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Impact of a Pharmacist-led Educational Intervention on knowledge of antibiotics among mothers of under-five children attending vaccination clinics in Delta State, Nigeria

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A – research concept and design; B – collection and/or assembly of data; C – data analysis and interpretation; D – writing the article; E – critical revision of the article; F – final approval of article.

Abstract

Background. The extent of mothers' knowledge about antibiotics largely determines their use in children.
Objectives. This study assessed knowledge of antibiotics among mothers' of under-fives and the immediate impact of a pharmacist-led educational intervention on knowledge scores
Methods. A prospective interventional study was conducted among mothers of under-five children. The pre-intervention knowledge scores were determined with the aid of an antibiotic knowledge questionnaire which was interviewer-administered. An educational intervention which focused on all aspects of knowledge of antibiotic use covered by the questionnaire was administered by a pharmacist; thereafter the post intervention knowledge scores were determined using the same knowledge questionnaire. Overall knowledge scores were categorized into poor, moderate and good. The percentage change in the proportions of mothers who had good scores was determined, Chi square test were performed to determine the relationship between knowledge scores and having a family member as a healthcare professional and paired t-test was done to determine impact of the intervention on the mean scores on each knowledge question. P values ≤ 0.05 were statistically significant.
Results. A total of 253 mothers participated in the study from two centres. Twenty-one mothers (7.7%) had good knowledge on antibiotics at baseline which increased to 138 (50.6%) after an educational intervention. Knowledge scores for each item also improved post-intervention with least pre-intervention mean scores increasing from 0.25(SD=0.44) to 0.67(SD=0.47), $p<0.0001$ and 0.18(SD=0.39) to 0.73 (SD=0.44),$p<0.0001$ at the Warri and Ughelli centres respectively post-intervention. The knowledge questions with the highest scores also increased from mean score of 0.79 (SD= 0.41) to 0.90 (SD= 0.30) at p=0.0041 in the Warri centre and 0.83 (SD= 0.26) to 0.93 (SD=0.26) at p=0.0448 in the Ughelli centre post- intervention. Other items such as knowledge of diarrhoea being a side effect of some antibiotics, completing full course of antibiotics for a child if symptoms improved also improved significantly.
Conclusion. This study found out that a pharmacist-led educational intervention had a measurable impact on mothers' knowledge of antibiotics use in children.

Keywords: Antibiotics, Children, Mothers, Knowledge, Pharmacist, Educational intervention

INTRODUCTION

Antibiotics are a major class of drugs used widely because of the prevalence of infectious diseases. In 2015, over 66% of total morbidity in Nigeria were as a result of communicable diseases and an under-five mortality rate of 128 per 1000 live births has been documented (National Population Commission, 2013, Nigeria Centre for Disease Control, 2017). This age group is particularly vulnerable to infectious diseases and are therefore major consumers of antibiotics, especially in the developing countries where these diseases thrive. Although antibiotics have been used effectively in combating infections in children, resistance to these agents could occur due to reasons which include misuse of antibiotics occasioned by self-prescription, incomplete therapies, missing doses and re-use of left-over antibiotics (Kardas *et al*., 2005). An objective of the global action is to tackle resistance to antibiotics and other antimicrobial agents throughout the world through effective communication, education and training (Nigeria Centre for Disease Control, 2017). Drugs are usually administered to children under age five by their caregivers, which are the mothers in most cases. Studies have highlighted the general lack of knowledge on the appropriate use of antibiotics in children (Bi *et al*., 2000, Huang *et al*., 2007). Also, antibiotics are in some cases administered to children without medical prescription especially in such developing countries, where this class of drugs can be accessed without a prescription (Larsson *et al*., 2000, Chan and Tang, 2006, Togoobaatar *et al*., 2010). Inappropriate use of antibiotics is a major drug therapy problem which can cause antimicrobial resistance and ultimately therapy failure. More so, lack of adequate knowledge about antibiotics has been widely outlined as a main cause for inappropriate use of this drug class. Previous studies have assessed parental knowledge of antibiotics use in children (Oh *et al*., 2011, Zyoud *et al*., 2015, Bert *et al*., 2017). Okide and colleagues reported that parents possessed poor knowledge and positive attitudes to antibiotic use in their children and exhibited poor practices (Okide *et al*., 2020) and half of parents of children visiting a clinic with sore throat reported they will request an antibiotic (Sadoh *et al*., 2015). A good understanding of antibiotic use in children by caregivers, especially mothers in developing countries is therefore paramount in ensuring appropriate use thereby optimizing therapy and curbing resistance.

