https://dx.doi.org/10.4314/jpb.v20i1.5
Vol. 20 no. 1, pp. 48-56 (January 2023)
http://ajol.info/index.php/jpb

Journal of
PHARMACY AND BIORESOURCES

Integrated community case management of childhood illnesses; impact on training of community health workers in Vandeikya, North-East Zone of Benue State, Nigeria

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Received 21st April 2021; Accepted 16th December 2022

Abstract
Community health workers appropriately trained on Integrated Community Case Management (ICCM) of childhood illnesses can correctly treat children below 5 years who have pneumonia, diarrhoea and malaria. In Benue State, Nigeria, primary healthcare workers care for most children at community level, as such they need to be trained on ICCM. The objective of this study was to find out if training of primary healthcare workers in Vandeikya, North-East Zone of Benue State can improve their knowledge on ICCM. In Benue North-East, Vandeikya Local Government Area (LGA) was randomly selected out of seven LGAs. Health Officers' in-charge of 30 Primary HealthCare Clinics were selected and trained based on our adapted ICCM training manual. The Pre- and Post-training assessment test for this study was designed based on the training manual. Paired sample t-test was conducted to find out if there was any significant difference in the knowledge of primary health care workers before and after receiving training. There was statistical difference in pre-training scores ($\overline{x_1}$ = 142.100, S_1 = 25.925) and post-training scores ($\overline{x_2}$ =177.600, S_2 =13.587) at (t=6.643, P=0.000). This result strongly indicated that the teaching intervention has improved the knowledge of the Primary Health Care workers on ICCM in Vandeikya LGA.

Keywords: ICCM; Pneumonia; Malaria; Diarrhoea; Training

INTRODUCTION

It has been observed that community health workers appropriately trained, supervised and supported with essential medicines and basic equipment can identify and correctly treat most children who have malaria, diarrhoea and pneumonia [1,2] It has also been reported that in developing countries, current treatment levels are unacceptably low that: (a) only 39% of children receive correct treatment for diarrhea [3]. (b) Only 30% of children with suspected pneumonia receive an antibiotic [3] (c) That less than 20% of children with fever have test for malaria and receive correct treatment for malaria [4]. (d) That poor and disadvantaged children at community level are at even greater risk. The World Health Organization (WHO) and the United Nations

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Children's Fund (UNICEF) has therefore issued a joint statement supporting the training of health workers at community level on Integrated Community Case Management (ICCM) of childhood illnesses in order to improve the optimal treatment of children below 5 years who have Malaria, Diarrhoea and Pneumonia [1,2]. As part of the ICCM strategy, front-line health workers are trained, supplied with basic equipment and essential drugs to treat children for both diarrheal and pneumonia as well as malaria using oral rehydration salt solution (ORS) and Zinc, Oral antibiotic, Malaria Rapid Diagnostic Test Kits (RDT) and Artemisinin-based combination Therapy (ACT) [5].

In Nigeria, Primary Health Care (PHC) is one of the grass-root management approach to providing health care services to communities. PHC are staffed by senior Community Health Officers (CHO), Community Health Extension Workers (CHEW), Junior Community Health Extension Workers (JCHEW), Nurses, Midwives, Medical Laboratory technicians and pharmacy assistants. The services provided at these PHCs include prevention and treatment of common communicable diseases, immunization, maternal and child health services, family planning, public health education, environmental health and the collection of data on health and health related events. PHC in Nigeria is the entry point of the health care system. Cases that cannot be treated at this level are referred to the nearest secondary health care such as General Hospitals or tertiary health care/Teaching Hospitals [6,7]. A greater population of the inhabitants of Benue individuals including children lives in the rural areas, and are attended to by Primary Health Care Workers when they are sick. since primary health care workers in Benue State are actively involved in caring for sick children at community level, there is every need for them to be fully trained on ICCM. The objective of this study is to find out if training of primary health care workers in Vandeikya LGA North-East Zone of Benue State on ICCM can improve their knowledge on integrated management of childhood illnesses such as diarrhoea, acute respiratory tract infection, malaria and other childhood illnesses.

