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Effect of Physical and Video - Assisted Training on Knowledge of Cardiopulmonary Resuscitation among Primary Health Care Workers in Osun State, Nigeria

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Abstract: *Cardiopulmonary Resuscitation (CPR) is critical in cardiac emergencies, yet many Primary Health Care Workers in Osun State lack adequate knowledge. Thus, this study assessed the effect of Physical Training (PT) and Video-Assisted Training (VAT) interventions on the knowledge of CPR among PHCWs in Osun State, Nigeria. This study employed quasi-experimental design. The population was 405 PHCWs from 12 selected Primary Health Care (PHC) centres in Osun State, Nigeria. A sample size of 133 was determined using Lemeshow's formula. Multistage sampling technique was used in selecting the PHCWs which were randomly assigned into four groups. Structured and validated questionnaire were used for data collection. Intervention was done for three hours per day, two days per week, for three weeks in each PHC centre. Data were analyzed using descriptive and inferential statistics at 5% level of significance. Findings revealed that pre-intervention, immediate and 12th week post-intervention CPR knowledge mean scores were 12.32 ± 1.70, 22.35 ± 2.58, and 21.85 ± 2.57 (PT); 12.41 ± 1.62, 22.97 ± 2.04, and 22.47 ± 2.09 (VAT); 12.48 ± 1.75, 24.00 ± 1.55, and 23.90 ± 1.58 (PT and VAT); and 12.38 ± 1.62, 12.78 ± 1.70 and 12.66 ± 1.70 (CG), respectively. The results further indicated significant increase ($p < 0.05$) in immediate post-intervention knowledge ($F = 212.16$, $\eta^2 = 0.71$) of CPR, and at 12th week post-intervention knowledge ($F = 202.11$, $\eta^2 = 0.80$) of CPR. In conclusion, physical training and video-assisted training on CPR improved the knowledge of CPR among PHCWs in Osun State, Nigeria. It is recommended that the management board of PHC facilities in Nigeria should integrate the use of both PT and VAT in CPR for the PHCWs.*

Keywords: cardiopulmonary resuscitation, cardiopulmonary resuscitation knowledge, physical training, primary health care workers, video-assisted training

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INTRODUCTION

Cardiopulmonary resuscitation (CPR) is recognised as a critical life-saving procedure during cardiac arrest, aimed at sustaining blood circulation and preserving brain function until specialised medical care becomes available (Yasin et al., 2023). The procedure has a long history, with the modern form of CPR evolving in the 1960s through pioneering research by physicians and scientists. Earlier techniques placed emphasis on mouth-to-mouth resuscitation, before chest compressions were introduced and combined into the approach widely used today (Berry Kilgour et al., 2023; Olofin-Samuel et al., 2024). Cardiac arrest itself represents a major global health problem, as it occurs when the heart suddenly ceases to beat, often leading to fatality if prompt intervention is not administered. In Nigeria, as in many other nations, cardiac arrest remains a significant contributor to mortality rates (Adewale et al., 2020).

The importance of CPR knowledge cannot be overstated, particularly because many cardiac arrests occur outside hospital settings. The ability of bystanders or frontline health providers to recognise cardiac arrest and apply appropriate measures is often the deciding factor in survival. Among primary health care workers (PHCWs), especially those serving in rural and underserved communities, knowledge of CPR is vital due to the frequent lack of immediate access to advanced medical services. PHCWs are usually the first point of contact in emergencies, and their knowledge of CPR can greatly influence patient outcomes (Veettil et al., 2023). The World Health Organization (WHO, 2020) has stressed the importance of equipping health workers with the knowledge required to manage emergencies, noting that timely recognition and appropriate intervention reduces both mortality and morbidity.

Despite its importance, studies reveal that CPR knowledge among health professionals globally remains suboptimal. On average, only about 50–60% of PHCWs worldwide possess adequate knowledge of CPR (Olofin-Samuel et al., 2024). The absence of such knowledge significantly contributes to mortality, with over 90% of cardiac arrest victims unable to survive when no CPR is administered (Gräsner et al., 2020). The situation is more concerning in Africa, where the level of CPR knowledge among health workers is reported to be around 30–40%, with marked disparities across regions. In Sub-Saharan Africa, this figure drops further, averaging about 20–30%, largely due to lack of resources, insufficient access to educational materials, and inadequate training opportunities. As a result, mortality rates for cardiac arrest victims in such contexts remain exceedingly high, often exceeding 90%.

Nigeria reflects these broader challenges, with CPR knowledge among PHCWs estimated at between 20% and 30% (Olateju & Amoran 2019). Regional variations exist, with studies showing that in Southwest Nigeria, CPR knowledge levels among PHCWs are approximately 25% (Olusakin, 2022). These low levels of knowledge have profound consequences, with studies such as that of Akande et al. (2021) linking inadequate knowledge among community health workers to mortality rates of 95–99% among cardiac arrest victims. In Osun State specifically, CPR knowledge among PHCWs remains at about 25% (Kerketta et al., 2023), while mortality in rural

communities from cardiac arrest is reported at approximately 98.2%. Such figures highlight the urgent need for improved dissemination of CPR knowledge in these regions.

In addressing this challenge, training interventions play a central role in enhancing knowledge acquisition. The Knowledge, Attitude and Practice (KAP) model has been widely adopted in public health research to monitor knowledge acquisition, assess changes in attitude, and measure subsequent application in practice. This theoretical model has proven valuable in intervention studies, demonstrating how increases in knowledge can influence behaviour and outcomes (Wang et al., 2020; Soar et al., 2015). Applying this framework to CPR education provides a structured way of understanding how enhanced knowledge among PHCWs could contribute to improved survival rates during cardiac emergencies.

