments should reward the development of new antibiotics to pharmaceutical companies.

On the aspect of Lab tests and capacity for AMR testing, 76.5% (45%, 31.75% female and male) responded correctly to the statement ''Lab tests (Antimicrobial susceptibility test) should be performed before antimicrobials prescription, 74.75% (41.5% female and 33.25% male) responded correctly to the statement ''Workforce should be developed through proper training of Lab personnel and epidemiologists for AMR surveillance while 79.75% (46.25%, 333.5% female and male) agree that Lab capacity (Ability) to test should be developed by the government, with 20.25% responding False and don't know to the statement. Majority, 85.5% (50% female, 35.5% male) of the respondents agree that Everyone needs to take responsibility for using antimicrobials responsibly.

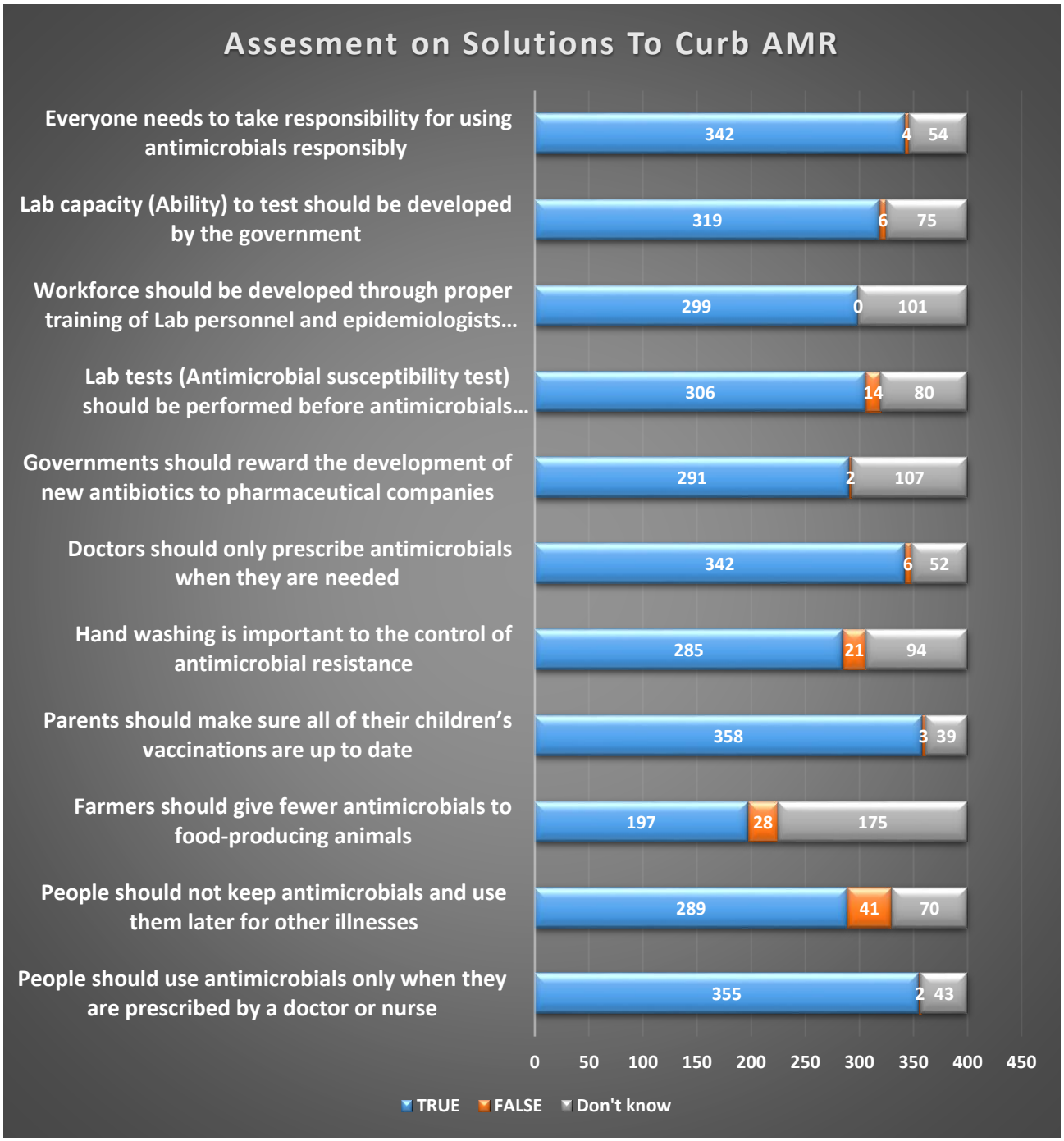

Figure 1: A Stacked-bar chart showing Proportion of participants with correct identification of true and false statements on knowledge of antimicrobial resistance among Maitama general hospital out-patients, Abuja.