Diarrhoea is one of the major causes of morbidity and mortality especially in children. The diarrhoea prevalence rate in Nigeria is 18.8% and is one of the worst in sub-Sahara Africa. It accounts for over 16% of child deaths in Nigeria and amounts to 150,000 deaths annually mainly amongst children under five years of age as a result of poor sanitation and poor hygiene practices [8,9].

Malaria, a preventable, treatable and curable disease is endemic in Nigeria and remains the foremost public health problem in the country, taking its greatest toll on children under age 5 and pregnant women. Africa still bears over 80% of the global malaria burden of which Nigeria accounts for about 25% globally [10]. Malaria is an infectious disease caused by parasites of the genus plasmodium. The four identified species of parasites causing human malaria are: *Plasmodium falciparum*, *P. vivax*, *P. ovale* and *P. malariae*. In Nigeria, about 98% of all cases of malaria are due to *Plasmodium falciparum*. It is transmitted from the bites of an infected female Anopheles mosquito to man. It has been reported that in Nigeria, malaria accounts for 60% of out-patients visit and 30% hospitalization among children under 5 years, Malaria is also common in pregnant women especially prim gravidae [6] Malaria related deaths account for up to 11% of maternal mortality, 25% infant mortality and 20% in children below five years resulting in about 300,000 childhood death annually. [6]

Acute Respiratory Infections (ARI) is among the leading causes of childhood morbidity and mortality in Nigeria and throughout the world. Pneumonia is the most serious outcome of ARI in young children, early diagnosis and treatment with antibiotics

can prevent a large proportion of deaths caused by pneumonia. Nigeria is engaging in substantial efforts to reduce pneumonia morbidity and mortality through Integrated Management of Childhood Illnesses (IMCI) and Integrated Community Case Management of Childhood Illnesses (ICCM) in hard to reach areas [11]. Acute Respiratory Infections (ARI) globally accounts for approximately 4 to 5 million deaths annually [12,13]. More than two third of the global burden from ARI related deaths occur in Africa [14]. It has been reported that every child has about 5 to 6 episodes of ARI in a year accounting for about 30-50% of the total pediatric outpatients' visits [15,16]. Data from National Demographic Health Survey 2018 reported the prevalence of ARI in Nigeria to be about 3% [11].

EXPERIMENTAL METHODS

Study area. Benue State is located in the Middle –Belt region of Nigeria. The state is divided into 3 zones or geopolitical zones or district as follows: Benue North-East (Zone A) with seven Local Government Areas, Benue North-West (Zone B) also with seven Local Government Areas and Benue South (Zone C) with nine Local Government Areas. This study was carried out in Benue North-East (Zone A) which is made up of the following Local Governments: Katsina-Ala, Konshisha, Kwande, Vandeikya, Logo, Ukum and Ushongo, Vandeikya LGA was randomly selected for this study. Vandeikya LGA has a population projection in 2016 of 157840 males and 157397 females; making up a total population projection of 315237. Out of this, about 18.4% of the total population in Vandeikya LGA is made up of children below 5 years [17]. Apart from Vandeikya Town which is a semi-urban settlement, the rest of the people in Vandeikya LGA reside in rural areas. Preliminary investigations show that there are about 32 primary health care facilities in Vandeikya LGA however only 30 PHC located in the LGA were selected for the study. There are about 92 health workers working in the 30 PHC clinics as follows: 1 {1.1%)B Sc Public Health Graduate, 20 (21.7%) Nurses and or Midwives, 17 (18.5%) Senior Community Health Officers, 32 (34.8%) Community Health Extension Workers, 22 (23.9%) Junior Community Health Extension Workers.

