



## Comparative assessment of medication knowledge among ambulatory patients: A cross-sectional study in Nigeria

Unyime Israel Eshiet<sup>\*</sup>, Chioma Nneoma Igwe, Angela Ogbonya Ogbeche

Department of Clinical Pharmacy and Biopharmacy, University of Uyo, Nigeria

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### ABSTRACT

**Background:** Patient knowledge on medication is considered a critical aspect of medication self-management by the patient. Medication education and counseling is an important component of pharmaceutical care services. **Objective:** This study was aimed at evaluating the impact of medication education and counseling services offered to ambulatory patients receiving care in a typical Nigerian healthcare setting on the patients' knowledge of their medication.

**Methods:** A cross sectional prospective study conducted at the outpatient pharmacy unit of University of Uyo Teaching Hospital, Nigeria. The patient population was divided into two arms: those who were yet to receive medication education/counseling – Arm 1, and those who had received medication education/counseling from the clinical pharmacist – Arm 2. A patient medication knowledge assessment questionnaire was used to assess patients' knowledge of their prescribed medication. Data obtained were analyzed using the IBM SPSS computer package version 25.0.

**Results:** Three hundred and ninety-one outpatients (196 in Arm-1 and 195 in Arm-2) participated in the study. There was a statistically significant difference in the mean medication knowledge score between patients in Arm-1 and those in Arm-2. Patients in Arm-2 had a statistically significant higher mean medication knowledge score than those in Arm-1 (5.228 versus 3.191;  $t = 10.152$ ;  $P = 0.000$ ).

**Conclusion:** Outpatients who received medication education and counseling from clinical pharmacists had better knowledge of their prescribed medications than those who were yet to receive this pharmaceutical intervention.

### 1. Introduction

Patient knowledge on medication has been defined as a set of information acquired by patients on their medication that is needed for its correct use. It includes information on the indication, dosage regimen, means of administration, treatment duration, potential adverse effects, precautions, contraindications, interactions and efficacy of the drug.<sup>1</sup> Findings from studies suggest that patients with chronic diseases have poor knowledge of their medications and a low level of awareness of the potential risks associated with the use of their medications.<sup>2,3</sup>

The need for the study of patients' knowledge on medication is based on the relationship between inadequate/low medicine knowledge and poorer adherence to prescribed medication.<sup>4</sup> Moreover, the effectiveness of medication depends not only on the efficacy of the therapy itself but on the patients' ability to manage the medication therapy daily either by themselves or by informal caregivers. Medication knowledge is considered a critical aspect of medication self-management by patients.<sup>5</sup>

Upon receipt of medicines from the pharmacy, patients need to understand the medication; accept to take the medication; take the medication at the right doses and at the right time; assess themselves for the effectiveness of the medication and finally identify adverse effects and side effects of the medication (if they occur). Such self-assessment can sometimes be deterred by inadequate knowledge, unclear label instructions, side effects, and loss of interest in the treatment regimen.<sup>4</sup>

An accurate diagnosis and a suitable drug prescription will not achieve the desired therapeutic effect if the patient fails to take the medication as prescribed. In many cases, patients may be unaware of the need to refill and continue a medication due to inadequate provider-patient counseling.<sup>4,6</sup> A major consequence of inadequate knowledge by patients on their medication is medication error. Patients' knowledge, if improved, may decrease the likelihood of medication errors and facilitate adherence.<sup>7</sup>

Pharmaceutical care is a patient-centered service that is focused on drug therapy and disease management with the aim of ensuring rational

<sup>\*</sup> Corresponding author at: Department of Clinical Pharmacy and Biopharmacy, University of Uyo, PMB 1017, Uyo, Nigeria.