Consequently, the Nigerian Centre for Disease Control in its strategic plan to combat antimicrobial resistance focuses on, among other areas, improving awareness and understanding of antimicrobial resistance through effective communication and training among the public and professionals in health-related fields (Nigeria Centre for Disease Control, 2017).Studies have also shown that educational intervention can be effective in improving the knowledge of antibiotics use (Finch *et al*., 2004; Gonzales *et al*., 2005; Ranji *et al*., 2008; Shehadeh *et al*.,2016).Pharmacists are accessible primary healthcare providers (Tsuyuki *et al*.,2018) and this accessibility can be harnessed in educating mothers of under fives on antibiotics use in children. Previous educational interventions by pharmacists have proven to be effective in improving the use of medicines by healthcare providers and patients (Adje *et al*., 2020; Jaam *et al*., 2021).This study therefore assesses mothers' knowledge of antibiotic use and the immediate impact of a pharmacist-led educational intervention .

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METHODOLOGY

Study Sites

The study was done in two towns in Delta state, Nigeria, namely Warri and Ughelli in 2019. Delta State is located in the oil-rich Niger Delta region of Southern Nigeria. Warri is a city located in the Delta South senatorial district of the state while Ughelli is a town located in the Delta Central Senatorial district. These towns were selected based on their location in two different senatorial districts. A pilot study on mothers' understanding of antibiotic use in children was conducted in Agbor, a town located in the Delta North Senatorial District prior to the interventional study in the other study sites. Central Hospitals are secondary healthcare facilities in the state and mothers of young children usually access immunization for their children at the health centres attached to these hospitals. Mothers were approached at the immunization centres attached to the central hospitals in these towns so as to ensure easy access.

Study design and sampling

This was an interventional study which assessed mothers knowledge of antibiotics use and the immediate impact of a pharmacist-led educational intervention. Mothers of a minimum of a child under 5 years who arrived early before the commencement of the immunization clinic and consented to participate were included the study. The study was

done early in the morning while the mothers were waiting for the clinic to commence. At the Warri study centre, three days of the week; Mondays, Tuesdays and Fridays were chosen for the study, while for the Ughelli centre, Wednesdays was chosen for the study

Sample size determination

An average of 680 mothers attended the clinic at both centres with the Warri centre contributing two-thirds of the population because of the more frequent clinic days. Sample size was calculated using the Raosoft sample size calculator (Raosoft,2004). Using the total population of 680 with 95% confidence interval , 5% margin of error and 50% response rate a sample size of was obtained 246. Two hundred and fifty-three mothers however completed the pre-intervention and post-intervention aspects of the study.

Data collection

Data was collected with the aid of a data collection instrument which was obtained through a modification of questionnaires used in previous studies (Scaioli *et al*., 2015; Bert *et al*., 2017). The modified questionnaire was subjected to review by different experts in order to establish face validity. Thereafter, the questionnaire was pilot tested among mothers attending a another hospital immunization centre. The final questionnaire had three sections namely socio-demographics, frequency of antibiotics use, knowledge of antibiotics use. Questions on knowledge of antibiotic use were prepared in statement format and had three possible responses- Agree, Disagree and Undecided. Each correct response was scored 1, while incorrect and uncertain responses were scored 0. The knowledge questions were a total of 12 items with maximum score as 12 and minimum as 0.Socio demographic information obtained from mothers included age, level of education, age of first child, number of children and having a family member in the medical or health-related profession. Items in the knowledge questions included but not limited to 'Ampicillin and amoxicillin are antibiotics ", "Aspirin is an antibiotic" "Paracetamol is an antibiotic", "Antibiotics are useful for bacterial infections", "Antibiotics are useful for viral infections", "Antibiotics are used for treatment of pain and inflammation".

The questionnaire was administered by way of an interview on all participants by trained final year pharmacy students who were educated on the purpose and nature of the study. A pre-intervention interview of individual participants was conducted, thereafter; a 15 minutes training on mothers' knowledge of antibiotic use in children was delivered by the intervening pharmacist who administered the intervention throughout the period of the study to allow consistency. The training covered all aspects of knowledge of antibiotics contained in the questionnaire with special emphasis as it relates to the child. Mothers were given another 15 minutes to ask questions and ensure proper understanding. Subsequently, the same questionnaire was re-administered to all participating mothers. The first questionnaire was coded as pre-test while the second was coded as post-test. An identification tag was given to each participant to ensure accurate matching of individual responses.

