



Effect of Intervention Training on Pharmacists' Knowledge and Attitude to Antibacterial Counselling

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Authors' contributions

All the authors contributed to the success of this work. Author AAM designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors KMO and OAI managed the analyses of the study and managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

The effectiveness of counselling patients on antibacterial rational use by pharmacists depends on their knowledge and attitude to counselling. This study evaluated the effect of intervention training on pharmacists' antibacterial therapy knowledge and attitude to counselling.

It was a cross-sectional questionnaire-based study among all the pharmacists (n=45) responsible for patients' antibacterial counselling in seventeen government secondary health care institutions in Ogun state of Nigeria between November 2017 and May 2018. Identified deficits were addressed through intervention and re-assessment was carried out after a month.

Twenty four (53.3%) were females. Twenty one (46.7%) had hospital pharmacy experience of over 10 years and mean year of experience was 10.7±6.7. Sixteen (35.6%) and 36 (80.0%) believed that antibacterial resistance may be prevented by taking antibacterial medication at regular intervals at the baseline and post intervention phases respectively. Thirty three (73.3%) and 44 (97.8%) had the opinion that pharmacists and patients are active participants in effective antibacterial counselling at the two phases respectively. Twenty eight (62.2%) and 44 (97.8%) had scores ≥ 70.0% signifying good knowledge pre and post intervention respectively.

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Disclosure of antibacterial identity to patients was believed to be necessary by thirty six (80.0%) and 43 (95.6%) while 27 (60.0%) and 43 (95.6%) exhibited positive attitude to antibacterial counselling at the two phases respectively. There was significant improvement in antibacterial knowledge and attitude to counselling ($p < 0.001$) post intervention. Regular antibacterial therapy and counselling training is hereby recommended for pharmacists.

Keywords: Antibacterials; knowledge; attitude; counselling.

ABBREVIATIONS

AMR : Antimicrobial resistance

WHO : World Health Organization

CDC : Centre for Disease and Prevention Control

1. INTRODUCTION

The great success in the treatment of bacterial infections and related diseases is being seriously threatened by the insurgence of antibacterial resistance [1,2]. Antimicrobial resistance (AMR) is the loss of efficacy of antibacterial agent against originally susceptible bacteria [3]. Irrational (non-prudent) antibacterial use has been identified to be the major cause of antibacterial resistance worldwide [4,5]. It may occur at different stages of antibacterial therapy including: indication, selection, dosage, treatment duration, antibacterial use and compliance with course of therapy [2,4].

Consequences of irrational antibacterial use include resistance to treatment, extended, duration of illness, loss of cost effective treatment as well as increase morbidity and mortality [6]. Over 25,000 people were reported in the European Union (EU) to die of antibacterial resistant diseases yearly [6]. In the United States of America (USA), the Centre for Disease Control and Prevention estimated that two million people acquire antibacterial resistant infections yearly, resulting in about 23,000 deaths [7]. The World Health Organization (WHO) puts the annual cost of treatment due to antibacterial resistance in the European hospitals at £1.5bn [5] equivalent to Nigerian ₦589.16bn at central bank of Nigeria currency exchange rate of ₦392.7706 to a £ as at October 16th 2019.

The challenge of irrational antibacterial use is global but it is more pronounced in developing countries such as Nigeria. Insufficient public awareness on antibacterial therapy has been identified as a factor leading to self-medication and incorrect use of antibacterials [8,9,10]. Studies have identified short consultation time,

poor patient-dispenser interactions, patients' demand for antibacterials and unfortunate infrastructural status of health institutions as some of the factors contributing to antibacterial misuse [11,12]. Efforts should therefore be geared towards ensuring rational use of antibacterials through adequate counselling of patients and their caregivers. Well-counselled patients will become identified with and be more concerned for their treatment with the likelihood of significant improvement in adherence [13].

Effectiveness of pharmacists counselling has been established in antihypertensive therapy, improved blood pressure control and proper use of medication devices such as inhalers or medical patches [14,15]. Proper counselling of patients on their medication might be the solution for rational antibacterial use [16]. The potential of pharmacists in antibacterial counselling have not been fully backed up with evidence-based research in Nigeria. The present study therefore evaluated the baseline knowledge and attitude of pharmacists to antibacterial therapy and counselling in this geographical region. Gaps in knowledge identified were addressed via education intervention and scripted drama. It is hoped that findings from the study will be useful in establishing and improving pharmacists' knowledge and attitude to antibacterial counselling. N/B MR C S DAFT and the full meaning is hereby moved to under materials and methods section.

2. MATERIALS AND METHODS

The study was carried out in seventeen government-owned secondary health care facilities in Ogun state of Southwest Nigeria between July 2017 and May 2018. It was a cross sectional survey among all the forty five pharmacists involved with dispensing and counselling of patients at the outpatients department of the health care institutions. The study comprises of (1) baseline survey (2) intervention and (3) post intervention survey. The limited number of available pharmacists compels

the inclusion of all eligible pharmacists in the study.