E-mail address: [unyimeeshiet@uniuyo.edu.ng](mailto:unyimeeshiet@uniuyo.edu.ng) (U.I. Eshiet).

and safe use of medicines, improving medication adherence, and achieving positive therapeutic outcomes.<sup>8</sup> Counseling and educating patients on their medications is both a professional and legal duty of the clinical pharmacist.<sup>9,10</sup> It is considered an important component of pharmaceutical care services.<sup>11</sup> It is defined as “providing medication information orally or in written form to the patient or their representative on direction of use, advice on side effects, precaution, storage, diet and lifestyle modifications”.<sup>12</sup> Medication counseling provides an opportunity for pharmacists to improve patients' therapeutic outcomes.<sup>10,13</sup> It has been associated with improved patient medication knowledge, reduction in the incidence of adverse drug events, improvement in medication adherence, and increased patient satisfaction with care.<sup>10</sup>

Important components of medication education and counseling include instructions on how to take the medicines, how often the medicines would be taken, duration of therapy, special direction and precautions for preparing (reconstitution of drugs), common side effects, therapeutic indication, contraindications, proper storage, refill information and appropriate actions to be taken in case of missed doses.<sup>14</sup> Patient education must be viewed as part of the continuum of health care and accurate health information must be provided to the patient.<sup>15</sup>

The development of clinical pharmacy practices that mandates patient-oriented pharmaceutical care services necessitates periodic assessment of the quality of the services provided. Pharmacists have the responsibility of clarifying instructions on medication use to prevent adverse drug events and potentially harmful medication errors.<sup>16</sup> Studies on the impact of pharmaceutical care interventions seem to be focused on inpatients – i.e., patients admitted in the wards. However, a vast majority of patients visit the outpatient departments and are good candidates for pharmaceutical care services. Medication education and counseling being an important component of pharmaceutical care services is key to the prevention of potential drug related problems. Hence, this study was aimed at assessing the impact of medication education and counseling services offered to ambulatory patients receiving care in a typical Nigerian healthcare setting on the patients' knowledge of their prescribed medication.

## 2. Methods

### 2.1. Study design

The study was conducted at the out-patient pharmacy department of the University of Uyo Teaching Hospital (UUTH), a tertiary healthcare facility and a referral medical institution providing specialized care in Southern Nigeria. It was designed as a cross sectional study using suitably designed and validated instruments to interview outpatients assessing pharmaceutical services at the outpatient pharmacy unit of UUTH between May 01 and July 31, 2021. Medication education and counseling is a component of the pharmaceutical care services offered to ambulatory patients before receiving their prescribed medications at the outpatient pharmacy unit of the hospital (UUTH).

Two groups of patients were used for this study. The first group were patients who received prescriptions from their physicians but were yet to receive medication education and counseling from the clinical pharmacist (control group). The second group were patients who had received prescriptions and medication education and counseling from the clinical pharmacist (education and counseling group). The interviewer was stationed at a desk in the medication counseling section of the out-patient pharmacy (however, not in the same room where medication counseling was offered) where patients who provided informed consent to participate in the study were recruited into the study.

#### 2.1.1. Eligibility criteria

The eligibility criteria for recruitment into the study were:

- Patients receiving clinical care at UUTH who assessed pharmaceutical care services at the outpatient pharmacy unit within the period of the study.
- Patients who expressed willingness to participate in the study.
- Patients who provided a written informed consent to participate in the study (by appending their signatures or thumb print in the informed consent forms provided by the researchers).

The exclusion criteria were:

- Patients <18 years old.
- Patients with active psychiatric illnesses.
- Patients who were not able to communicate effectively in English language (i.e., able to read, speak and write in English language).
- Patients too ill to participate in the study (i.e., patients who were too weak to participate in the study by responding to the questions either verbally or in writing).

The formula described by Yamane  $\{n = N/1 + N(e^2) (\pm 5\%)\}$ <sup>17</sup> was used to calculate sample size.

Where  $n$  = calculated sample size (390);  $N$  = Estimated population of patients that assessed pharmaceutical care services at the outpatient pharmacy unit of the hospital within the period of the study (17120);  $e$  = level of precision ( $\pm 5\%$ ). Although the calculated sample size was 390 patients (195 patients in each arm of the study), a total of 421 patients were recruited into this study to account for possible drop-out or collection of incomplete data.