Data Analysis

Data analysis was done using SPSS software version 23 (Armonk, NY: IBM Corp). A descriptive analysis on the sample was conducted on all categorical variables. Scores on individual items on antibiotic knowledge were presented as frequencies. Total knowledge scores for each participant were further categorized with scores of 0-6 (50% and lower) as poor, 7-9 (greater than 50%-75%) as moderate and 10-12(greater than 75%) as good; this cut-off was modified from that used in previous studies (Agarwal *et al.*,2015; Alkhaldi *et al*., 2015). Frequencies and percentages were reported for categorical variables, Chi square test was done to compare association between having s family member as a healthcare profrssional and knowledge score pre-intervention while differences in means of pre-test and post-test knowledge scores were assessed with Paired t-tests. P values ≤ 0.05 were statistically significant.

RESULTS

A total of 253 mothers (170 from Warri centre and 83 from Ughelli centre) with the mean ages of 30.7(SD=6.4)years and 28.8(SD=5.9)years respectively participated in the study. Majority (224; 88.5%) were married and had a minimum of secondary education (241; 95.2%).Over half of the mothers had more than one child with a mean of 2.5 (SD=1.4) and 2.14 (SD=1.3) children per parent at the respective centres; trading(105,41.5%) was the occupation mostly engaged in by mothers at both

centres. Seventeen (17.1%) and 12(14.1%) of mothers at the Warri and Ughelli centres respectively declared they had family members in the medical or health-related professions whom they consult before administering antibiotics to their children (Table 1).

Table 1. Socio-demographic characteristics of mothers

Variable		Centre		
		Warri (N=170) Frequency (%)	**Ughelli (N=83) Frequency (%)**	**Total (N=253) Frequency (%)**
Marital status				
	Married	150(88.2)	74(89.2)	224(88.5)
	Single	19(11.2)	8(9.6)	28 (11.1)
	Divorced	1(0.6)	1(1.2)	2(0.8)
Level of Education				
	No Basic Education	1(0.6)	0(0)	1(0.4)
	Primary Education	7(4.1)	4(4.8)	11(4.3)
	Secondary	88(51.8)	44(53.0)	133(53.2)
	NCE/ND	29(17.1)	20 (24.1)	49(3.56)
	Bachelors/HND	43(25.3)	15(18.1)	58(22.9)
	Postgraduate	2(1.2)	0(0)	2(0.8)
Occupation				
	Student	2(1.2)	7(8.4)	9(3.5)
	Housewife	10(5.9)	1(1.2)	11(4.30
	Unemployed	7(4.1)	2(2.4)	9(3.5)
	Trader	71(41.8)	33(41.0)	105(41.5)
	Artisan	45(26.5)	29(33.7)	74(29.2)
	Public servant	8(4.7)	0	8(3.2)
	Others	27(15.9)	11(13.3)	38(15.0)
Number of children				
	One	51(30.0)	34(41.0)	85(33.6)
	More than one	119(70.0)	49(59.0)	168(66.4)
Consult family member in a healthcare-related profession before using medications	Yes	28(17.1)	12(14.5)	40(15.8)
	No	27(16.50	11(13.3)	38(15.0)

One hundred and twenty-two (45%) mothers had used antibiotics for their children in the last one month preceding the study with 88(52%) mothers in the Warri centre and 34 (41%) in Ughelli centres using antibiotics for their children (Tables 2). These Antibiotics were either self-recommended or prescribed by healthcare professionals.

Ampicillin/Cloxacillin was the most frequently used antibiotics for the children (Table 3).