2.1 Data Collection Instrument

The data collection instrument was a structured questionnaire. It consisted of four sections: (a) pharmacists' demographic characteristics, (b) Questions that assessed antibacterial therapy knowledge of the pharmacists (c) knowledge questions on antibacterial counselling and (d) evaluation of pharmacists' attitude to antibacterial counselling.

2.2 Validation and Pretest of Data Collection Instrument

2.2.1 Pretest of data collection instruments

Content and face validity of the questionnaire was ascertained by discussion with two lecturers (pharmacists) at the Department of Clinical Pharmacy and Pharmacy Administration. These lectures are knowledgeable in construction of questionnaires in similar surveys. Their contributions led to rewording of some questions after which the content was considered satisfactory. A pre-test of the questionnaire was carried out at Sacred Heart Hospital, Lantoro, Abeokuta, Ogun state of Nigeria which is also a secondary health care institution like those selected for the study. Two pharmacists participated in the pre-test. This led to rephrasing of some questions while some were removed. The result of the pre-test was not included in the final analysis.

2.2.2 Reliability of data collection instrument

The reliability of the questionnaire was established by applying Cronbach's Alpha test. The value of Cronbach's Alpha for the questionnaire ranged from 0.696 to 0.828. Cronbach's Alpha threshold ≥ 0.7 is generally acceptable by researchers as satisfactory [17].

2.3 Procedure for Data Collection

All the eligible pharmacists assented to partake in the study and the pharmacists' questionnaire was given to them after signing the informed consent. The average response time was 45 minutes. Pharmacists that were not able to respond immediately were re-visited until they were available for immediate response. The baseline survey was carried out from July 2017 to September 2017, Monday to Friday 7.30 am to 3.30 pm within the study period. The data

obtained were coded and entered into the Statistical Package for Social Science (SPSS version 20).

2.4 Processing of Baseline Data

The data were transformed into scale data by allocating scores to the responses. Test of knowledge was computed by allocating a score of 1 to correct response, and 0 to incorrect response. Pharmacist individual percentage knowledge score was computed by dividing score obtained by individual pharmacist with total obtainable score multiplied by 100, ranging between 0-100%.

$$\text{Individual Percentage knowledge score} = (\text{Score obtained}/\text{total obtainable score} \times 100)$$

A cut off percentage score of $\geq 70.0\%$ was set as good knowledge while percentage score $<70.0\%$ was adjudged to be poor knowledge. Attitudinal score was similarly computed.

$$\text{Individual Percentage Attitudinal score} = (\text{score obtained}/\text{total obtainable score} \times 100)$$

A percentage attitudinal score $\geq 70.0\%$ was considered to be positive attitude while $< 70.0\%$ was regarded as negative attitude [18].

2.5 Intervention Training

The intervention training comprised educational training and scripted drama developed to address the identified gaps in knowledge. The training was conducted between December 2017 and January 2018.

2.5.1 Antibacterial training seminar

The antibacterial training seminar was handled by a hospital based pharmacist with doctorate degree in pharmaceuticals in collaboration with the researcher. The training was done in three locations. Each participant attended one of the training sessions. Knowledge gaps identified from the baseline survey include: missed doses, regular dosing intervals, complete course of therapy, side effects, duration, antibacterial awareness and identification, food and drug interactions and action to take in case of delay or failure in therapy. Considering the identified gaps in line with the guidelines on counselling by Prince Edward Island Pharmacy Board [19], a mnemonic MR CS DAFT was coined. The intervention training was therefore "MR C S DAFT"-guided coined by the investigator as

counselling tips in antibacterial counselling. MR C S DAFT signifies: M = Missed dosage, R = Regularity of dosages, C = Completing the course of therapy, S = Side effects, D = Duration of therapy, A = Antibacterial awareness and identification, F = Food and drug interactions, T = Therapy delay/failure.

2.5.2 Pre and post intervention training evaluation

The training seminar was evaluated by means of a pre- and post-test. This comprised eleven (11) questions which include seven (7) questions on knowledge and four (4) questions on pharmacists' attitude to antibacterial counselling. They were required to respond to the questions within 7 minutes before and after the seminar respectively. The response of each pharmacist was coded so as to allow for matching. Each correct response was allotted a unit score while an incorrect response attracted zero. Individual percentage score was computed as:

$$\text{Individual \% score} = (\text{individual score} \div \text{total obtainable score} \times 100)$$

A score $\geq 70.0\%$ was considered good knowledge while scores $< 70.0\%$ was adjudged to be poor [18].

2.5.3 Scripted drama

It is generally believed that people tends to remember demonstrated actions better, hence the pharmacists were engaged in different scenarios of antibacterial counselling. The scripted drama scenarios were to demonstrate the possibility of effective antibacterial counselling within an average period of three minutes being guided by the mnemonic: MR C S DAFT. This takes care of gaps identified from the baseline study and brings into memory important areas of antibacterial counselling hitherto neglected by the pharmacists. Five scenarios on effective antibacterial counselling addressing different circumstances were demonstrated by pharmacists and moderated by the investigator. In each scenario, one pharmacist acted the part of a pharmacist counsellor and the other as a patient with antibacterial containing prescription. Every pharmacist participated in at least one of the scenarios.