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Table 2: Distribution of Respondents by the level of knowledge on Solutions to curb antimicrobial Resistance among Maitama general hospital out-patients, Abuja

Level of knowledge onSolutions to curb AMR	Total score	% Score	No of respondents, (%)Male	No of respondents, (%) Female	Total N (%)
Good Knowledge	≥ 8	>72%	132 (33.00%)	179 (44.75%)	311 (77.75%)
Fair Knowledge	5-7	45.5% - 63.6%	12 (3.00%)	28 (7.00%)	40 (10.00%)
Poor Knowledge	< 5	<45.5%	28 (7.00%)	21 (5.25%)	49 (12.25%)
Total			**172 (43%)**	**228 (57%)**	400 00%)

Knowledge of Antimicrobial Stewardship Actions (I.e Solutions to curb antimicrobial Resistance) Among Respondents

Table 2 shows the level of knowledge about solutions to curb AMR between male andfemale respondents showed 179 (44.75%) of female respondents had good knowledge, 28 (7.0%) had fair knowledge and 21 (5.25%) had poor knowledge. Of all the male respondents, 132 (33.0%) had good knowledge,12 (3.00)% had fair knowledge and 28 (7.00%) had poor knowledge. Summarily, 311 (77.75%) had good knowledge of antimicrobial stewardship, 40 (10%) had fair knowledge of antimicrobial stewardship and 49 (12.25%) had poor knowledge of antimicrobial stewardship. Their scores were accumulated by adding the total of correct answers (1) and wrong answers (0) to the questions in the survey. Figure 1, 2 and 3 gives a visual representation on the assessment on level of knowledge about solutions to curb AMR.