Various training methods have been explored for improving knowledge retention in CPR. Video-Assisted Training (VAT), for instance, employs multimedia tools such as animations, visuals, and audio to present CPR concepts in a simplified and engaging manner (Yuksen et al., 2019). This method allows learners to observe procedures, review information at their own pace, and repeatedly reinforce concepts. VAT has the added advantage of appealing to diverse learning styles and promoting better retention of theoretical knowledge. On the other hand, physical classroom training remains common in many contexts. While it often emphasises practical demonstration, it also includes lectures and discussions that strengthen participants' understanding of CPR concepts (Kuriyagawa & Minazuki, 2022). Each approach has benefits and drawbacks, yet both are united in the goal of enhancing comprehension and long-term knowledge retention.

Evidence suggests that combining methods may produce stronger outcomes, but this potential is not always fully explored in low-resource settings (Madadian et al., 2023). VAT, while effective, requires financial and technological resources, which may be scarce in rural health facilities. Conversely, traditional training methods, although more accessible, may not provide sufficient reinforcement for knowledge retention and may be limited by the lack of exposure to diverse cardiac arrest scenarios (Khunti et al., 2022). The choice of method thus has direct implications for the knowledge level of PHCWs and, ultimately, for the survival rates of patients in cardiac emergencies.

Findings across multiple studies demonstrate that cardiopulmonary resuscitation (CPR) knowledge remains insufficient among healthcare workers, students, and the general public, despite its critical role in survival during cardiac arrest. Jamalpour et al. (2020) found a significant deficiency in CPR knowledge among Iranian general dental practitioners, although post-graduation training improved knowledge substantially. This underscores the importance of ongoing CPR education for professionals. In Nigeria, Onyeaso and Achalu (2019) revealed alarmingly low pre-training CPR knowledge among secondary school students at only 8.9%, which rose dramatically to 88.6% after structured training. The findings demonstrate that Nigerian students can acquire CPR knowledge effectively, supporting the integration of CPR into school curricula. Similarly, Olateju and Amoran (2019) observed knowledge gaps among community nurses in Ogun State, where younger nurses performed better. Their study highlighted the need for

regular CPR refresher training, particularly for older healthcare workers, to maintain adequate knowledge.

A Ugandan study by Munezero et al. (2023) confirmed significant improvements in CPR knowledge among nurses after training, with scores increasing from 53.8% to 82.5%. This finding reflects how structured interventions significantly raise awareness and comprehension. Comparable results were found by Onyeaso and Onyeaso (2019), who reported that Nigerian teachers had very low pre-training knowledge but showed significant theoretical improvement post-training. Their study suggested that teachers, once trained, could act as multipliers of CPR knowledge for students and the broader community. Among medical professionals, Okonta and Okoh (2019) reported that Nigerian house officers with prior training and practical exposure demonstrated better theoretical comprehension of CPR than those without such experience. Similarly, Mbada et al. (2023) found that physiotherapists in Nigeria displayed only low-to-average CPR knowledge, confirming gaps even among trained professionals.

Calicchia et al. (2019) studied dental interns and found a moderate overall level of CPR knowledge, with women demonstrating higher awareness than men. The findings supported the inclusion of CPR training within university curricula to address inconsistencies in knowledge acquisition. Madadian et al. (2023) also highlighted serious gaps among doctors in Karachi, where 65.6% lacked awareness of revised compression rates, and 75.8% were unfamiliar with updated depth guidelines. Despite these knowledge deficits, many participants expressed willingness to perform CPR and endorsed the integration of CPR education into medical curricula. Broader surveys reinforce these concerns. Schlesinger (2023) found that only 62% of healthcare workers had adequate CPR knowledge, with many unable to recognise cardiac arrest symptoms. Similarly, Johnson and Lee (2023) discovered that only half of final-year medical students could correctly recall the recommended compression-to-ventilation ratio. Patel and Khan (2023) reported that community members scored far lower than healthcare providers, highlighting the wider knowledge gap in non-medical populations. Furthermore, Bennett et al. (2022) demonstrated that knowledge retention declines significantly, with a 30% reduction within a year of training, reinforcing the importance of refresher courses.

In summary, knowledge of CPR among PHCWs in Nigeria, particularly in Osun State, remains low despite the critical role these workers play as first responders in cardiac emergencies. The implications of inadequate CPR knowledge are reflected in the persistently high mortality rates from cardiac arrest in the region. Strengthening CPR knowledge through appropriate training interventions, is crucial for improving health outcomes. By assessing the effects of Video-Assisted Training and traditional training on CPR knowledge, this study aims to provide recommendations for optimising educational strategies for PHCWs, ultimately contributing to reduced mortality and improved survival rates in communities where advanced medical care is limited

The study assessed the effect of Physical and VAT interventions on knowledge of CPR among primary healthcare workers in Osun State, Nigeria. The specific objectives were to:

1. assess the pre-intervention knowledge of CPR among PHC workers in the four groups (PT, VAT, PT & VAT, and control) in selected primary health facilities in Osun State;
2. assess the immediate post-intervention knowledge of CPR among PHC workers in the four groups (PT, VAT, PT & VAT, and control) in selected primary health facilities in Osun State;
3. assess the 12th week post-intervention knowledge of CPR among PHC workers in the four groups (PT, VAT, PT & VAT, and control) in selected primary health facilities in Osun State

Research Hypotheses

Ho 1: There is no significant difference in the pre-intervention knowledge of CPR among PHC workers exposed to PT, VAT, PT & VAT, and control.

Ho 2: There is no significant difference in the immediate post-intervention knowledge of CPR among PHC workers exposed to PT, VAT, PT & VAT, and control.

Ho 3: There is no significant difference in the 12th week post-intervention knowledge of CPR among PHC workers exposed to PT, VAT, PT & VAT, and control.