The first scenario addressed a patient with a single antibacterial drug with emphasis on regularity of dosage intervals and completion of

course of treatment. Scenario two: concerned the use of empathy to gain the attention and cooperation of a nervous patient. Scenario three was on antibacterial-drug interactions; scenario four dealt with antibacterial-drug and antibacterial-food interactions while the fifth scenario was on patients with more than one antibacterials. All the scenarios took place in a semi-private setting to de-emphasize window dispensing.

2.6 Post Intervention Survey

This was conducted a month post intervention and involved the re administration of the same questionnaire as at baseline to the pharmacists. This was carried out from March to May 2018. The data collected was coded and entered in to the SPSS- package version-20.

2.7 Data Analysis

Descriptive statistics such as frequency, percentage and mean \pm standard deviation were used to summarize the data. Chi-square and Fisher's exact tests was used to test associations, paired-t test to compare mean scores and McNemar test was used to compare the difference of scores between each response (SPSS version 20).

3. RESULTS

3.1 Socio-demographic Distribution of Pharmacists in the Selected Institutions (n=45)

All the 45 pharmacists in the selected hospitals participated in the study both at the baseline and the post-intervention surveys. There were slightly more females, 24 (53.3%) than males, 21 (46.7%). Ten (22.2%) of the pharmacists were within the age bracket of 20-30 years, 19 (42.2%) were between 30-40 years while 16 (38.6) were above 50 years. Their mean age was 38.2 ± 7.5 years. Thirty eight (84.4%) were married and 28 (62.2%) had no post graduate experience. Twenty one (46.7%) had hospital pharmacy experience of over 10 years and the mean year of experience was 10.7 ± 6.7 .

3.2 Pre and Post- Training Evaluation (n=45)

The pre- and post-intervention assessment revealed that 37 (82.2%) of the pharmacists demonstrated good knowledge of antibacterial therapy and counselling before the training while

all the 45 (100.0%) manifested good knowledge after the training. Comparison of the mean scores between pre- and post-tests, applying paired T-test showed the mean knowledge scores to be 5.5 ± 1.3 and 6.6 ± 0.6 respectively. The difference of mean was significant, $P < 0.001$ (Table 1). Thirty two (71.1%) and 43 (95.6%) of the pharmacists exhibited positive attitude to antibacterial counselling with a score $\geq 70\%$ before and after the intervention training respectively (Table 1). The difference of mean scores was significant ($P < 0.001$).

3.3 Baseline and Post Intervention Pharmacists' Knowledge of Antibacterial Therapy, Counselling and Attitude to Antibacterial Counselling (n = 45)

Sixteen (35.6%) and 36 (80.0%) of the pharmacists believed that antibacterial resistance may be prevented by taking antibacterial medication at regular intervals pre and post intervention respectively. There was significant difference between the responses at the two phases (Table 2). Forty three pharmacists (95.6%) believed that duration of therapy should be included in patients' antibacterial counselling at the post intervention rather than 39 (86.7%) at the baseline survey. Thirty three (73.3%) and 44 (97.8%) of the pharmacists had the opinion that pharmacists and patients are active participants in effective antibacterial counselling at the two phases respectively. Good antibacterial counselling knowledge depicted with scores $\geq 70.0\%$ was demonstrated by twenty eight (62.2%) and 44 (97.8%) of the pharmacists respectively (Table 3). Disclosure of antibacterial identity to patients was believed to be necessary by 36 (80.0%) and 43 (95.6%) pharmacists at the two phases respectively. Twenty seven (60.0%) and 43 (95.6%) exhibited positive attitude to antibacterial counselling pre and post intervention respectively (Table 4).

3.4 Comparison of Baseline and Post Intervention Knowledge and MR CS DAFT- Guided Intervention on Antibacterial Therapy and Counselling (n=45)

The results of the MR CS DAFT- guided intervention for the pharmacists are shown in Table 5. The mean pharmacists' knowledge score increased from 4.8 ± 1.3 to 7.1 ± 0.8 between the two phases. The difference of mean was significant ($p < 0.001$).

4. DISCUSSION

Irrational use of antibacterial agents is still a great challenge to success of antibacterial therapy. Despite all efforts, irrational usage of antibacterials continues to thrive. Patients need to be adequately counselled, [2,20] the effectiveness of which depends on the knowledge and attitude of pharmacists to antibacterial counselling.

Challenges exist in determining the knowledge and attitude of pharmacists to antibacterial counselling and designing suitable intervention that will address identified gaps. The current study succeeded in discovering and addressing pharmacists' antibacterial therapy, counselling knowledge and attitudinal deficits.

4.1 Pharmacists' Knowledge of Antibacterial Therapy and Counselling

The baseline knowledge of the pharmacists on antibacterial therapy was poor. They however exhibited a rather good counselling knowledge. The poor knowledge demonstrated by pharmacists here is in line with earlier study in Ethiopia [16]. There was significant improvement in pharmacists' knowledge post intervention.