Table 2. Incidence of antibiotic use in children in the one month preceding the study

Antibiotic use (in the preceding month)	Warri N=170	Ughelli N=83	Total N=253
	Frequency (%)	Frequency (%)	Frequency (%)
Once	68(40.0)	25(30.1)	93(34.1)
Twice	13(7.7)	5(6.0)	18(6.6)
Three times	7(4.1)	1(2.9)	8(2.9)
Forgotten	0(0)	3(8.8)	3 (1.1)
Total	88(51.8)	34(47.8)	122(44.7)

Table 3. Last antibiotic used for the under-five children

Antibiotic	Warri centre Frequency (%)	Ughelli centre Frequency (%)
Cephalexin	0(0)	1(1.2)
Cefixime	0(0)	1(1.2)
Ceftazidine	1(0.6)	0(0)
Ceftriaxone	1(0.6)	0(0)
Co-Trimoxazole	1(0.6)	1(1.2)
Erythromycin	2(1.2)	0(0)
Amoxicillin/ clavulanate	3(1.8)	2(2.4)
Cefuroxime	7(4.1)	1(1.2)
Ampicillin	8(4.7)	1(1.2)
Amoxicillin	20(11.8)	3(3.6)
Ampicillin/ Cloxacillin	47(27.7)	18(21.7)
None	24(14.1)	29(34.9)
Forgotten	56(32.9)	24(28.9)
Total	170	83

Antibiotic Knowledge Test

Twelve questions tested mothers' knowledge on antibiotic use in children. While responses on the use of antibiotics on viral infections received the least (43,25.3%) correct responses at the Warri centre, mothers at the Ughelli centre scored the least (15,18.1%) on diarrhoea being a side effect of some antibiotics. A high proportion of mothers at both centres agreed that misuse of antibiotics can make bacteria develop resistance to them, 135(79.4%) and 69(83.1%) correct responses at Warri and Ughelli centres respectively. (Table 4).

At baseline, 63 (37.1%), 94(55.3%) and 13(7.6%) of the mothers at the Warri centre had poor, moderate and good scores respectively while 36(43.4%), 32(38.6%) and 15(18.1%) of the mothers at the Ughelli centre had poor, moderate and good scores, respectively.

Table 4. General antibiotics knowledge test questions for the mothers

Question No.	Antibiotics knowledge questions	Correct Responses(Pre-intervention)		
		Warri n=170	Ughelli n=83	Total N=253
Question 1	Ampicillin and Amoxicillin are antibiotics	120 (70.6)	48 (57.8)	168(66.4)
Question 2	Aspirin is an antibiotic	50 (28.8)	25 (30.1)	75(29.6)
Question 3	Paracetamol is an antibiotic	127 (74.7)	55(66.3)	185(70.4)
Question 4	Antibiotics are useful for bacterial infections	127 (74.7)	51(61.5)	178(73.1)
Question 5	Antibiotics are useful for viral infections	43 (25.3)	24(28.9)	67(26.5)
Question 6	Antibiotics are used for treatment of pain and inflammation	95 (55.9)	51(61.5)	146(57.7)
Question 7	Antibiotics can kill 'good bacteria' present in our system	105(61.8)	52(62.7)	157(62.1)
Question 8	Diarrhea is a common side effect of antibiotics like ampicillin and amoxicillin	48(28.2)	15(18.1)	63(24.9)
Question 9	Antibiotics can cause allergic reactions	108(63.5)	44(53.0)	152(60.1)
Question 10	Misuse of antibiotics can make bacteria develop loss of sensitivity to them	135 (79.4)	69 (83.1)	204(80.6)
Question 11	If symptoms improved before completing the full course of antibiotics , you can stop giving it to your child	123(72.4)	58(69.9)	181(71.5)
Question 12	Antibiotics can be used to treat all forms of fever	115(67.7)	57(68.7)	172(68.0)

Relationship between having a family member in a health-related profession and knowledge score

At the Warri Centre, there was a significant relationship between having a family member in a health-related profession and the knowledge level at baseline (p=0.009) for this population. However, this did not hold true for the Ughelli centre.(p =0.56).

Impact of pharmacist's educational intervention on knowledge scores

Correct responses were observed to have increased after administering the educational intervention on the participating mothers at both centres. Mothers at the Warri centre had a marked increase in the item that had to do with the usefulness of antibiotics in the treatment of viral diseases which increased from 43(25.35%) to 114(67.1%) correct responses and the in the Ughelli centre correct responses on "Diarrhoea

being a common side effect of some antibiotics like ampicillin and amoxicilin" increased from 15(18.1%) to 61(73.5%).

Table 5 shows the differences in mean scores of individual items and their level of statistical significance.