METHODS AND MATERIALS

The study employed a quantitative research approach utilizing a four-group pretest–posttest quasi-experimental design to evaluate the effect of physical and video-assisted training interventions on the knowledge of cardiopulmonary resuscitation (CPR) among primary healthcare workers (PHCWs) in Osun State, Nigeria. Participants were divided into four groups: Experimental Group 1, which received physical training; Experimental Group 2, which was exposed to video-assisted training; Experimental Group 3, which received a combination of both physical and video-assisted training; and a control group that was not exposed to any intervention. Data collection was conducted at three time points—baseline (pre-intervention), immediately after the intervention, and at 12 weeks post-intervention—to determine both immediate and sustained impacts of the interventions.

The independent variables of the study were the physical and video-assisted training methods, while the dependent variable was the knowledge of CPR among participants. The study population consisted of 133 PHCWs drawn from 12 selected primary health care facilities across Osun State. The group included a diverse mix of professionals and support staff such as nurses, midwives, community health extension workers, laboratory scientists, pharmacists, health attendants, and other allied personnel. To ensure appropriateness of selection, the inclusion criteria specified workers with at least three years of experience who had been confirmed in service, while those who were ill, pregnant, cognitively impaired, or unwilling to participate were excluded.

The sample size was calculated using Lemeshow's formula for detecting differences in means and proportions in paired t-tests, ensuring sufficient statistical power. With estimated parameters including a Z-value of 1.96 at 95% confidence, a Z-value of 0.82 for 80% power, a standard

deviation of 14 from prior studies, and a desired effect size of 5, the minimum sample size was determined as 121. To accommodate a 10% attrition rate, 12 additional participants were added, yielding a final sample size of 133. A multistage sampling technique was employed. At the first stage, one local government area (LGA) was randomly selected from each senatorial district of Osun State. At the second stage, four PHCs with the highest number of staff were purposively selected from each chosen LGA. Finally, proportionate allocation was applied to select participants from the facilities, ensuring fair representation. The distribution of participants across LGAs and PHCs was based on the ratio of facility staff to the total, with proportional samples drawn accordingly.

Data collection employed a structured questionnaire designed to measure CPR knowledge before and after the interventions. The instrument consisted of two sections: Section A captured sociodemographic details such as age, gender, religion, years of experience, and educational background; Section B assessed CPR knowledge using 25 semi-structured questions. Items 1–14 were in a True/False format, while items 15–25 were multiple-choice, with one correct option. Correct answers were scored 1 point and incorrect answers 0, creating a 25-point scale. Scores of 18 or more denoted good knowledge, 13–17 moderate knowledge, and 12 or less low knowledge. The questionnaire was validated by experts in nursing and research methodology for content relevance, clarity, and adequacy. Face validity was also ensured by reviews from a departmental panel. The video-assisted component was separately validated using the Content Validity Ratio, where four experts assessed audio and visual quality, content relevance, structuring, and clarity, yielding strong consensus on most criteria.

A pilot study was conducted among 27 PHCWs in a facility outside the study sample to test the reliability of the instrument. Cronbach's alpha for the knowledge section was 0.774, indicating acceptable internal consistency. Ethical clearance was obtained from the Babcock University Health Research Committee, and permission was sought from the Osun State Primary Health Care Board. Participants provided informed consent after being briefed about the study's purpose, procedures, and their right to withdraw at any stage. Confidentiality was assured, with data anonymized and securely stored. Participation was voluntary, and principles of justice, beneficence, and respect for rights were observed throughout.

Data collection occurred in three phases. During the pre-intervention phase, participants were gathered at their respective LGA headquarters, briefed on the study, and administered the baseline questionnaire with the assistance of trained research assistants. The intervention phase lasted three weeks, with each experimental group receiving its assigned mode of training delivered by the researcher and nursing officers. Physical training involved face-to-face teaching and demonstrations, while the video-assisted group received an audiovisual presentation. The combined group received both methods. Information, Education, and Communication (IEC) leaflets were distributed to reinforce learning. The control group did not undergo training during this period. The post-intervention phase involved immediate reassessment of knowledge, followed by a second posttest at the 12th week to measure retention.

Data analysis was carried out using IBM SPSS version 28. Descriptive statistics such as means, standard deviations, frequencies, and proportions were employed to summarize participant characteristics and knowledge scores. Inferential statistics, including Univariate Analysis of Variance (ANOVA), were used to test hypotheses and assess differences in knowledge scores across groups and over time.

RESULT

Table 1: Description of the Socio-Demographic Characteristics of the Respondents

	Experimental Group One (PT) (34)		**Experimental Group Two (VAT) (32)**		**Experimental Group Three (PT & VAT) (31)**		**Control Group (32)**	
Variables	**Freq. N**	**Percent (%)**	**Freq. N**	**Percent (%)**	**Freq. N**	**Percent (%)**	**Freq. N**	**Percent (%)**
Gender								
Male	7	20.6	5	15.6	6	19.4	8	25.0
Female	27	79.4	27	84.4	25	80.6	24	75.0
Age								
20 - 30 years	2	5.9	4	12.5	4	12.9	2	6.3
31 - 40 years	10	29.4	10	31.3	8	25.8	9	28.1
41 - 50 years	16	47.1	14	43.8	17	54.8	15	46.9
51 years and above	6	17.6	4	12.5	2	6.5	6	18.8
Religion								
Christianity	15	44.1	14	43.8	16	51.6	12	37.5
Islam	19	55.9	18	56.3	15	48.4	20	62.5
Years of Experience								
Less than 8 years	3	8.8	4	12.5	4	12.9	3	9.4
9 - 14 years	9	26.5	8	25.0	7	22.6	8	25.0
15 - 20 years	16	47.1	14	43.8	13	41.9	17	53.1
Above 20 years	6	17.6	6	18.8	7	22.6	4	12.5
Previous CPR Training								
Yes	5	14.7	4	12.5	3	9.7	8	25.0
No	29	85.3	28	87.5	28	90.3	24	75.0
Total	**34**	**100.0**	**32**	**100.0**	**31**	**100.0**	**32**	**100.0**

PT: Physical Training; and VAT: Video Assisted Training

The socio-demographic characteristics of respondents across the four groups (Physical Training, Video Assisted Training, Combined PT & VAT, and Control) show that females were predominant in all groups, representing over 75% of participants. The majority of respondents fell within the 41–50 years age bracket, followed by those aged 31–40 years, while very few were below 30 years or above 50 years. In terms of religion, both Christianity and Islam were represented, though Islam was slightly more prevalent in most groups except the combined PT & VAT group, where Christianity dominated. Regarding years of professional experience, most respondents had between 15–20 years, followed by those with 9–14 years, with a smaller proportion having less than 8 years or above 20 years of experience. Notably, previous CPR training was generally low across all groups, with the majority reporting no prior exposure, particularly in the experimental groups, while the control group had the highest proportion of participants with prior CPR training.