Only a minority were of the opinion that the challenge of antibacterial resistance can be resolved by using antibacterial drugs at regular intervals. Irregular dosing of antibacterials may lead to very low concentration which may be ineffective and thus encourage the growth of resistant strains. Too frequent dosing may produce peak serum concentrations which might be lethal [2,21]. Antibacterials should therefore be administered at regular intervals to ensure maintenance of serum level within the therapeutic window. A twice daily antibacterial drug is best taken every twelve hours rather than two times daily [21]. There was significant improvement in response ($P < 0.001$) at the post intervention.

More than half the pharmacists wrongly believed that effectiveness of antibacterials whose absorption could be hindered by food interactions cannot be improved by using the drug one hour before or two hours after meals. Oral penicillins, co-trimoxazole, ciprofloxacin, tetracycline and azithromycin, in the capsule form are better taken one hour before or two hours to meals for good absorption [21].

Pharmacists knowledge on antibacterial-food interactions improved significantly post intervention ($p < 0.001$).

More than half of the pharmacists held the opinion that cost of therapy may not be increased by prolonging course of therapy unduly [22] Rational antibacterial use is the prescription and dispensing of the right antibacterial drug(s) for the right patient in adequate dose for sufficient duration as appropriate to the clinical needs of the patient at the lowest cost [23]. Prolonging course of therapy may increase cost of therapy and the chance of adverse reactions especially in antibacterials with narrow therapeutic index [21].

Probing into patients' allergic history is very important in antibacterial counselling. Some antibacterials such as the penicillins, cephalosporins, sulphonamides are associated with allergic effects Allergic reactions could be detrimental [19,21,24]. The current study revealed that only minority of the pharmacists was in support of probing into patients' allergic history; this improved significantly post intervention $P < 0.001$.

4.2 Pharmacists' Attitude towards Counselling of Patients on Antibacterial Usage

The attitude of pharmacists to antibacterial counselling is vital to ascertaining rational drug therapy and improving therapeutic outcome[1,16]. From the present study, majority of the pharmacists' manifested positive attitude to antibacterial counselling. More than half had the belief that antibacterial counselling is pharmacists' responsibility. This finding differs from that reported in another study [16] held among community pharmacists. A study conducted in Karnataka which is a state in the south western region of India [25] reported that most of the respondents believed that patient counselling is the professional obligation of pharmacists. It is possible that, pharmacist-patient ratio may be lower in Karnataka than in the present setting.

The dynamic nature of drugs particularly antibacterials makes regular updating of drug mandatory. New products and information about existing ones are being discovered. Pharmacists especially those involved with counselling of patients on medication use must keep themselves abreast of updates so as to be

effective in counselling [26]. Pharmacists should acknowledge their responsibility of patients' counselling and ensure regular updating of knowledge [1]. In the present study, majority of the pharmacists agreed to the need for regular updating of knowledge. This is at variance with the minority reported by Ayalew, et al. [16]. The attitudinal difference between the participants of the two studies may be as a result of different in the field of practice.

More than half, of the pharmacists believed that antibacterial identity should not be concealed from the patients. It is important that patients are aware of the identity of the antibacterial drug(s) they are to use. This is likely to make them realize the peculiarity of the antibacterial agent as distinct from others and may improve adherence. Post intervention revealed significant improvement in pharmacists' support for disclosure of antibacterial identity to patients ($P = 0.039$).

Most of the pharmacists were of the view that shortage of pharmacists is a justifiable reason for ineffective patients' counselling. Counselling of patients on medication use is one of the most important services conducted by pharmacists that attend to patients [27]. The general complain of shortage of pharmacists at the hospitals must not hinder effective counselling.

Majority of the pharmacists agreed that pharmacists should be responsible for follow up of patients on antibacterial therapy. The pharmacists should establish a system of follow up on patients that are counselled. Documenting patients' phone contacts will make it easier to get at the patient if need arises. Pharmacists on call duty may have their phone contacts displayed at the pharmacy. This will make it possible for patients to contact the pharmacy when necessary.

4.3 MR C S DAFT- Guided Intervention Training

The post intervention findings of the present study, confirmed the effectiveness of the MR CS DAFT-guided intervention in addressing the gaps in knowledge identified from the study. The effectiveness of the approach reflected in the significant improvement in therapy and counselling knowledge of the pharmacists.

Table 1. Intervention training evaluation result (N = 45)