Table 5. Difference of means between pre-intervention and post-intervention scores at the centres

Antibiotics knowledge questions	**Warri N=170**			**Ughelli N=83**		
	Pre-Intervention Mean score (SD)	Post-intervention Mean score (SD)	*P-value	Pre-Intervention Mean score (SD)	Post-Intervention Mean score (SD)	*P-value
Ampicillin and Amoxicillin are antibiotics	0.71(0.46)	0.88(0.32)	<0.0001	0.58(0.50))	0.73(0.44)	0.006
Aspirin is an antibiotic	0.29(0.45)	0.58(0.50)	<0.0001	0.30(0.460)	0.47(0.50)	0.037
Paracetamol is an antibiotic	0.75(0.44)	0.87(0.34)	0.0002	0.66(0.48)	0.90(0.30)	<0.0001
Antibiotics are useful for bacterial infections	0.75(0.44)	0.85(0.36)	0.0041	0.61(0.49)	0.75(0.44)	0.0269
Antibiotics are useful for viral infections	0.25(0.44)	0.67(0.47)	<0.0001	0.29(0.46)	0.47(0.51)	0.0047
Antibiotics are used for treatment of pain and inflammation	0.56(0.50)	0.84(0.37)	<0.0001	0.61(0.49)	0.81(0.40)	0.0013
Antibiotics can kill 'good bacteria' present in our system	0.62(0.49)	0.85(0.36)	<0.0001	0.63(0.49)	0.75(0.44)	0.0322
Diarrhea is a common side effect of antibiotics like ampicillin and amoxicillin	0.28(0.45)	0.72(0.45)	<0.0001	0.18(0.39)	0.73(0.44)	<0.0001
Antibiotics can cause allergic reactions	0.64(0.48)	0.86(0.35)	<0.0001	0.53(0.50)	0.81(0.40)	<0.0001
Misuse of antibiotics can make bacteria develop loss of sensitivity to them	0.79(0.41)	0.90(0.30)	0.0041	0.83(0.38)	0.93(0.26)	0.0448
If symptoms improve before completing the full course of antibiotics , you can stop giving it to your child	0.72(0.45)	0.85(0.35)	<0.0001	0.70(0.46)	0.82(0.39)	0.0405
Antibiotics can be used to treat all forms of fevers	0.68(0.47)	0.88(0.32)	<0.0001	0.69(0.47)	0.83(0.38)	0.0065

* P<0.05 is statistically significant,

Similarly, the total number of mothers with good knowledge increased from 21(7.7%) to 138(50.5%) (Table 6).

Table 6: Pre-intervention and post-intervention knowledge of mother participants

Knowledge categorization	Warri N=170		Ughelli N=83		Total N=253	
	Pre-test n(%)	Post-test n (%)	Pre-test n (%)	Post-test n (%)	Pre-test n (%)	Post-test n (%)
Poor	62 (36.5)	16 (9.4)	36 (43.4)	7 (8.4)	98 (35.9)	23 (8.4)
Moderate	95 (55.9)	53 (31.2)	39 (47.0)	39 (47.0)	134 (49.1)	92 (33.7)
Good	13 (7.6)	101 (59.4)	8 (9.6)	37 (44.6)	21 (7.7)	138 (50.6)

DISCUSSION

This study focused on knowledge of mothers of under-five children on the use of antibiotics and the immediate impact of an educational intervention .Our findings show that about one-tenth of the population studied had good knowledge of antibiotic use in children at baseline which is poor, and corroborates other findings from previous studies conducted among Saudi Arabian and Nigerian parents in which there was generally poor knowledge among the parents studied (Al-Ayed, 2019, Okide *et al*., 2020). In another study there was a lack of knowledge in 10-40% of an Italian parents' population regarding the use of antibiotics in children (Bert *et al*., 2017). More so, Alkhaldi and his colleagues reported that only one in four mothers had adequate knowledge about antibiotic use in children while Dadari noted a lack of adequate knowledge and understanding about antibiotic use among breastfeeding mothers in Northern Nigeria (Alkhaldi *et al*., 2015;Dadari, 2020). Interestingly, most of the mothers in our study agreed that misuse of antibiotics can make bacteria lose sensitivity to them, which shows their level of knowledge about antibiotic resistance, this was also the findings of other studies conducted among parents where 80-90% of parents studied related the misuse of antibiotics with bacterial resistance (Vinker *et al*., 2003; Panagakou *et al*., 2011; Rousounidis *et al*., 2011; Zyoud *et al*., 2015). Majority of our study population also agreed that antibiotics are useful in viral infections, demonstrating their lack of knowledge about viruses. Yu and colleagues reported the same finding in up to 80% of the population of parents in rural China, also 69% of a population of parents in Saudi opined the usefulness of antibiotics in treating infections caused by viruses (Abobotain *et al*., 2013; Yu *et al*., 2014). This is understandable because the term 'virus' was not commonly used among the general public and non-health related professionals prior to the COVID-19 pandemic and is often confused with bacteria.