Table 2: Summary of pre-intervention knowledge of cardiopulmonary resuscitation among PHC workers in the four groups (PT, VAT, PT & VAT, and control)
EG1: Physical Training, EG2: Video Assisted Training, EG3: PT & VAT

Knowledge of CPR before intervention	**EG 1 (PT)** **Freq. (%)**	**EG 2 (VAT)** **Freq. (%)**	**EG 3 (PT & VAT)** **Freq. (%)**	**Control** **Freq. (%)**
Poor Knowledge (0-12)	19 (55.88)	14 (43.75)	14 (45.16)	15 (46.87)
Moderate Knowledge (13-17)	15 (44.12)	18 (56.25)	17 (54.84)	17 (53.13)
Good Knowledge (18-25)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Mean ±SD	**12.32±1.70**	**12.41±1.62**	**12.48±1.75**	**12.38±1.62**

The knowledge is categorized as poor (scores 0–12), moderate (scores 13–17), and good (scores 18–25). Across all groups, none of the participants demonstrated good knowledge of CPR before the intervention, as indicated by a 0% frequency in the highest category. In the poor knowledge category, the highest percentage was observed in the PT group (55.88%), followed by the control group (46.87%), the PT & VAT group (45.16%), and the VAT group (43.75%). Conversely, the moderate knowledge category had the highest percentage in the VAT group (56.25%), with slightly lower but similar percentages in the PT & VAT group (54.84%) and the control group (53.13%). The PT group had the lowest proportion of participants in the moderate knowledge range (44.12%). The mean knowledge scores across the groups were relatively similar, with all means falling within the poor knowledge range (12.32 ± 1.70 for PT, 12.41 ± 1.62 for VAT, 12.48 ± 1.75 for PT & VAT, and 12.38 ± 1.62 for the control group). These results indicated that, prior to any training intervention; the participants had generally low baseline knowledge of CPR, with no significant variation among the groups.

Table 3: Summary of immediate post-intervention knowledge of cardiopulmonary resuscitation among PHC workers in the four groups (PT, VAT, PT & VAT, and control)
EG1: Physical Training, EG2: Video Assisted Training, EG3: PT & VAT

Immediate Post-intervention Knowledge of CPR	**EG 1 (PT) Freq. (%)**	**EG 2 (VAT) Freq. (%)**	**EG 3 (PT & VAT) Freq. (%)**	**Control Freq. (%)**
Poor Knowledge (0-12)	0 (0.0)	0 (0.00)	0 (0.00)	13 (40.63)
Moderate Knowledge (13-17)	3 (8.82)	1 (3.13)	1 (3.23)	18 (56.25)
Good Knowledge (18-25)	31 (91.18)	31 (96.88)	30 (96.77)	1 (3.13)
Mean ±SD	**22.35±2.58**	**22.97±2.04**	**24.00±1.55**	**12.78±1.70**

Table 3 presents the immediate post-intervention knowledge of CPR among PHC workers across four groups: PT, VAT, a combination of PT and VAT, and a control group. The findings indicate a significant variation in knowledge levels between the experimental and control groups. In the experimental groups (EG 1, EG 2, and EG 3), no participants showed poor knowledge of CPR (scores of 0-12). In contrast, 40.63% of the control group fell into the poor knowledge category, reflecting the absence of an intervention. Among participants with moderate knowledge (scores of 13-17), the proportion was slightly higher in the control group (56.25%) compared to 8.82% in EG 1, 3.13% in EG 2, and 3.23% in EG 3. Notably, the majority of participants in the experimental groups demonstrated good knowledge (scores of 18-25), with 91.18% in EG 1, 96.88% in EG 2, and 96.77% in EG 3. In contrast, only 3.13% of the control group achieved good knowledge scores. These findings shows the effect of all intervention methods in improving knowledge of CPR.

The mean knowledge scores further corroborated these differences. The combined PT & VAT group (EG 3) had the highest mean score of 24.00 ± 1.55, followed by VAT alone (22.97 ± 2.04) and PT alone (22.35 ± 2.58). The control group had a significantly lower mean score of 12.78 ± 1.70, suggesting that the interventions provided a substantial boost to participants' knowledge. The combination of PT and VAT proved slightly superior to individual interventions, indicating the potential benefits of integrating multiple training methods.

Table 4: Summary of 12th week post-intervention knowledge of cardiopulmonary resuscitation among PHC workers in the four groups (PT, VAT, PT & VAT, and control)
EG1: Physical Training, EG2: Video Assisted Training, EG3: PT & VAT

12th Week Post-intervention Knowledge of CPR	**EG 1 (PT)** **Freq. (%)**	**EG 2 (VAT)** **Freq. (%)**	**EG 3 (PT & VAT)** **Freq. (%)**	**Control** **Freq. (%)**
Poor Knowledge (0-12)	0 (0.0)	0 (0.00)	0 (0.00)	14 (43.75)
Moderate Knowledge (13-17)	3 (8.82)	1 (3.13)	1 (3.23)	17 (53.13)
Good Knowledge (18-25)	31 (91.18)	31 (96.88)	30 (96.77)	1 (3.13)
Mean ±SD	**21.85±2.57**	**22.47±2.09**	**23.90±1.58**	**12.66±1.70**

The data in Table 4 provides a comparative analysis of the knowledge of CPR among PHC workers across four groups those who received PT, VAT, a combination of PT and VAT, and a control group at the 12th week post-intervention. The findings indicated a marked improvement in CPR knowledge among the experimental groups (EG1, EG2, and EG3) compared to the control group. Notably, none of the participants in the experimental groups exhibited poor knowledge (scores 0-12), while 43.75% of the control group fell within this category. Among those with moderate knowledge (scores 13-17), the proportion was relatively low in the experimental groups, with EG1, EG2, and EG3 recording 8.82%, 3.13%, and 3.23%, respectively, in contrast to 53.13% in the control group. A significant majority of participants in the experimental groups demonstrated good knowledge (scores 18-25), with EG1, EG2, and EG3 achieving 91.18%, 96.88%, and 96.77%, respectively. In contrast, only 3.13% of the control group reached this level.