| Statements | Pre Intervention | | Post Intervention | | McNemar p-value |
|---|----------------------------|------------|-------------------|------------|--------------------|
| | N (%) | N (%) | N (%) | N (%) | |
| | Yes | No | Yes | No | |
| Antibacterial Therapy and Counselling Knowledge | | | | | |
| Antibacterial drug are better taken on daily basis rather than hourly intervals | 15 (33.3) | 30 (66.7)* | 4 (8.9) | 41 (91.1)* | 0.019 |
| Probing into patients' allergic history is of great benefit in antibacterial counselling | 39 (86.7)* | 6 (13.3) | 41 (91.1)* | 4 (8.9) | 0.754 |
| Ignorance of antibacterial side effects may aid patients' non compliance with regimen | 35(77.1)* | 10(22.2) | 43 (95.6)* | 2 (4.4) | 0.021 |
| It is advisable to stop antibacterial therapy once relief of symptoms of ailment being treated has been achieved | 12 (26.7) | 33(73.3)* | 4 (8.9) | 41(91.1)* | 0.057 |
| Written and proper verbal counsels are equally important in antibacterial usage | 32 (71.1)* | 13(28.9) | 44(97.8)* | 1 (2.2) | 0.002 |
| Probing patients for possible possession of drugs at home may help to prevent drug-drug interactions | 41.(91.1)* | 4(8.9) | 44 (97.8)* | 1 (2.2) | 0.375 |
| Not all patients on antibacterial treatment should be counseled on duration of treatment | 8 (17.8) | 37 (82.2)* | 2(4.4) | 43 (95.6)* | 0.109 |
| Attitude to Antibacterial Counselling | | | | | |
| Disclosure of antibacterial identity to patients should be encouraged | 31 (68.9)* | 14 (31.1) | 42 (93.3)* | 3 (6.7) | 0.013 |
| In antibacterial counselling, the pharmacists are the active participants while the patients are the passive participants | 26 (57.8) | 19 (42.2)* | 6 (13.3) | 39(86.7)* | < 0.001 |
| Shortage of staff (pharmacists) is a justifiable reason forpoor antibacterial counselling | 7 (15.6) | 38 (84.4)* | 42 (93.3) | 3 (6.7)* | 0.289 |
| Counselling and post counselling follow up of patients on antibacterials should be the responsibility of pharmacists | 43 (95.6)* | 2 (4.4) | 44 (97.8)* | 1 (2.2) | 1.000 |
| Cut off of knowledge score | | | Remark | | |
| < 70.0% | 8 (17.8) | | 0 (0.0) | | Poor Knowledge |
| ≥ 70.0% | 37 (82.2) | | 45 (100.0) | | Good Knowledge |
| Mean ±SD | (Paired T- test) 5.5 ± 1.3 | | 6.6 ± 0.6 | | P < 0.001** |
| Cut off of Attitudinal score | | | Remarks | | |
| < 70.0% | 13 (28.9) | | 2 (4.4) | | Negative Knowledge |
| ≥ 70.0% | 32 (71.1) | | 43 (95.6) | | Good Positive |
| Mean ±SD | (Paired T- test) 2.9 ± 0.8 | | 3.7 ± 0.5 | | P< 0.001** |

*Correct response = 1, incorrect response = 0, maximum obtainable knowledge score = 7, % individual knowledge score = score obtained by individual ÷ total obtainable score × 100. Significant difference in mean scores P < 0.001. % individual Attitude = score obtained by individual ÷ total obtainable score × 100. Maximum attitudinal score = 4. Significant difference in mean scores (P < 0.01) **

Table 2. Comparison of pharmacists' knowledge of antibacterial therapy at baseline and post intervention surveys (N = 45)

| Statement | Baseline survey | | Post intervention survey | | McNemar test |
|--|------------------|-----------------|--------------------------------|-----------------|--------------|
| | Yes N (%) | No N (%) | Yes N (%) | No N (%) | p – value |
| Antibacterial drug whose absorption may be hindered by food is best taken at least one hour before or two hours after meal | 15 (33.3)* | 30 (66.7) | 43 (95.6)* | 2(4.4) | < 0.001 |
| Antibacterial-food interaction cannot be avoided by using the drug at a specified space of time to meals | 10 (22.2) | 35 (77.8)* | 1 (2.2) | 44 (97.8)* | 0.012 |
| Antibacterial resistance has the potential of ushering health care system into 'post antibacterial era' | 35 (77.8)* | 10 (22.2) | 37 (82.2)* | 8 (17.8) | 0.774 |
| Antibacterial resistance may be prevented by taking antibacterial medication at regular intervals | 16 (35.6)* | 29 (64.4) | 36 (80.0)* | 9 (20.0) | < 0.001 |
| Antibacterial effectiveness may be improved by taking the medication at a specified time | 18 (40.0)* | 27 (60.9) | 37 (82.2)* | 8 (17.8) | < 0.001 |
| Prolonging antibacterial therapy unduly may not increase cost of therapy | 26(57.8) | 19 (42.2)* | 8 (17.8) | 37 (82.2)* | < 0.001 |
| In antibacterial therapy, it is advisable to probe into patient's allergic history | 10 (22.2)* | 35(77.8) | 41 (91.1)* | 4 (8.9) | < 0.001 |
| Mean knowledge score | 3.3 ± 1.2 | | 6.0 ± 0.9 (p <0.001) | | |
| Cut off of pharmacists' % knowledge score on Antibacterial Therapy | Remark | | Remark | | |
| < 70.0% | 37 (82.2) | Poor Knowledge. | 5 (11.1) | Poor Knowledge. | |
| ≥ 70.0% | 8 (17.8) | Good Knowledge. | 40 (88.9) | Good Knowledge. | |

*Correct response = 1, incorrect response = 0, maximum obtainable score = 7, % individual knowledge score = (score obtained by individual ÷ total obtainable score) × 100