Sampling methods. Since it was difficult to train all the 92 health workers in Vandeikya LGA, officers in charge (if absent, their assistants) in all the 30 health care facilities constituted the study population. The selection of officers in charge or their assistants was based on the assumption that on receiving training, they will step down and pass the knowledge to other health workers in their clinics.

Study instrument. It involves the development and use of training manual, as well as the development and use of pre and post training assessment test. The training manual for this study "Integrated Community Case Management of Childhood Illnesses in Benue State" was adapted from WHO and UNICEF Handbook "Caring for the sick Child in the community, a training course for Community Health Worker" [18]. Other documents used were: National Malaria Strategic Plan 2014- 2020 [6], Federal Ministry of Health Module 2 Case Management of Malaria at the Primary Healthcare centre, Trainee Content [19], National Guideline for Diagnosis and Treatment of Malaria [20], MacGil Markus [21]; Khan Waqas and Sellen Daniel [22]. The pre and post training assessment test for this study was designed based on the above adapted training manual. The pre training assessment exercise was carried out immediately before the training exercise and post training assessment exercise was carried out a day after the training exercise Ethical approval was granted by Benue State University Teaching Hospital through approval latter (Ref.N0: BSUTH/MKD/HREC/2O13B/2017/0016)

Study protocol. During the study The selected 30 officers in charge were given a three days intensive training by the researchers in form of lectures, explanations, practical demonstration by trainers in the presence of trainees, practical demonstration by trainees in the presence of trainers, question and answer sessions, group discussion, performance of RDT by participants on each other and sharing of relevant experiences and encounters by trainees and trainers on the following:

1. Malaria and its management:

a) What is malaria, its transmission, prevention, signs and symptoms?

b) How to perform RDT and the importance of parasitological diagnosis in the management of malaria.

c) How to treat confirmed simple uncomplicated malaria with different ACT drugs.

d) How to recognise or diagnose severe malaria in children, pre-referral treatment with artesunate suppositories and subsequent referral.

2. How to recognise or diagnose the following danger signs of severe illnesses in children, first aid and or pre-referral treatment and subsequent referral.

a) Convulsions or fits

b) Not able to drink when giving a drink or breast feed

c) Severe vomiting or vomiting everything

d) Unusually sleepy, drowsiness or unconsciousness

e) Severe anaemia demonstrable by very pale nail beds, palms, conjunctiva or tongue

f) Severe dehydration shown by sunken eyes, skin turgor and dryness of the buccal mucous membrane and degree of thirst.

g) Difficulty in breathing with intercostal, subcostal recession (chest in-drawing)

h) Stiff neck (sign of meningitis)

i) Tender swollen behind the ear (mastoiditis)

j) Visible severe wasting and oedema of both feet/ankles (severe malnutrition)

3. Respiratory tract infection and fever in Children

a) How to diagnose acute respiratory tract infection with cough by counting respiratory rates and treating those with rates above the normal cut off for age and administration of antibiotics (oral amoxicillin).

b) How to diagnose severe pneumonia in children with cough and difficulty in breathing by counting the respiratory rates and observing the chest for chest-in drawing, initiating management and subsequent referral.

c) How to carry out system by system examination/diagnosis of illnesses in children with fever including treatment or first aid measures and possible referral as the case may be.

4. Diarrhoea and its management in children

a) How to diagnose and treat children with acute watery diarrhoea with ORT and Zinc

b) How to prepare and give pre-packed ORS solution to children with diarrhoea.

c) How to prepare and give salt, sugar and water solution to children with diarrhoea in absence of pre-packed ORS

d) How to diagnose and refer children with moderate to severe dehydration due to diarrhoea who are restless or irritable by observing presence of sunken eyeballs, abdominal skin turgor, and degree of thirst.

e) How to diagnose and refer children with bloody, persistent and chronic diarrhoea

f) How to prevent diarrhoea and the use of Zinc in the treatment of diarrhoea.