#### 2.1.2. Assignment of participants into study arms.

The patient population was divided into two arms:

- Those who were yet to receive medication education/counseling – Arm 1, and
- Those who had received medication education/counseling from the clinical pharmacist – Arm 2.

Patients who provided consent to participate in the study were assigned numbers as they presented with their prescriptions at the outpatient pharmacy unit. The patients were then randomly assigned to either arm of the study based on their numbers. Patients with even numbers were assigned to the Arm-1, while those with odd numbers were assigned to Arm-2.

### 2.2. Data collection instrument

A validated pre-piloted instrument adapted from an instrument used in a previous study<sup>1</sup> was used in this study. It is structured in two (2) parts. The first part (Part A) was used to obtain data on the socio-demographic and some clinical characteristics of the patients namely: gender, age, educational level, duration of illness, number of medicines prescribed, and type of prescription (i.e., new prescription or refill prescription). The second section (Part B) consists of questions that was used to assess the medication knowledge of the patients [Table A].

The accuracy of the patients' responses was evaluated by a clinical pharmacist with the aid of the essential medicine index (EMDEX) mobile app. The EMDEX is Nigeria's trusted source for drug and therapeutic information with its first publication in 1991. It is based on both the WHO Model Formulary and Nigeria's Essential Drugs List. The EMDEX details over 15,000 pharmaceutical products approved for use in Nigeria.

#### 2.2.1. Scoring and classification of knowledge

The respondents were scored 1 mark for every correct answer and 0 for every incorrect answer. A score of >6–9 points was classified as Excellent medication knowledge, while scores of >4 - ≤6 points and 1–4 points were classified as average and poor medication knowledge

respectively.

### 2.3. Data analysis

Data obtained were analyzed using the IBM Statistical Product and Service Solutions (SPSS) computer package version 25.0. Descriptive statistics were used to summarize data while inferential statistics such as independent sample *t*-test and Pearson chi square test were used where applicable to make statistical inferences. A prior level of significance  $p < 0.05$  was used for all comparisons. Data was entered and cleaned before analysis, i.e., errors during data entry were identified and corrected before final analysis.

### 2.4. Ethical consideration

Ethical clearance and institutional approval for this research was duly obtained from the Health Research and Ethics Committee of UUTH.

## 3. Results

### 3.1. Participant response rate

A total of 421 outpatients were recruited into the study. Two hundred and eleven of the patients were assigned into the first arm of the study (i.e., patients who were yet to receive medication education/counseling – control group) while 210 of the patients were assigned to the second arm of the study (patients who had received medication education/counseling from the clinical pharmacist – education and counseling group). However, we received complete responses from 391 of the patients yielding a 92.87% response rate, with 196 in control group and 195 of the patients in the education and counseling group. A schematic representation is shown in Fig. 1.

### 3.2. Sociodemographic characteristics of patients interviewed

The sociodemographic and some clinical characteristics of the patients in both arms of the study are as presented in Table 1. There was no statistically significant difference in the sociodemographic characteristics of patients in the control and education and counseling (EnC) arms. Majority of the patients in both arms presented with chronic medical conditions. Also, most of the patients had refill prescriptions.

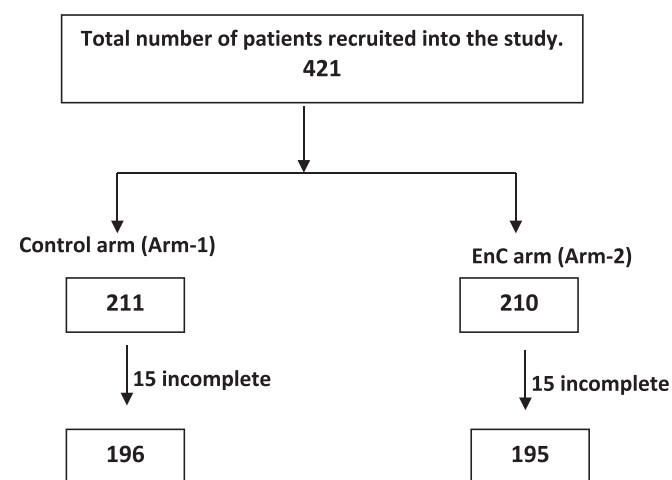


Fig. 1. A schematic representation of the design of the study showing the number of patients that were assigned to each group and the number that completed the study in each group.