Table 3. Comparison of baseline and post intervention knowledge of pharmacists on antibacterial counselling (N = 45)

| Statements | Baseline survey | | Post intervention survey | | McNemar |
|--|-----------------|-------------|--------------------------|------------|---------|
| | Yes N (%) | No N (%) | Yes N (%) | No N (%) | p-value |
| Patients' counselling on antibacterial usage should not include duration of therapy | 6 (13.3) | 39 (86.7) * | 2 (4.4) | 43 (95.6)* | 0.039 |
| Patients' knowledge of antibacterial use can be enhanced by clearly written guides | 23 (51.1)* | 22 (48.9) | 43 (95.6)* | 2 (4.4) | < 0.001 |
| Counselling patients on likely side effects may not be necessary | 8 (17.8) | 37 (82.2)* | 2 (4.4) | 43 (95.6)* | 0.109 |
| Pharmacists and patients are active participants in antibacterial counselling | 33 (73.3)* | 12 (26.7) | 44.(97.8)* | 1 (2.2) | 0.003 |
| Counselling patients on demerits of antibacterial misuse/abuse is not beneficial | 6 (13.3) | 39 (86.7)* | 1 (2.2) | 44 (97.8)* | 0.125 |
| It is advisable to counsel patients on antibacterial therapy to stop the medication once perfect relief has been achieved | 7 (15.6) | 38 (84.4)* | 1 (2.2) | 44 (97.8)* | 0.012 |
| Antibacterial counselling must necessarily include completion of dosage and taking the antibacterial drug at regular intervals | 42 (93.3)* | 3 (6.7) | 44 (97.8)* | 1 (2.2) | 0.500 |

| | | | | | |
|---|------------------|-----------------|------------------|----------------|-----------------------|
| The most appropriate counsel for patients in case of missed dosage, is to take the missed dose immediately he/she remembers | 32 (71.1)* | 13 (28.9) | 40 (88.9)* | 5 (11.1) | 0.057 |
| Antibacterial capsule prescribed as i daily is best communicated to patients as: take one capsule every 24 hours | 25 (55.6)* | 20 (44.4) | 38 (84.4)* | 7 (15.6) | 0.007 |
| Mean knowledge score | 6.8 ± 1.5 | | 8.5 ± 0.7 | | (p < 0.001) |
| Cut off of individual pharmacist % knowledge score on counselling patients antibacterial on use | Remark | | Remark | | |
| < 70% | 17 (37.8) | Poor Knowledge. | 1 (2.2) | Poor Knowledge | |
| ≥ 70% | 28 (62.2) | Good Knowledge. | 44 (97.8) | Good Knowledge | |

*Correct response = 1, Incorrect response = 0, maximum obtainable score = 9, % individual knowledge score = score obtained by individual ÷ total obtainable score × 100

Table 4. Comparison of pharmacists' attitude to patients counselling at baseline and post intervention surveys (N =45)

| Statements | Baseline | | Post intervention | | McNemar |
|---|------------------|-------------------|-------------------|-------------------|-----------------------|
| | Yes N (%) | No N (%) | Yes N (%) | No N (%) | |
| Shortage of pharmacists in most hospitals is a justifiable reason for ineffective counselling | 26 (57.8) | 19 (42.2)* | 16 (35.6) | 29 (64.4)* | 0.064 |
| Pharmacists should be responsible for follow up of patients on antibacterial therapy: | 31 (68.9)* | 14 (31.1) | 42 (93.3)* | 3 (6.7) | 0.003 |
| Feedback may not always be necessary in antibacterial counselling | 4 (8.9) | 41 (91.1)* | 3 (6.7) | 42 (93.3)* | 1.000 |
| 'Sorry Madam, If you don't mind, I just want to call your attention to something about your medication' This statement seems effective in approaching an angry and non co-operating patient | 33 (73.3)* | 12 (26.7) | 38 (84.4)* | 7 (15.6) | 0.267 |
| Effective antibacterial counselling necessitates regular update of knowledge | 43 (95.6)* | 2 (4.4) | 44 (97.8)* | 1 (2.2) | 1.000 |
| I regularly make use of the internet to update my knowledge of antibacterial therapy and counselling | 24 (53.3)* | 21 (46.7) | 43 (93.3)* | 2 (4.4) | < 0.001 |
| Window counselling is always appropriate in antibacterial therapy | 8 (17.8) | 37 (82.2)* | 4 (9.9) | 41 (91.1)* | 0.388 |
| Antibacterial identity should not be disclosed to patients | 9 (20.0) | 36 (80.0)* | 2 (4.4) | 43 (95.6)* | 0.039 |
| Most patients on antibacterial medication need no counselling | 7 (15.6) | 38 (84.4)* | 6 (13.3) | 39 (86.7)* | 1.000 |
| Mean knowledge score | 6.7 ± 1.6 | | 8.0 ± 0.9 | | (p < 0.001) |
| Cut off of pharmacists % attitudinal score to counselling res | N (%) | Remark | N (%) | Remark | |
| <70% | 18 (40.0) | Negative Attitude | 2 (4.4) | Negative Attitude | |
| ≥ 70% | 27 (60.0) | Positive Attitude | 43 (95.6) | Positive Attitude | |