5. How to diagnose and treat other childhood illnesses such as:

a) Treat acute ear infections with ear pain and discharge with oral amoxicillin and paracetamol

b) Treat skin rashes and or abscess due to bacterial infections with antibiotics (oral amoxicillin).

c) Treat children with mild to moderate anaemia due to malaria, worm infestation or nutritional causes as follows;

i. If test for malaria is positive give anti malaria drugs (ACT).

ii. If test for malaria is negative deworm the child (above one-year-old) with Mebendazole

iii. Give multivitamin preparations containing iron and counsel for good nutrition in both (i and ii) above

6. Others

a) How to identify and quickly refer cases of suspected treatment failures

b) Teach child care givers how to give drugs to their children at home

c) How to improve patients' adherence to treatment

d) How to improve management and storage of medicines or drugs in a health facility

e) The designed pre and post training assessment test for primary health care workers based on the training manual was used to observe if there were any significant difference in their knowledge before and after receiving training

The pre training assessment scores and post training assessment scores from our study was classified or grouped into topics as follows:

a) 90 pre and post training assessment question where set for malaria and its management

b) 62 pre and post training assessment questions on how to recognize severe illness and cases of treatment failure in children, first aid management and referral.

c) 27 pre and post training assessment question for management of acute respiratory tract infections and other childhood illnesses.
d) 21 pre and post training assessment questions for diarrhoea and its management especially in children.
e) This makes up to a total of 200 pre and post training assessment questions for Vandeikya study. Each participant was to answer each of the above question by indicating TRUE if the answer to the question or statement was true and FALSE if the answer to the question or statement was false. Each correct answer ernes one mark and each wrong answer scores zero mark

The formula for t-test for the differences of two means

$$t = \frac{\overline{x_1} - \overline{x_2}}{\sigma\sqrt{(\frac{1}{N_1} + \frac{1}{N_2})}}$$

Where $\sigma = \sqrt{(\frac{N_1 S_1^2 + N_2 S_2^2}{N_1 + N_2 - 2})}$ s

$N_1 + N_2 - 2$ = degree of freedom

$\overline{x_1}$ = Pre-training Mean

S_1 = Pre-training standard deviation

$\overline{x_2}$ = Post-training Mean

S_2 = Post-training standard deviation

The formula for t-test for the differences of two means also the % mean response was used to compare statistically the pre training assessment scores with the post training assessment scores in order to see if there is any significant difference in the knowledge of the primary health care workers before and after receiving training.

RESULTS

The Bio-data of participants and topic by topic analysis of result and our findings from Vandeikya local government area are presented in Tables 1 and 2

Biodata of participants. The Bio-data of 30 primary health care workers from Vandeikya LGA who participated in the study is as follows: 29 (96.7%) of participants were officers in charge, only 1 (3.3%) were Assistant Officers. On educational qualifications 1 participant (3.3%) had a B.Sc. degree in Public Health while 8 (26.6%) had Nursing and/or Midwifery certificate. The remaining 21 were made up of 3 (10%) Senior Community Health Workers, 17 (56.7%) Community Health Extension Workers and 1 (3.3%) was a Junior Community Health Extension Workers. Apart from the junior community health extension workers, about 29 (96.7%) of participants were well experienced community Health Workers. On how to communicate, about 19 (63.4%) could communicate or read and write in English and Tiv (Tiv is the main ethnic language in Vandeikya LGA) and 11 (36.6%) could read and write in English only. 8 (26.7%) participants were males and 22 (73.3%) were females. 23 (76.7%) of the participants were adults within the ages of 30 - 59 and only 7 (23.3%) were adolescents (20 – 29 years old). It was also observed that 26 (81.7%) of participants were married and 4 (13.3%) were widowed. From the Bio- data, 27 (90%) of participants had at least one or more children, only 3 (10%) had no child. From the Bio-data, it was observed that most of the participants were experienced adults who were married and have children and as such may have come across the disease condition affecting children discussed in their training.