The mean knowledge scores further underscore the effectiveness of the interventions. The combined PT and VAT group (EG3) recorded the highest mean score (23.90 ± 1.58), followed by the VAT group (22.47 ± 2.09) and the PT group (21.85 ± 2.57). The control group lagged significantly with a mean score of 12.66 ± 1.70, reflecting limited knowledge gains without intervention. These results highlighted the superior impact of combining PT and VAT, followed by VAT alone, in enhancing CPR knowledge among PHC workers.

Analysis of Research Hypotheses

Ho1: There is no significant difference in the pre-intervention knowledge of CPR among PHC workers exposed to PT, VAT, PT & VAT, and control

Table 5: Difference in the pre-intervention knowledge of CPR among PHC workers exposed to PT, VAT, PT & VAT, and control

Groups	Sum of Squares	df	Mean Square	F	Sig.	Effect Size (Eta - Squared
Between Groups	0.435	3	0.145	0.052	.984	0.082 (0.043 - 0.098)
Within Groups	350.402	125	2.803			
Total	350.837	128				

P > 0.05

The result presented in table 5 showed that F-cal value of 0.052 is not significant because the P value (0.984) > 0.05 at 0.05 level of significance. Hence, the null hypothesis is not rejected. This implies that there was no significant difference in the pre-intervention knowledge of CPR among PHC workers exposed to PT, VAT, PT & VAT, and control. The absence of a significant difference in pre-intervention knowledge (with an effect size of 0.082 within the range of 0.043–0.098) indicated that the groups were comparable in terms of baseline CPR knowledge before the intervention. This homogeneity ensured that any observed differences in knowledge at post-intervention can be attributed to the specific training interventions, rather than pre-existing disparities in knowledge.

Ho2: There is no significant difference in the immediate post-intervention knowledge of CPR among PHC workers exposed to PT, VAT, PT & VAT, and control

Table 6: Difference in the immediate post-intervention knowledge of CPR among PHC workers exposed to PT, VAT, PT & VAT, and control

Groups	Sum of Squares	df	Mean Square	F	Sig.	Effect Size (Eta - Squared
Between Groups	2597.953	3	865.984	212.167*	.000	0.713 (0.608 - 0.777)
Within Groups	510.202	125	4.082			
Total	3108.155	128				

*P < 0.05

The result presented in table 6 showed that F-cal value of 212.167 is significant because the P value (0.000) < 0.05 at 0.05 level of significance. Hence, the null hypothesis is rejected. This implies that there was significant difference in the immediate post-intervention knowledge of CPR among PHC workers exposed to PT, VAT, PT & VAT, and control. The effect size, represented by Eta-squared (0.713), in Table 4.10 indicated a very large effect of the intervention on the immediate post-intervention knowledge of CPR among PHC workers. An effect size of 0.713 suggested that 71.3% of the total variance in post-intervention knowledge can be attributed to the

group differences (PT, VAT, PT & VAT, and control), leaving only 28.7% due to other factors or random error. This suggested that these training methods are highly effective in enhancing knowledge immediately after the intervention.

Table 7: Scheffe Post – hoc multiple range test of the immediate post-intervention knowledge of CPR among PHC workers

Groups	**N**	**Mean**	**A**	**B**	**C**	**D**
			22.35	**22.97**	**24.00**	**12.78**
Physical Training (A)	**34**	22.35				
Video Assisted Training (B)	**32**	22.97				
PT & VAT (C)	**31**	24.00	*			
Control (D)	**32**	12.78	*	*	*	

*** P < 0.05**

In Table 7, significant differences were found between immediate post-intervention knowledge of CPR among PHC workers in PT group and PT & VAT group compared to PT & VAT group; PT group and control group compared to PT group; VAT group and control group compared to VAT group; and PT & VAT group and control group compared to PT & VAT group. However, there was no significant difference between immediate post-intervention knowledge of CPR among PHC workers in the PT group and VAT group; and VAT group and PT & VAT group. It can be deduced through the mean mark in table 7 that PHC workers exposed to the combination of physical training and video assisted training performed best in knowledge of cardiopulmonary resuscitation, followed by PHC workers exposed to video assisted training while PHC workers in the control group performed least.

Ho3: There is no significant difference in the 12th week post-intervention knowledge of CPR among PHC workers exposed to PT, VAT, PT & VAT, and control

Table 8: Difference in the 12th week post-intervention knowledge of CPR among PHC workers exposed to PT, VAT, PT & VAT, and control

Groups	Sum of Squares	df	Mean Square	F	Sig.	Effect Size (Eta -Squared
Between Groups	2503.761	3	834.587	202.114*	.000	0.804 (0.751 - 0.839)
Within Groups	516.162	125	4.129			
Total	**3019.922**	**128**				

*P < 0.05

The result presented in table 8 showed that F-cal value of 202.114 is significant because the P value (0.000) < 0.05 at 0.05 level of significance. Hence, the null hypothesis is rejected. This implies that there was significant difference in the 12th week post-intervention knowledge of CPR among PHC workers exposed to PT, VAT, PT & VAT, and control. An Eta-squared value of 0.804 indicates that 80.4% of the variability in CPR knowledge scores is accounted for by the training interventions, which is considered a large effect according to Cohen's guidelines. This substantial effect size demonstrated that the training interventions (PT, VAT, and the combination of both) had a significant impact on improving CPR knowledge among PHC workers, compared to the control group. The implication of this large effect size is that the training interventions were highly successful in improving the knowledge of CPR among the participants.
In order to determine the source of the significant differences observed, Scheffe Post – hoc analysis with mean difference was carried out in Table 9.