Maximum obtainable score = 9; % individual attitudinal score = (score obtained by individual ÷ total obtainable score) × 100

Table 5. Pharmacists’ knowledge and MR CS DAFT – Guided intervention on antibacterial therapy and counselling (N = 45)

| Statements | Baseline | | Post intervention | | McNemar |
|---|------------------|----------------|---------------------------------|-----------------|----------|
| | Yes N (%) | No N (%) | Yes N (%) | No N (%) | p- value |
| Missing of dosage often necessitates counselling patient to take the missed dose immediately he/she remembers | 32 (71.1)* | 13 (28.9) | 40 (88.9)* | 5 (11.1) | 0.057 |
| Regular dosing is effective in addressing the challenge of antibacterial resistance | 16 (35.6)* | 29 (64.4) | 36(80.0)* | 9 (20.0) | < 0.001 |
| Completing the course of antibacterial treatment is not essential once there is apparent relief | 7 (15.6) | 38 (84.4)* | 1 (2.2) | 44 (97.8)* | 0.012 |
| Side effects of antibacterials are not necessary consideration in counselling of patients | 8 (17.8) | 37 (82.2)* | 2 (4.4) | 43 (95.6)* | 0.109 |
| Duration of antibacterial therapy, if prolonged unduly may not increase cost | 26 (57.8) | 19 (42.2)* | 8 (17.8) | 37 (82.2)* | < 0.001 |
| Awareness of antibacterial identity should not be encouraged when counselling patients | 9 (20.0) | 36 (80.0)* | 2 (4.4) | 43 (95.6)* | 0.039 |
| Food interaction with antibacterials whose absorption may be hindered by food is preventable by taken the antibacterial drug one hour before or two hours after meals | 15 (33.3)* | 30 (66.7) | 43 (95.1)* | 2(4.4) | < 0.001 |
| Therapy delay or failure may necessitate that pharmacist re-evaluate therapy options before referring the patient to the physician | 24 (53.3)* | 21 (46.7) | 34 (75.6)* | 11 (24.4) | 0.031 |
| Mean knowledge score (Paired T-test) | 4.8 ± 1.3 | | 7.1 ± 0.8 (p < 0.001) | | |
| Cut off of pharmacists % knowledge score of antibacterial therapy and counselling | N (%) | Remark | N (%) | Remark | |
| < 70% | 32 (71.1) | Poor knowledge | 2 (4.4) | Poor knowledge | |
| ≥ 70% | 13 (28.9) | Good knowledge | 43 (95.6) | Good knowledge. | |

*Correct response = 1, incorrect response = 0, maximum obtainable score = 8, % individual knowledge score = (score obtained by individual ÷ total obtainable score) × 100. M= Missed dosage, R = Regular dosage intervals, C = Completion of course of therapy, S = Side effect, D = Duration, A = Antibacterial awareness and identification, F = Food and drug interactions, T = Therapy delay or failure

Application of McNemar test revealed the pharmacists' knowledge on missed dosage, regular dosage intervals, completion of course of therapy, duration of treatment, awareness and antibacterial identity, food and antibacterial interactions increased significantly $p < 0.05$ at the post intervention. The increase in knowledge on side effects and delayed or failure of antibacterial activities was not significant, $p = 0.065$ and 0.064 respectively. The comparison of mean knowledge scores revealed significant improvement in the pharmacists' antibacterial therapy and counselling knowledge after the intervention ($p < 0.001$).

5. LIMITATIONS

The study has some limitations which should be considered while interpreting the findings. The pharmacists were somewhat few in number. This necessitated the use of total sampling of the pharmacists in the study. The use of dichotomous Yes or No questions format in ascertaining the pharmacists' attitude rather than the Likert scale may be viewed as a limitation. However the approached here was employed to enhance quick response.

6. CONCLUSION

From the findings of this study it can be concluded that the baseline knowledge of pharmacists in antibacterial therapy was poor with fairly good knowledge in antibacterial counselling. Pharmacists' attitude to antibacterial counselling was found to be on the positive side. The significant improvement in the pharmacists' mean knowledge and attitudinal scores confirmed the effectiveness of the intervention measures. The mnemonic MR C. S. DAFT was found to be of great advantage in antibacterial counseling.

CONSENT

Participants' informed consent was obtained by the author.