Mean % response. From the pre- and post-training Mean percentage (%) response (table 1), it was observed that the pre-training mean % response for Malaria and its management was 73% while the post-training mean % response was 91%, Acute Respiratory Tract infection and other childhood illnesses the pre training mean % was 64% while the post training mean % response was 82%, Diarrhea and its management the pre training mean % response was 63%,while the post-training mean % was 87%, on how to recognize severe illnesses and cases of treatment failure in children, first aid management and referral, the

pre training mean % response was 74% and the post training mean % response was 90%, on the overall performance from Vandeikya LGA the pre training mean % response was 71%while the post training mean % response `was 89%, (table 1)

Paired sample t-test. A paired sample t-test (Table 1 and 2) shows a significant difference in the knowledge of the PHC workers on all the topics indicated below before and after receiving training as follows:

a. Malaria and its management: There were significant difference in pre-training scores ($\overline{x_1}$ = 65.667 S_1 = 11.698) and post-training scores ($\overline{x_2}$ = 81.633, S_2 = 6.955) at (t = 6.426, P = 0.000).

b. How to recognize severe illnesses in children, first aid management and referral: There were significant difference in the pre-training scores ($\overline{x_1}$ = 45.900, S_1 = 11.318) and post-training scores ($\overline{x_2}$ = 55.667, S_2 = 5.346) at (t = 4.274, P = 0.000).

c. Management of Acute Respiratory Tract Infection and other childhood illnesses: There were significant difference in the pre-training scores ($\overline{x_1}$ = 17.233, S_1 = 5.667) and post-training scores ($\overline{x_2}$ = 22.067, S_2 = 2.348) at (t = 4.316 , P = 0.000)

d. Diarrhea and its management: There were significant differences in the pre-training scores ($\overline{x_1}$ = 13.300, S_1 = 7.401) and post-training scores ($\overline{x_2}$ =18.233, S_2 = 3.471) at (t = 3.308, P = 0.003).

e. Overall scores or combined scores in Vandeikya LGA: There were significant difference in the pre-training scores ($\overline{x_1}$ = 142.100 S_1 =25.925) and post-training scores ($\overline{x_2}$ =177.600, S_2 =13.587) at (t = 6.643, P = 0.000)

This results strongly indicates that the teaching intervention has improve scores and hence the knowledge of the Primary Health care Workers on how to manage childhood illnesses in all topics and on the overall performance in Vandeikya LGA. .

Table 1: Samples statistics and mean percentage response from Vandeikya L.G.A study

Topics		Total score	N	Mean ($\overline{X}$)	SD (S)	Mean Percent Response %	
A	Pre / 90	1970	30	65.6667	11.6983	65.67/90x100	73
A	Post / 90	2449	30	81.6333	6.9554	81.63/90x100	91
B	Pre / 62	1377	30	45.9000	11.3178	45.90/62x100	74
B	Post /62	1670	30	55.6667	5.3455	55.67/62x100	90
C	Pre/ 27	517	30	17.2333	5.6671	17.23/27x100	64
C	Post /27	662	30	22.0667	2.3479	22.07/27x100	82
D	Pre/21	399	30	13.3000	7.4006	13.3/21x100	63
D	Post /21	547	30	18.2333	3.4709	18.23/21x100	87
Overall scores	Pre / 200	4263	30	142.1000	25.9248	142.10/200x100	71
	Post/ 200	5328	30	177.6000	13.5865	177.60/200x100	89

A= Malaria and its management B= How to recognize severe illness in children, first aid managements and referrals C= Management of acute respiratory tract infections and other childhood illnesses D= Diarrhoea and its management especially in children SD= Standard Deviation,