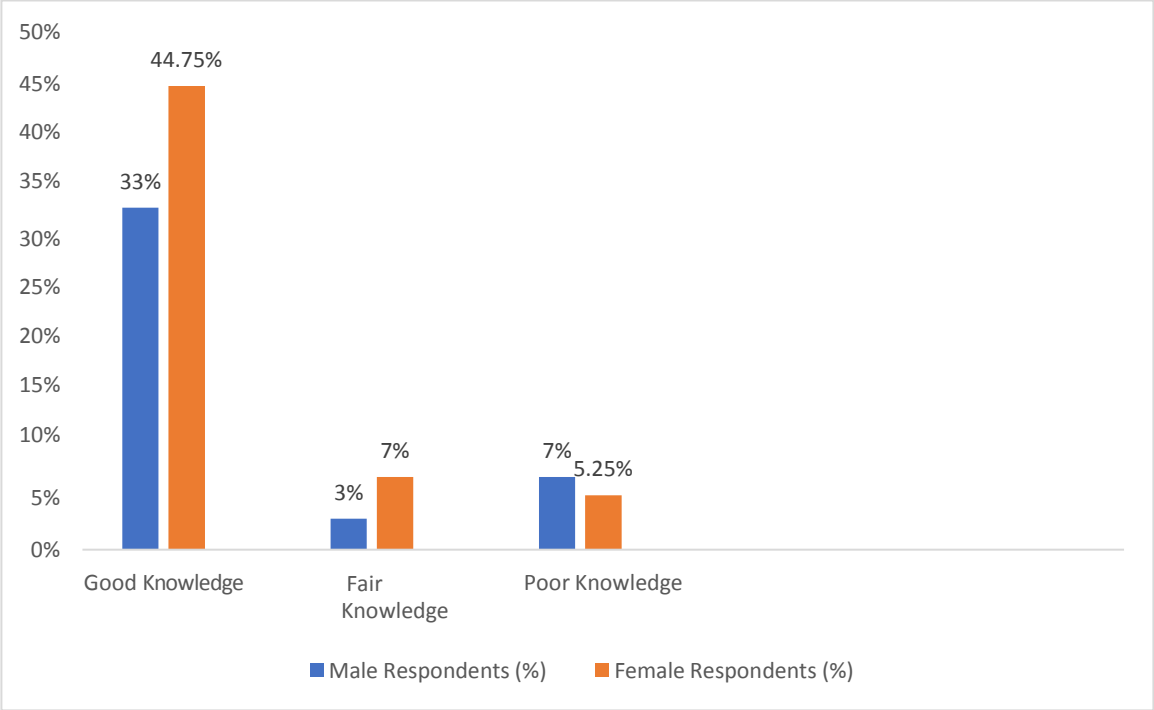

Figure 2: Column chart presentation of male and female respondents Knowledge levels on Solutionsto curb antimicrobial Resistance among Maitama general hospital out-patients, Abuja

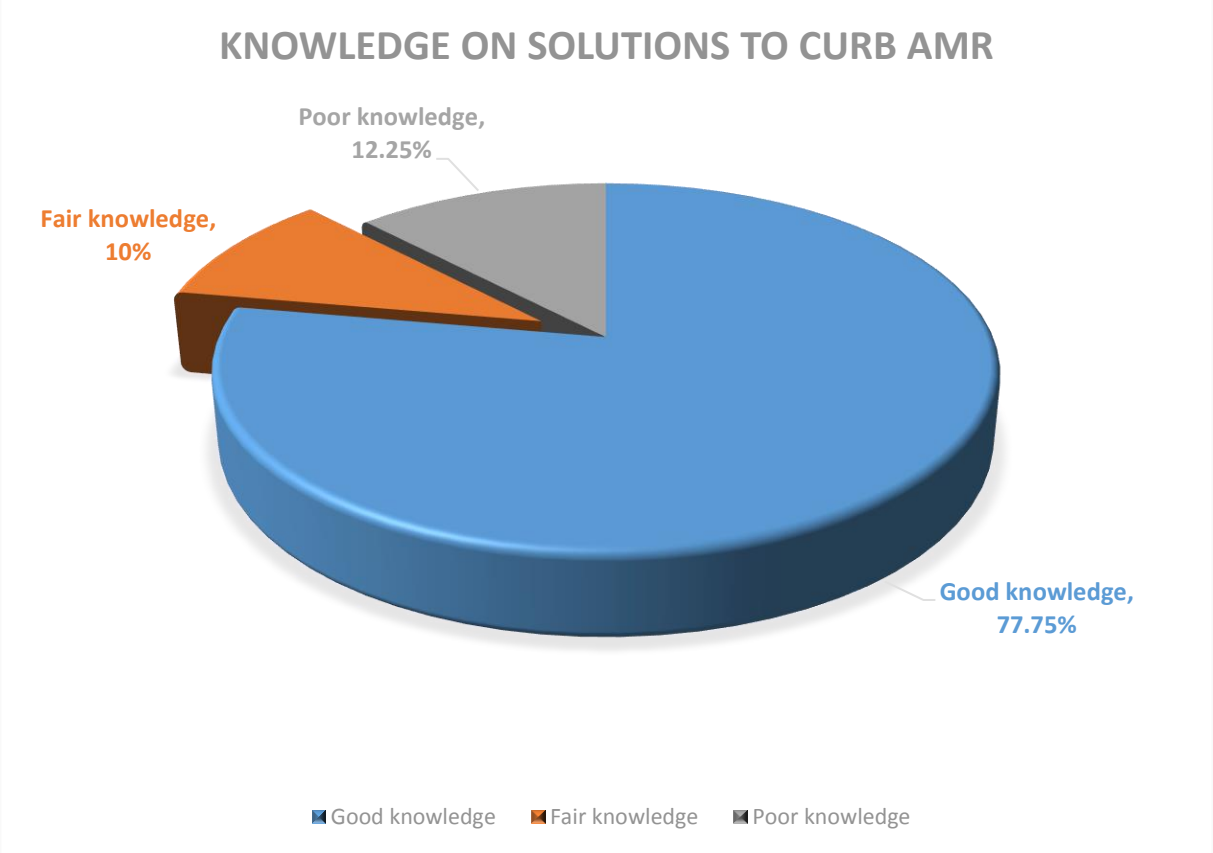

Figure 3: **Pie chart presentation of Total percentage Knowledge levels AboutAntimicrobial resistance among Maitama general hospital out-patients, Abuja**

Table 3: Description of scores (outcomes) obtained by respondents (n = 400)

Outcomes	**Maximum Obtainable Score**	**Scores Obtained by Respondents**		**Good *n (%)***	**Fair *n (%)***	**Poor *n (%)***
		Lowest	**Highest**			
Knowledge of Antimicrobial Stewardship Solutions to curb AMR)	11	0	11	77.75%	10%	12.25%

Table 3 shows a summary of the outcomes obtained by respondents, 77.75% gave satisfactory answers, 10% gave average answers and 12.25% gave unsatisfactory answers to questions regarding solutions to curb AMR.