ETHICAL APPROVAL

Ethical approval for the study was obtained from University of Ibadan/University College Hospital (UI/UCH) Health Research and Ethics Committee with approval number UI/EC/15/038. Permission was also obtained from the pharmacy department of Ogun State Health management board with reference number: SHB/2146/DPS/201.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Choudhury P, Zulawati A, Lailatul MI, Ong KS, Shahnaz B. Effectiveness of pharmacists' intervention in improving patients' knowledge and attitude towards antibiotic usage in Klinik Kesihatan Seremban, Malaysia. *International Journal of Advancement in Life Sciences Research*. 2018;1(1):34-42
2. Zahreddine L, Hallit S, Shakaroun S, Al-Hajje A, Awada S, Lahoud N. Knowledge of pharmacists and patients towards antibiotic use in paediatrics: A cross-sectional study in Lebanon. *Pharmacy Practice*. 2018;16(3):1194
3. Márió Gajdács, Fernando Albericio. Antibiotic resistance: From the bench to patients. *Antibiotics*. 2019;8(3):129. Available: <https://doi.org/10.3390/antibiotics8030129>
4. Gualano MR, Scaioli G, Gili R, Masucci S, Bert F, Siliquini R. Antibiotic use: A cross-sectional survey assessing the knowledge, attitudes and practices amongst students of a school of medicine in Italy. *Plos One*. 2015;10(4):e0122476.
5. WHO. Global Antimicrobial Surveillance System (GLASS) report: Early implementation; Geneva; 2017.
6. World Health Organisation. Antimicrobial Resistance Global Report on Surveillance; Geneva; 2014. Available: <http://www.who.int/drugresistance/document/surveilancereport/> (Accessed 15 July 2017)
7. Centres for Disease Control and Prevention (US). Antibiotic resistance threats in the United States, Atlanta, GA: CDC; 2013. Available: <http://www.edegov/drugresistance/threat-report> [15 April 2014]
8. Khalil RB. Turning the implausible to the plausible: Towards a better control of over the counter dispensing of antibiotics in Egypt. *Value Heal*. 2012;15:A169.

9. Mohamed Z, El-din F, Alaa Mohamed F, Hamdy S, Yasser M. Egyptian community pharmacists' attitudes and practices towards antibiotic dispensing and antibiotic resistance: A cross-sectional survey in Greater Cairo. *Current Medical Research and Opinion*. Mohsen Tavkol 2011. Making sense of Cronbach's alpha. *International Journal of Medical Education*. 2018;2:53-55.
10. Adeel Aslam, Che Suraya Zin, Norny Syafinaz, Ab Rahman Syed, Imran Ahmed. Public awareness and practices towards self-medication with antibiotics among Malaysian population: Questionnaire Development and Pilot Testing; 2020.
11. Holloway KA. Promoting rational use of antibiotics. *Rational essential drug and medicines*. World Health Organization. Regional Office for South-East Asia Regional Health. 2011;15(1):121-130.
12. Márió Gajdács, Edit Paulik, Andrea Szabó. Knowledge, attitude and practice of community pharmacists regarding antibiotic use and infectious diseases: A Cross-Sectional Survey in Hungary; 2020.
13. Mansour O, Al-Kayali R. Community pharmacists' role in controlling bacterial-antibiotic resistance in Aleppo, Syria. *Research*. 2017;16(4):1612-1620.
14. Wong MC, Liu KQ, Wang HH, Lee CL, Kwan, Lee MW, Cheung KW, Lee Y, Morisky GK, Griffiths GM. Effectiveness of pharmacist-led drug counselling on enhancing antihypertensive adherence and blood pressure control: A randomized controlled trial. *The Journal of Clinical Pharmacology*. 2013;53(7):753-761.
15. Nieto P, Mateo H. Analysis of pharmacy interventions on antibiotic prescriptions in medical patients. *European Journal of Hospital Pharmacy*. 2014;21:A171:1-8.
16. Ayalew E, Seid Y, Agalu A. Knowledge, attitude and practice of patient medication counselling among drug dispensers in Mekele town, Northern Ethiopia. *International Research Journal of Pharmacy*. 2014;4(2):28-34.
17. Mohsen T. Making sense of Cronbach's alpha. *International Journal of Medical Education*. 2011;2:53-55.
18. Jimmy J, Beena J, Al-Gahliya M, Saif A, Ghalya A. A study assessing public knowledge, beliefs and behaviour of antibiotic use in an Omani population. *Oman Medical Journal*. 2013;28(5):324-330.
19. PEIPB. Patient counselling: Guidelines on counselling approved by Prince Edward Island Pharmacy Board. 2005;1-7.
20. Mason T, Claire T, Remmya T, Babar M, Iman H, Reem K. Knowledge and awareness of the general public and perception of pharmacists about antibiotic resistance. *BMC Public Health*. 2018;18:711.
21. Chris O. EMDEX. Drug formulary for Nigeria's Health Professionals. *Anti-Infective Drugs*. 2016/2017;335-558.
22. Gajdács M, Paulik E, Szabó A. The attitude of community pharmacists towards their widening roles in the prevention and treatment of infectious diseases in the southeast region of Hungary. *Gyógyszerészet*. 2019;63:26-30.
23. Omole MK, Adeola AM. A study of rational prescription of penicillin and cephalosporin antibiotics in a secondary health facility in south west Nigeria. *Global Journal of Medical Research*. 2012;12(1):1-8.
24. Bhattacharya S. The facts about Penicillin allergy: A review med know. *Publications & Media Pvt Ltd*; 2010.
25. Hanna K, Nirakoran D, Oran B. Assessment of patient nursing. 2004;5(4):311-316.
26. DACA of Ethiopia Manual for good dispensing practice; 2007.
27. Ayalew Mohamed. Medication counselling practice in Ethiopia: A systematic review. *Journal of Basic Clinical Pharmacy*. 2017;8:001-005.

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