Table 2: Paired sample statistics and t-test from Vandeikya LGA study

TOPICS		Mean (X)	SD(S)	t	Df	Sig (2-tailed)
A	Pre X1 /90 – Post Y1 /90	-15.96667	2.48481	-6.426	58	.000
B	Pre X2/ 62 – Post Y2/ 62	-9.76667	2.28523	-4.274	58	.000
C	Pre X3/ 27 - Post Y3/ 27	-4.83333	1.11995	-4.316	58	.000
D	Pre X4 /21 - Post Y4 / 21	-4.93333	1.49238	-3.306	58	.003
Overall scores	Pre X / 200 - Post Y / 200	-35.50000	5.34380	-6.643	58	.000

A= Malaria and its management B= How to recognize severe illness in children, first aid managements and referrals C= Management of acute respiratory tract infections and other childhood illnesses D= Diarrhoea and its management especially in children

DISCUSSION

From the Bio data, it was observed that about 96% of participants were experienced Health Workers and all Health Workers in this study could read and write in English. Also, about 77% of participants were adults and all participant were married or had been married and about 90% of them had children as such most of them might had personal encounter with the disease condition affecting children in this study. As a result, almost all of the Health Workers had no difficulty in understanding the training that were giving to them and this contributed to the success of this study.

A recent review by the Child Health Epidemiological Reference Group (CHERG) estimate that: (a) training of health workers on community management of all cases of childhood pneumonia could result in a 70% reduction in mortality from pneumonia in children less than 5 years of age [23]. (b) That training of health workers on community case management of malaria can reduce the overall and malaria specific under five mortality by 40 - 60% respectively; and severe malaria morbidity by 53% [24,25].(c) That Oral rehydration salt solution (ORS) and zinc are effective against diarrhea mortality at home and community setting and ORS is estimated to prevent 70 - 90% death due to acute watery diarrhea at home and community level [26] and zinc is estimated to decrease diarrhea mortality by 11.5% [27].It was observed from the present study that training of community health workers in Vandeikya LGA has improved their knowledge on how to manage Malaria illness in children by 91%, Acute Respiratory Tract infection and other childhood illnesses by 82% and Diarrhea and its management by 87%. On how to recognize severe illnesses and cases of treatment failure in children, first aid management and referral, there was 90% improvement in health workers' knowledge, and on the overall result or combined scores there was 89% improvement. Also a Paired sample t-test carried out shows a significant improvement in the knowledge of the primary health care workers on all topics after receiving training as indicated above.

The findings above are consistent with what has been reported by many authors in different parts of the world. For example, Kalyango *et al*., in eastern Uganda demonstrated a significant improvement in the overall knowledge of malaria (72% in the group that utilized anti-malarial and antibiotics, and 70% in the group the used only anti-malaria) [28]. Another study which utilized the same methodology and similar subjects, obtained similar findings. In the study, CHWs were trained using the ICCM guideline for the management of common childhood diseases, the outcome showed improved knowledge in the care of common childhood diseases [29]. George et al., in the study: CHWs providing community case management in sub-Sahara Africa, who are they and what are they doing? The authors concluded that, the trained CHWs on ICCM were able to acquire knowledge that assisted in their curative task in common childhood illnesses (malaria, diarrhea and acute respiratory tract infections) [30]. Chinbuah *et al.*, revealed in a cluster randomized control trial involvement of trained CHWs in the management of common childhood illnesses led to a significant mortality reduction [31].

Conclusion

Our findings have strongly indicated that training of primary health care workers on integrated community case management of childhood illnesses in Vandeikya, North-East Zone of Benue State, Nigeria, has greatly improved their knowledge on how to manage childhood illnesses. This study is also in line with UNICEF, WHO and other Partners who are supporting the training of community health workers in other to improve their knowledge on integrated community case management of childhood illnesses and hence

reduction in mortality and morbidity of children under 5 years of age.

Acknowledgement

We acknowledge the Presidential Initiative Fund, Benue State University, Makurdi that sponsored the study. We also wish to acknowledge Mr. Ayoo Martins Msughter, Mr. John Aju and late Mr. Michael Demawa who assisted in organizing the study.

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