### 3.3. Test of difference in mean scores of patient medication knowledge between the two study arms

The result of a test of difference in mean scores of patient medication knowledge score as well as the test of difference in medication knowledge level between the two study arms are presented in Tables 2 and 3 respectively.

We found a statistically significant difference in mean medication knowledge score and medication knowledge level between patients in the education and counseling (EnC) arm and the control arm of the study.

Patients in the EnC arm of the study had a statistically significant higher mean medication knowledge score than those in the control arm of the study. However, we observed that only 6 (1.54%) of the total study participants (391) had an excellent knowledge of their prescribed medication.

### 3.4. Assessment of the effect of sociodemographic parameters on patients' medication knowledge level

Results of our assessment of the effect of sociodemographic parameters on patients' medication knowledge level is presented in Table 4 below.

Gender, age, education, and type of ailment did not have any statistically significant impact on the medication knowledge of the patients. However, our result showed that the type of prescription and the duration of illness had a statistically significant association with the medication knowledge level of the patients.

## 4. Discussion

Patients' knowledge of recommended medicines is an important determinant of therapeutic outcomes. Inadequate knowledge about prescribed medicines can result in negative outcomes including therapeutic failure and wastage of healthcare resources.<sup>18,19</sup> This study was undertaken to assess the impact of medication counseling services on patients' knowledge of their medication. An assessment of whether or not the information provided during medication counseling is fully understood by the patients as intended is important and could serve as an audit of the medication counseling services offered by clinical pharmacists.

We found that the gender, age, type of ailment, and the level of education of the patients did not significantly affect their medication knowledge. A previous study in a teaching hospital in Benin - Nigeria by Enato et al reported that although gender had no influence on patients' medication knowledge, age and level of education significantly influenced medication knowledge.<sup>20</sup> A study among the general population in Penang – Malaysia found that the sociodemographic characteristics of the respondents was also a predictor of medication knowledge. For instance, they found that knowledge of medicines declined with age, and females were more knowledgeable about medicines than males.<sup>21</sup>

Saqib et al identified a number of factors (categorized as healthcare provider related, patient related, and system related factors) that affects patient's knowledge of medicines. These factors include the rude behavior of healthcare professionals, inadequate attention and time by healthcare professionals, hesitation among patients in asking about medicines due to fear of insult, insufficient education provided by healthcare professionals, language barrier between healthcare professionals and patients, illiteracy of patients, no specialized labeling on medicines for illiterate patients, unavailability of pharmacists, copy of prescriptions not provided to patients, and healthcare professionals being overburdened.<sup>18</sup>

Our results showed that patients who presented with refill prescriptions had statistically significant better knowledge of their medications than those who presented with fresh prescriptions. This is expected as the former group of patients should have been previously

**Table 1**  
Sociodemographic characteristics of the respondents.

Variables	EnC arm* (n = 195)		Control arm (n = 196)		Chi-Square	p - value
	Frequency	Percentage	Frequency	Percentage		
<b>Gender</b>						
Male	115	58.97	111	56.63	0.220	0.630
Female	80	41.03	85	43.37		
<b>Age</b>					1.786	0.878
18–25	11	5.64	7	3.57		
26–35	48	24.62	46	23.47		
36–45	42	21.54	43	21.94		
46–55	48	24.62	55	28.06		
56–65	7	3.59	9	4.59		
>65	39	20.00	36	18.37		
<b>Educational level</b>					0.771	0.856
Non-formal	12	6.15	14	7.14		
Primary	15	7.69	19	9.69		
Secondary	35	17.95	32	16.32		
Tertiary	133	68.21	131	66.84		
<b>Prescription type</b>					3.135	0.077
New	88	45.13	106	54.08		
Refill	107	54.87	90	45.92		
<b>Number of medications</b>					4.136	0.845
1 (one)	20	10.25	21	10.71		
2 (two)	38	19.49	39	19.90		
3 (three)	62	31.80	64	32.65		
4 (four)	42	21.54	44	22.45		
5 (five)	18	9.23	11	5.61		
6 (six)	12	6.15	12	6.12		
7–9 (seven – nine)	3	1.54	5	2.55		
<b>Type of ailment</b>					1.118	0.290
Acute	56	28.72	66	33.67		
Chronic	139	71.28	130	66.33		
<b>Duration of illness</b>					2.955	0.707
Recently diagnosed	90	46.15	103	52.55		
1–6 months	23	11.80	20	10.20		
>6 months - <2 years	12	6.15	8	4.08		
2 years - <4 years	31	15.90	24	12.25		
4 years - < 8 years	29	14.87	29	14.80		
≥ 8 years	10	5.13	12	6.12		