Only 15% of medical students population and Italian parents acknowledged the need to discontinue the use of antibiotics when a patient's condition improves and 28% of a Malaysian general population` agreed that antibiotics should be discontinued when one is getting better which is somewhat consistent with our study findings where nearly three-quarters of the study population disagreed that one can stop giving antibiotics to a child if symptoms improve before completing the full course (Oh *et al*., 2011; Scaioli *et al*., 2015; Okide *et al*., 2017;). In contrast, up to 37% of parents believed antibiotics should be discontinued when the patient's condition improved (Al-Ayed, 2019). Participants' assertions about the lack of efficacy of antibiotics in treating fever, colds and as anti-inflammatory agents elicited similar responses in previous studies among parents. One-third of our study population agreed that antibiotics can be used in treating all forms of fever, which is similar to a study in rural China with 31% of parents admitting same (Yu *et al*., 2014). Also, as high as 60% of a Lebanese parents population thought antibiotics are used to treat fever, which was the most important drive for seeking antibiotics for children among parents in Hong Kong (Wun *et al*., 2012; Zahreddine *et al*., 2018). However, only 13% of parents' population in Cyprus agreed that fever is an indication for the administration of antibiotics (Rousounidis *et al*., 2011). Almost half of the mothers who participated agreed that antibiotics are used for the treatment of pain and inflammation which also corroborates another study in which 51%

and 18% of a general population agreed to the statement and were unsure respectively (Oh *et al*., 2011). Conversely, lower proportions of incorrect answers of 21% and 32% were seen in a population of Italian and a Saudi parents' respectively (Okide *et al*., 2017;Al-Ayed, 2019;).

Although there was a significant association between having a relative in a health- related field and level of knowledge at the Warri centre, the findings from the Ughelli centre was contrary suggesting that other factors such individuals' willingness to access health information may be responsible.

The educational intervention increased mothers' knowledge about the use of antibiotics in children. Responses about the tendency to cause diarrhoea as a side effects of antibiotics such as ampicillin and amoxicillin increased markedly among the population studied, a previous study have also shown that parents do not have sufficient knowledge on the side effects of antibiotics (Ber *et al*, 2017). In addition, most of the mothers improved their knowledge about the use of antibiotics for viral infections. The proportion of parents with good knowledge increased after the educational intervention and this was the case in the two centres used for the study. In general, there were differences in the mean scores of mothers' knowledge of antibiotic use in children at both centres which were statistically significant. Our finding corroborates previous studies on educational interventions on the use of antibiotics: a previous study conducted in Washington indicated that a simple educational intervention can significantly alter the attitudes of parents regarding the use of antibiotics for children while community- level intervention in Massachusetts was only modestly successful at decreasing overall antibiotic use beyond secular trends, a pharmacist-led educational intervention in a sample of adults improved knowledge of participants on the proper and safe use of antibiotics (Taylor *et al*., 2003; Finkelstein *et al*., 2008;Shehadeh *et al*., 2016). Ivanovska and colleagues however, noted the need for continuous educational initiatives or at least repetitive actions to improve sustainability of the effects (Ivanovska *et al*., 2018).

Although this study has shown that a Pharmacist-led educational intervention had a positive impact on mothers knowledge on antibiotics, it did not allow sufficient time to determine how much of the knowledge is retained overtime. Further studies involving a longer lag time should therefore be encouraged.

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CONCLUSION

Majority of the mothers studied did not have good knowledge on antibiotic use at baseline. However, the immediate impact of a Pharmacist-led educational intervention was significant. Pharmacist involvement in educating mothers on antibiotic use should be encouraged to promote a safe use of this class of drugs.

ETHICAL APROVAL

Ethical approval was granted for the study by the Ethics committee of Central Hospital Warri as part of a larger study with a Protocol number: CHW/ECC VOL1/159 dated 19th April 2018. Oral informed consent was obtained from the mothers after the purpose of the study and the methods of obtaining information were explained. Participants were assured of the confidentiality of the information obtained from them and that it was for research purpose only.

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