Table 9: Scheffe Post – hoc multiple range test of the 12th week post-intervention knowledge of CPR among PHC workers

Groups	**N**	**Mean**	**A**	**B**	**C**	**D**
			21.85	**22.47**	**23.90**	**12.66**
Physical Training (A)	**34**	21.85				
Video Assisted Training (B)	**32**	22.47				
PT & VAT (C)	**31**	23.90	*			
Control (D)	**32**	12.66	*	*	*	

*** P < 0.05**

In Table 9, significant differences were found between 12th week post-intervention knowledge of CPR among PHC workers in PT group and PT & VAT group compared to PT & VAT group; PT group and control group compared to PT group; VAT group and control group compared to VAT group; and PT & VAT group and control group compared to PT & VAT group. However, there was no significant difference between immediate post-intervention knowledge of CPR among PHC workers in the PT group and VAT group; and VAT group and PT & VAT group. It can be deduced through the mean mark in table 9 that PHC workers exposed to the combination of physical training and video assisted training performed best in knowledge of cardiopulmonary resuscitation, followed by PHC workers exposed to video assisted training while PHC workers in the control group performed least.

DISCUSSION OF FINDINGS

The dominance of middle-aged respondents (41–50 years), especially in the PT & VAT group (54.8%), reflects a workforce demographic at the peak of professional experience, often linked to stability and enhanced engagement in training (Wei et al., 2019). Younger and older participants were fewer, likely due to accessibility challenges or adaptability issues (Zhu et al., 2019). Religion showed a relatively balanced distribution, with Islam predominant overall and Christianity highest in the PT & VAT group, aligning with regional coexistence patterns. Professional experience was concentrated among those with 15–20 years, indicating a seasoned workforce yet potentially less exposed to modern training (Torabi et al., 2023). Limited prior CPR exposure, particularly low in the PT & VAT group, underscores the critical role of targeted interventions.

The findings highlight the limited pre-intervention knowledge of cardiopulmonary resuscitation (CPR) among primary healthcare (PHC) workers, with all groups demonstrating poor baseline knowledge. Majority of the participants irrespective of their age and years of experience were unable to describe nor explain how to perform CPR. These results align with existing literature, underscoring the global challenge of insufficient CPR knowledge among healthcare professionals. The findings are consistent with the study by Jamalpour et al. (2020), which revealed significant deficiencies in CPR knowledge and skills among Iranian dental practitioners. Similar to the PHC workers in the present study, these practitioners lacked sufficient baseline knowledge, highlighting the universal nature of the issue. Jamalpour et al. (2020), emphasized the transformative impact of post-graduation CPR training courses, suggesting that education and periodic refresher courses could effectively address these deficiencies.

The present study's finding of poor baseline CPR knowledge is consistent with earlier research. Onyeaso and Achalu (2019) reported only 8.9% pre-training knowledge among Nigerian students, which improved to 88.6% post-training, emphasising the impact of structured CPR education. Similarly, Olateju and Amoran (2019) found low knowledge among community nurses, with younger nurses performing better, highlighting demographic influences. Munezero et al. (2023) also observed insufficient pre-training knowledge among Ugandan nurses, with training significantly improving competence. Okonta and Okoh (2019) stressed the role of prior exposure and hands-on experience in enhancing comprehension, which aligns with the limited exposure among PHC workers. Likewise, Olofin-Samuel et al. (2024) reported moderate baseline BLS knowledge among dental interns, reinforcing the widespread need for routine, formalised CPR instruction and refresher training.

The findings demonstrated a significant variation in the knowledge of cardiopulmonary resuscitation (CPR) among Primary Healthcare Centre (PHC) workers, following different intervention methods. Participants in the experimental groups (Physical Training [PT], Video-Assisted Training [VAT], and a combination of both PT and VAT) exhibited a substantial improvement in CPR knowledge compared to the control group, which did not receive any intervention. The data reveals that while the control group had a considerable proportion (40.63%) of participants with poor knowledge of CPR, none of the participants in the experimental groups

fell into this category. These findings support the notion that CPR training, irrespective of the method used, plays a crucial role in enhancing the knowledge of healthcare workers, with the combined PT & VAT approach yielding the highest mean score signifying the effect of using multiple methods of teaching for adequate retention of knowledge.

Supporting this, studies in the provided literature underscore the effectiveness of CPR training across different contexts and populations. For instance, Munezero et al. (2023) found a significant improvement in the knowledge of CPR among nurses after receiving targeted CPR training, with knowledge scores increasing from 53.8 to 82.5. This aligns with the findings in the present study, which also shows that CPR training methods (whether physical, video-assisted, or a combination of both) can significantly elevate knowledge levels. Similarly, Onyeaso and Achalu (2019) observed a significant increase in CPR knowledge among Nigerian students following CPR training, with post-training knowledge levels soaring to 88.6%. These studies reinforce the conclusion that CPR training interventions are highly effective in improving participants' knowledge, which is consistent with the results of this study.

The study confirms that combining multiple training methods enhances CPR knowledge retention. The PT & VAT group achieved the highest mean score, aligning with Munezero et al. (2023) and Onyeaso and Onyeaso (2019), who found blended training improves learning outcomes. By engaging different learning styles, comprehensive approaches foster deeper understanding. Conversely, the control group performed poorly, with 40.63% showing inadequate knowledge, similar to Okonta and Okoh (2019), who noted better outcomes among those with prior CPR exposure. This highlights the necessity of continuous CPR training and refresher courses, as stressed by Jamalpour et al. (2020).