\* Education and counseling arm.

**Table 2**  
Test of difference in mean scores of patient medication knowledge (Item by Item) between EnC\* and control arms.

knowledge Scale Items	Mean knowledge Score (StD) EnC arm	Mean knowledge Score (StD) Control arm	t-Test	p-value
Knowledge of indication for use	0.9282 (0.259)	0.8980 (0.304)	1.060	0.290
Knowledge of dosage regimen	0.8718 (0.335)	0.5561 (0.498)	7.348	0.000
Knowledge of treatment duration	0.8190 (0.386)	0.5051 (0.501)	6.940	0.000
Knowledge of form of administration	0.8615 (0.346)	0.5282 (0.500)	7.648	0.000
Knowledge of precautions to be adhered to/ contraindications	0.5436 (0.499)	0.2143 (0.411)	7.118	0.000
Knowledge of potential side/adverse effects of the drug	0.3093 (0.464)	0.1122 (0.317)	4.908	0.000
Knowledge of drug effectiveness	0.0829 (0.277)	0.0564 (0.231)	1.024	0.000
Knowledge of potential drug/food interactions	0.5795 (0.495)	0.2449 (0.431)	7.129	0.000
Knowledge of risk of missed dose	0.1340 (0.342)	0.0205 (0.142)	4.283	0.000
Mean knowledge score	5.228 (1.603)	3.191 (2.108)	10.152	0.000

\* EnC = Education and counseling arm.

**Table 3**  
Test of difference in patient medication knowledge level between EnC and control arm.

Knowledge Level	EnC Group*		Control Group		Chi-square	p-value
Poor	37	18.92	110	56.12	57.504	0.000
Average	154	78.97	84	42.86		
Excellent	4	2.05	2	1.02		

\* Education and counseling group.

counseled and educated on their prescribed drugs by the clinical pharmacists. We also found that the duration of illness had a statistically significant effect on medication knowledge of our respondents. Again, it is expected that the longer a patient lives with a medical condition, the higher his/her knowledge of the disease and its therapeutic management.

Patient medication counseling is an essential aspect of good pharmacy practice. Guidelines approved by the World Health Organization and adopted by the International Pharmaceutical Federation (FIP) for the achievement of good pharmacy practice in developing countries mandates clinical pharmacists to provide sufficient information to ensure that patients know how and when to use prescribed drug products through verbal instructions reinforced with handwritten/typed instructions affixed to the container in addition to medication counseling.<sup>22</sup> Unfortunately, in spite of the benefits and therapeutic importance of medication counseling, previous reports indicate that it is not optimally provided to patients before receiving their medications.<sup>23</sup> A report from an observational study indicates that little medication