DISCUSSION

In order to explore levels of knowledge and understanding around ways to address the problem of antibiotic resistance and foster antimicrobial stewardship, respondents were asked questions about series of actions to address the problem,and the majority of respondents agreed that all of these actions would help address the problem, with'Parents should make sure all of their children's vaccinations are up to date'' (89.5%) and ''People should use antimicrobials only when they are prescribed by a doctor or nurse' (88.75%) coming out on top (Table 1). Farmers should give fewer antimicrobials to food-producing animals was the least(49.25%) commonly

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agreed to, with most participants responding that they were not aware of the response to this question, this may be due to the fact that this survey was conducted in the hospital, perhaps a more structured survey targeting the farmers will provide more suitable responses to this particular question. Majority of respondents also made correct responses to Knowledge of antimicrobialstewardship actions (I.e Solutions to curb antimicrobial Resistance) among respondents like people should not keep antimicrobials and use them later for other illnesses, hand washing is important to the control of antimicrobial resistance, doctors should only prescribe antimicrobials when they are needed, governments should reward the development of new antibiotics to pharmaceutical companies and everyone needs to take responsibility for using antimicrobials responsibly. This is in contrast to finding from a study done in South Africa. [73] where 25% of patients thought that people should be given antibiotics on demand. Thus, there is a need to promote the prescription of antimicrobials only when needed. This gives credence to the current development of the 5-year National Action Plan (NAP) (2017–2022). The NAP seeks to address five critical issues in accordance with the WHO Global Action Plan on AMR which are advancing AMR education and awareness, creating a One Health AMR surveillance system, advancing infection prevention and control, encouraging responsible use of antibiotics and antimicrobial stewardship, and investing in AMR research and development[31] .

The level of knowledge about solutions to curb AMR between male andfemale respondents, 44.75% of female respondents had good knowledge, 7% had fair knowledge and 5.25% had poor knowledge. Of all the male respondents, 33% had good knowledge,3% had fair knowledge and 7% had poor knowledge. (Table 2). This is in contrast to studies done in Ghana[32] where 95% had good knowledge of antimicrobial stewardship. This difference may be due to the fact that the study done in Ghana was among health care workers like doctors, nurses, pharmacists. Our study was similar to study done in Zambia[33] where antimicrobial stewardship (AMS) knowledge was relatively low among physicians (51%) and pharmacists (39%). Antimicrobial stewardship programs are needed to address knowledge and understanding of antibiotic use and resistance, dispel myths about antibiotics, and increase awarenessin both the general public and clinical settings. These areas should be given priority in any health education and training session. To stop the evolution of antimicrobial resistance as a result of improper antibiotic usage, rigorous antimicrobial stewardship actions (ASP) implementation is required in all spheres of society[34]. A limitation to this study was that the responses to knowledge of antimicrobials stewardship questions were self-reported, and so the concern of response or recall bias is of consideration. Inherently, the cross-sectional study design was unable to establish temporality of knowledge variables, and was unable to track relative changes in these and other parameters.

CONCLUSION

Summarily, 311 (77.75%) had good knowledge of antimicrobial stewardship, 40 (10%) had fair knowledge of antimicrobial stewardship and 49 (12.25%) had poor knowledge of antimicrobial stewardship.

RECOMMENDATIONS

Antimicrobial stewardship programmes (AMS) are designed to improve the use of antimicrobials, and they have been developed and implemented successfully. Antimicrobial

stewardship (AMS) should be planned and organized in communities and among patients in the hospitals[18].

Antimicrobial stewardship (AMS) programs should be introduced into undergraduate training programs for health care workers and also be included in regular training's for health professionals, to expand their ability and continue their professional development (CPD). This will increase their ability to comprehend antimicrobials and resistance and how they may effectively spread awareness to the general population.

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