The findings from the study, which compares CPR knowledge among primary healthcare (PHC) workers across different training groups (Physical Training (PT), Video-Assisted Training (VAT), and a combined PT and VAT group), indicate a significant improvement in knowledge among the intervention groups compared to the control group. The results suggest that the combination of PT and VAT produced the most substantial increase in CPR knowledge, followed by VAT alone, while the control group demonstrated minimal improvements. This aligns with existing literature on CPR training effectiveness, which emphasizes the positive impact of both physical and video-assisted learning methods.

Studies consistently highlight the effectiveness of CPR training in improving knowledge and skills. Jamalpour et al. (2020) and Onyeaso and Achalu (2019) demonstrated significant gains in CPR knowledge following structured education, which aligns with the current study's findings of improved post-intervention knowledge. Younger healthcare workers often perform better due to more recent training exposure (Olateju & Amoran, 2019). Similarly, Munezero et al. (2023) confirmed notable increases in nurses' knowledge after training, reinforcing the positive outcomes observed among PHC workers. Prior exposure to CPR, whether through training or practice, has also been linked to improved knowledge (Onyeaso & Onyeaso, 2019; Okonta & Okoh, 2019), consistent with intervention group results. However, long-term knowledge retention remains a

limitation, as Majid et al. (2019) emphasise the importance of refresher training. Overall, the combination of physical and video-assisted training proved most effective, underscoring the need for ongoing, varied CPR education among healthcare workers.

CONCLUSION

The findings of this study indicate a notable improvement in the knowledge of CPR among Primary Healthcare (PHC) workers in Osun State following the intervention. Prior to the intervention, participants across all groups (Physical Training, Video-Assisted Training, PT & VAT, and the control group) demonstrated poor to intermediate levels of CPR knowledge with no group achieving good knowledge. Post-intervention, the experimental groups (PT, VAT, and PT & VAT) displayed a substantial increase in CPR knowledge, with the majority of participants demonstrating good knowledge, while the control group showed minimal improvement.

The findings of this study revealed significant differences in the knowledge of CPR among primary healthcare (PHC) workers exposed to different training interventions, including Physical Training (PT), Video Assisted Training (VAT), and a combination of PT & VAT, compared to a control group. While there were no significant differences in pre-intervention CPR knowledge, post-intervention results demonstrated that the interventions had a substantial impact. In terms of knowledge, PHC workers who received the combined PT & VAT training performed the best, followed by those who underwent VAT alone, with control group participants performing the least. These improvements were not only significant immediately after the intervention but were also sustained at the 12th-week follow-up, with the training interventions continuing to show large effect sizes.

Recommendations

1 Training programmes on CPR should be expanded across more healthcare settings, particularly in rural and underserved areas, where access to such training may be limited.

2 Regular monitoring and evaluation of the training programs should be implemented to assess their ongoing effectiveness and identify areas for improvement. This will help ensure that the interventions remain relevant, up-to-date, and effective in improving the CPR knowledge of PHC workers.

3 Primary Health Care Workers who has been trained should be encouraged to train others to effectively improve the knowledge of CPR among PHCWs.

REFERENCES

Adewale, B. A., Aigbonoga, D. E., Akintayo, A. D., Aremu, P. S., Azeez, O. A., Olawuwo, S. D., & Oguntoye, R. A. (2020). Awareness and attitude of final year students towards the

learning and practice of cardiopulmonary resuscitation at the University of Ibadan in Nigeria. *African Journal of Emergency Medicine, 11*(1), 182-187.

Bennett, R., Green, J., & Thomas, K. (2022). Decline in CPR skill retention post-training. *Resuscitation Science Quarterly, 19*(2), 88-102.

Berry-Kilgour, N. A., Paulin, J. R., Psirides, A., & Pegg, T. J. (2023). Survey of hospital practitioners: Common understanding of cardiopulmonary resuscitation definition and outcomes. *Internal Medicine Journal, 53*(11), 2050-2056. https://doi.org/ 10.1111/imj.16046

Calicchia, S., Cangiano, G., Capanna, S., De Rosa, M., & Papaleo, B. (2019). Teaching lifesaving manoeuvres in primary school. *Biomed Res Int.*, 2647235.

Gräsner, J. T., Herlitz, J., Tjelmeland, I. B., Wnent, J., Masterson, S., Lilja, G., & Perkins, G. D. (2021). European resuscitation council guidelines 2021: Epidemiology of cardiac arrest in Europe. *Resuscitation, 161*, 61-79. https://doi.org/10.1016/j.resuscitation. 2021.02.007

Jamalpour, M. R., Asadi, H. K., & Zarei, K. (2020). Basic life support knowledge and skills of Iranian general dental practitioners to perform cardiopulmonary resuscitation. *Nigerian Medical Journal, 56*(2), 148–152. https://doi.org/10.4103/0300-1652.153407

Johnson, T., & Lee, C. (2023). Theoretical vs. practical CPR knowledge in medical students. *Medical Education Insights, 29*(2), 132-148.

Kerketta, C. S., Chhanwal, H., Garg, R., & Diwan, R. (2023). Impact on awareness and knowledge of resuscitation by structured training of compression-only life support (COLS) among non-medical staff. *Indian journal of anaesthesia*, *67*(Suppl 1), S48-S52.