**Table 4**  
Assessment of effect of sociodemographic parameters on patients' medication knowledge level.

Parameter	Poor Knowledge	Average Knowledge	Excellent Knowledge	Chi-square	P-value
<b>Gender</b>					
Male	75	147	3	3.925	0.140
Female	71	91	3		
<b>Age</b>					
16–25	10	8	0	17.248	0.069
26–35	41	52	1		
36–45	37	47	1		
46–55	25	77	1		
56–65	7	8	1		
>65	27	48	2		
<b>Educational level</b>					
Non-formal	14	11	1	8.573	0.199
Primary	16	18	0		
Secondary	27	40	0		
Tertiary	90	169	5		
<b>Prescription type</b>					
New	108	84	2	53.623	0.000
Refill	39	154	4		
<b>Number of medications</b>					
1 (one)	17	21	3	26.392	0.049
2 (two)	37	40	0		
3 (three)	48	76	2		
4 (four)	27	59	0		
5 (five)	13	16	0		
6 (six)	3	20	1		
7–9 (seven to nine)	2	6	0		
<b>Type of Ailment</b>					
Acute	40	80	2	1.748	0.417
Chronic	107	158	4		
<b>Duration of illness</b>					
Recently diagnosed	102	89	2	51.595	0.000
1–6 months	17	26	0		
>6 months - <2 years	5	15	0		
2 years - <4 years	11	41	3		
4 years - <8 years	8	49	1		
≥8 years	4	18	0		

related information and counseling is provided by community pharmacists before dispensing drugs to patients.<sup>24,25</sup>

The result of our comparative assessment of the medication knowledge of patients in the control and education/counseling groups revealed that patients in the education/counseling group had statistically significant better knowledge of their medications than those in the control group. We found that patients in the education and counseling group had significantly better knowledge of the dosage regimen, treatment duration, route of drug administration, precautions/contraindications, potential adverse effects, and potential drug-food interactions. A study in Ethiopia showed that majority of the patients who received appropriate medicines-related information at an out-patient pharmacy had sufficient exit knowledge about their dispensed medication.<sup>26</sup> A comparative assessment of the effect of patient information leaflets versus package inserts on the medication safety knowledge of patients in two hospitals in Thailand reported that the provision of patient information leaflets achieved superior effectiveness over package inserts in enhancing medication safety knowledge among the patients. Thus, the authors recommended the provision of patient information leaflets to patients alongside the dispensed medicines.<sup>2</sup>

An intermediate medication review of patients taking oral anticoagulants found gaps in the knowledge of the patients regarding their prescribed medicines. The most frequently identified gap in knowledge among the patients was in knowing what to do in events of missed doses. However, the investigators observed that the provision of a pharmacist-

led communication after review of the medicines significantly improved the patients' medication knowledge.<sup>24,25</sup>

Reports from studies evaluating the impact of education and counseling services offered to patients by clinical pharmacists demonstrate the clinical importance of this pharmaceutical intervention.<sup>27,28</sup> For instance, a study among patients with type II diabetes mellitus and systemic arterial hypertension concluded that patients who received pharmacist-delivered education significantly increased their medication adherence compared to the control group. They also observed a significant improvement in the clinical variables (including glycated hemoglobin, fasting plasma glucose, blood pressure triglycerides, and cholesterol) of patients in the intervention group. The researchers attributed the positive change in adherence to the knowledge and confidence that the patients obtained from the health education provided by the clinical pharmacist.<sup>28</sup> Improvement in medication adherence in patients with different diseases has also been achieved through pharmacist delivered medication education.<sup>27</sup> Furthermore, pharmaceutical education has led to improvements in patient self-management of medication regimen resulting in improved clinical outcomes.<sup>29</sup>

Although we found a statistically significant higher medication knowledge among patients in the education and counseling arm, we observed that in both arms of the study, majority of the patients had poor knowledge of the potential adverse effects of the drugs, drug effectiveness (i.e., what the drug does to the body), and the risk of missed doses. This may be reflection of a lack of emphasis on these important aspects of drug information by the clinical pharmacist during medication counseling sessions. A similar study by Desta et al found that less than one-third of the patients interviewed had a sufficient exit knowledge of the major side effects of the drugs they received from the pharmacy.<sup>30</sup> A recent report from Showande and Laniyan on the quality and content of patient medication counseling in 125 community pharmacies in Ibadan, Nigeria reported that although the community pharmacists and patients who assessed care in the community pharmacies reported the provision of patient medication counseling including medication history, medication usage, side effects, and allergies; the overall quality of counseling received by the patients was unsatisfactory.<sup>19</sup> Also, an observational study on the outpatient medication dispensing and counseling processes in 8 hospitals in North-Western Nigeria found that the information about the names, indications, side effects, and the importance of medication adherence were provided in <5% of the cases studied.<sup>31</sup>

Our results showed that there was no statistically significant difference between participants in both groups compared on their knowledge about the indication of their prescribed drugs. This is worrisome.

We also found that <2 % of the all study participants in both arms of the study had an excellent knowledge of their prescribed medication. This is remarkably low and a bit disturbing as poor patient medication knowledge has been reported to negatively affect pharmacotherapeutic outcomes due to inappropriate use of prescribed medicines.<sup>1</sup>

In some situations, inappropriate use of medicines may occur even when adequate information or counseling has been offered. This has been attributed to poor patient understanding of the drug information provided.<sup>32</sup> The extent of comprehension of information received during medication counseling may be influenced by the language difference, interest, and educational status of the patient. Furthermore, it could be affected by the commitment, professional skill, knowledge, and experience of the clinical pharmacist.<sup>18,30</sup>

Clinical pharmacists should be committed to ensuring that patients have sufficient understanding of the medication information provided before they receive their dispensed medications. This is because adequate medication education and counseling is essential in maintaining a safe and cost-effective use of prescribed drugs. It is also essential to the prevention of medication related problems.

Medication education and counseling should include an evaluation of patients' understanding and comprehension of the information provided as well as the appropriate use of their prescribed medication. The

dispensing clinical pharmacist should ensure that patients have satisfactory knowledge of important aspects of their medications including the name, therapeutic indication, route of administration, dosing schedule, duration of use, actions to be taken if a dose is missed, as well as relevant precautions that should be taken while using the drug. To improve the medication knowledge and intake behavior in patients, it is important to train pharmacists in the provision of patient-centred medication education and counseling.

## 5. Conclusion

Although our study revealed some gaps in the knowledge of patients who had received medication education and counseling from the dispensing clinical pharmacist, outpatients who received this service had better knowledge of their prescribed medications than those who were yet to receive this pharmaceutical intervention. Medication education and counseling is an indispensable component of pharmaceutical care service. The findings of this study emphasize the importance of pharmacists-provided medication education and counseling in health-care delivery. Clinical pharmacists should ensure that ambulatory patients have sufficient knowledge of their dispensed drugs before they leave the pharmacy. Recording medication education and counseling sessions with the aim of reviewing the process and outcome is

recommended.

### 5.1. Limitations

This study did not assess if the patients evaluated had some degree of education on their medications and treatments while seeing the physicians and nurses in the clinic, before eventually seeing the clinical pharmacists. This may be considered a potential source of bias. Nevertheless, the researchers do not think this would have significantly affected the findings of the study.

### CRedit authorship contribution statement

**Unyime Israel Eshiet:** Conceptualization, Formal analysis, Methodology, Project administration, Supervision, Writing – original draft, Writing – review & editing. **Chioma Nneoma Igwe:** Methodology, Project administration, Supervision. **Angela Ogbonya Ogbече:** Methodology, Project administration.

### Declaration of Competing Interest

The authors hereby declare that there is no conflict of interest.

## Appendix A. Appendix

**Table A**

Patient medication knowledge assessment questionnaire – part B.

Patient knowledge on medication	Question asked
1. Knowledge of indication for use	Why are you taking this medication?
2. Knowledge of dosage regimen	How would you take this medication?
3. Knowledge of treatment duration	How long are you to take this medication?
4. Knowledge of form of administration	Is this drug a tablet or syrup or injection?
5. Knowledge of precautions to be adhered to	What special care would you take when taking this drug?
6. Knowledge of potential side/adverse effects of the drug	Do you know of any adverse effects or unfavorable effects of this medication?
7. Knowledge of drug effectiveness	What does this medication do in the body?
8. Knowledge of potential drug/food interactions	Are there any medications or food that you shouldn't take with this medication?
9. Knowledge of risk of missed dose	What do you think will happen if you don't take this medication as prescribed?

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