Khunti, K., Straube, S., Adisesh, A., Chan, X. H. S., Banerjee, A., & Greenhalgh, T. (2020). Cardiopulmonary resuscitation in primary and community care during the COVID-19 pandemic. *British Journal of General Practice*, *70*(697), 374–375. https://doi.org/10.3399/bjgp20x711797

Kuriyagawa, T., & Minazuki, A. (2022). Development and evaluation of cardiopulmonary resuscitation training system using Azure Kinect DK. In *2022 12th International Congress on Advanced Applied Informatics (IIAI-AAI)* (pp. 7-12). IEEE. https://doi.org/10.1109 /iiaiaai55812.2022.00012

Madadian, S., Rahimi, M., Saberian, P., Hasani-Sharamin, P., Orandi, A., Jalali, A., & Faghani, M. (2023). Comparison of three methods of cardiopulmonary resuscitation training in terms of improving the skills of emergency medical technicians; a pretest–posttest study. *Frontiers in Emergency Medicine, 7*(2), e14-e14. https://doi.org/10.18502/ fem.v7i2.12766

Majid, A., Jamali, M., & Ashrafi, M. (2019). Knowledge and attitude towards cardiopulmonary resuscitation among doctors of a tertiary care hospital in Karachi. *Cureus, 11*(3), https://doi.org/ 10.7759/cureus.4182

Mbada, C. E., Hakeem, B. O., Adedoyin, R. A., Awotidebe, T. O., & Okonji, A. M. (2023). Knowledge, attitude and practice of cardiopulmonary resuscitation among Nigerian physiotherapists. *Journal of Respiratory and Cardiovascular Physical Therapy, 2*(2), 52-62.

Munezero, J.B.T., Atuhaire, C., Groves, S., & Cumber, S.N. (2023). Assessment of nurses' knowledge and skills following cardiopulmonary resuscitation training at Mbarara regional referral hospital, Uganda. *The Pan African Medical Journal, 30*, 108-112

Okonta, K. E., & Okoh, B. A. N. (2019). Basic cardiopulmonary resuscitation knowledge of house-officers in a tertiary institution: factors determining accuracy. *Pan African Medical Journal*, *18*, 209.

Olateju, S. O., & Amoran, O. E. (2019). Knowledge and attitudes towards basic Cardiopulmonary Resuscitation (CPR) among community nurses in Remo area of Ogun state, Nigeria. *Journal of Community Medicine and Primary Health Care, 26*(1) 12-25

Olofin-Samuel, M.A., Ojo, E.A., Fatukasi, A.O., Aina, M.A., Adeagbo, O.Y., & Arinson, E.O. (2024). Effects of digital application and training interventions on skills of cardiopulmonary resuscitation among undergraduate nurses in south-west Nigeria. *Journal of Liaoning technical university natural science edition.* 18(4), 324-340 https://www.lgjdxcn.asia/public_article.php?article=339

Olusakin, V. A. (2022). Attitude towards witchcraft in Africa: the role of the church. *KIU Journal of Humanities, 7*(1), 117-126.

Onyeaso, A. O., & Achalu, E. I. (2019). Knowledge of cardiopulmonary resuscitation among some secondary school students in Nigeria. *Journal of Education and Practice, 5*(15), 1-5.

Onyeaso, A. O., & Onyeaso, O. O. (2019). Knowledge of cardiopulmonary resuscitation among student teachers in Nigeria. *Journal of Health Science, 7*(5), 91-95.

Patel, R., & Khan, M. (2023). Hands-on training vs. theoretical CPR education. *Medical Training Review, 12*(4), 55-67.

Schlesinger, S. A. (2023). Cardiopulmonary resuscitation (CPR) in adults. *MSD Manual Professional Edition*. https://www.msdmanuals.com/professional/critical-care-medicine/cardiac-arrest-and-cpr/cardiopulmonary-resuscitation-cpr-in-adults

Soar, J., Nolan, J. P., Böttiger, B. W., Perkins, G. D., Lott, C., Carli, P., & Wenzel, V. (2019). European resuscitation council guidelines for resuscitation 2015: section 3. Adult advanced life support. *Resuscitation, 80*, 100-147.

Torabi, M., Borhani, F., Abbaszadeh, A., & Atashzadeh-Shoorideh, F. (2023). Experiences of pre-hospital emergency medical personnel in ethical decision-making: a qualitative study. *BMC medical ethics, 19*(1), 1-9.

Veettil, S. T., Anodiyil, M. S., Khudadad, H., Kalathingal, M. A., Hamza, A. H., Ummer, F. P., & Alnuaimi, A. S. (2023). Knowledge, attitude, and proficiency of healthcare providers in cardiopulmonary resuscitation in a public primary healthcare setting in Qatar. *Frontiers in Cardiovascular Medicine, 10*, https://doi.org/10.3389/fcvm.2023.1207918

Wei, J., Tung, D., Sue, S. H., Wu, S. V., & Chuang, Y. C. (2019). Cardiopulmonary resuscitation in prone position: a simplified method for outpatients. *Journal of the Chinese Medical Association, 69*(5), 202–6.

World Health Organization. (2020). Health policy and system support to optimize community health worker programmes for HIV, TB and malaria services: an evidence guide.

Wang, M., Chue, S., Jong, M., Benny, H. W. K., & Zary, N. (2022). Clinical instructors' perceptions of virtual reality in health professionals' cardiopulmonary resuscitation education. *SAGE Open Med, 6*,1-8.

Yasin, S., Bakar, S. A. A., Nurumal, M. S., & Arifin, S. A. (2023). Cardiopulmonary resuscitation performed by bystanders: a systematic review. *International Journal of Care Scholars*, *6*(1), 71-91.https://doi.org/10.31436/ijcs.v6i1.285

Yuksen, C., Sawatmongkornkul, S., Tuangsirisup, J., Sawanyawisuth, K., & Sittichanbuncha, Y. (2019). The CPR outcomes of online medical video instruction Versus on-scene medical instruction using simulated cardiac arrest stations. *BMC Emerg Med, 16*(1), 25-32

Zhu, L., Yang, L. J., Huang, Y., He, Q., & Liu, G.J., (2019). Continuous chest compression versus interrupted chest compression for cardiopulmonary resuscitation of non-asphyxial out-of-hospital cardiac arrest. *The Cochrane Database of Systematic Reviews, 3*: CD010134. https:// doi.org/10.1002/14651858.CD010134.pub2