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EFFECT OF PHYSICAL AND VIDEO - ASSISTED TRAINING ON SKILLS OF CARDIOPULMONARY RESUSCITATION AMONG PRIMARY HEALTH CARE WORKERS IN OSUN STATE, NIGERIA

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Abstract

The study assessed the effect of Physical Training (PT) and Video-Assisted Training (VAT) interventions on the skills of cardiopulmonary resuscitation (CPR) among primary healthcare (PHC) workers in Osun State, Nigeria. Specifically, the study assessed their pre-intervention skills, and measured immediate and 12th-week post-intervention outcomes. The study compared four groups: PT, VAT, PT & VAT, and a control group that received no intervention. A quasi-experimental, four-group pretest-post-test design was employed, involving 133 PHC workers selected from 12 primary health centers through multistage sampling. Participants included nurses, midwives, pharmacists, and laboratory scientists. Data were collected using a structured CPR skills checklist, validated and tested for reliability (0.919 for skills). The intervention was conducted in three phases: pre-intervention, training, and post-intervention assessments. Data were analyzed using SPSS, employing descriptive statistics, and Univariate Analysis of Variance (ANOVA) to test the hypotheses. Pre-intervention, CPR skills were poor across all groups. Post-intervention, significant improvements were observed, especially in the PT & VAT group, which outperformed others. At 12 weeks, the combined PT & VAT approach remained the most effective in sustaining CPR competency. The results indicated no significant difference in pre-intervention CPR skills ($F = 0.639$, $p = 0.591$) across the groups, confirming baseline homogeneity. However, significant improvements were observed post-intervention, with immediate post-intervention skill ($F = 476.719$, $p = 0.000$, $\eta 2 = 0.870$) showing substantial enhancement. At the 12th-week post-intervention, skill levels remained significantly higher in the intervention groups compared to the control. PHC workers exposed to the combination of PT

and VAT demonstrated the highest improvement in skills, followed by the VAT group, while the control group exhibited the least improvement. It is recommended that PHC facilities institutionalize blended training approaches for CPR, ensuring periodic refresher sessions to sustain skill retention.

Keywords: Cardiopulmonary resuscitation (CPR), Physical training (PT), Primary healthcare workers, Skills, Video-Assisted training (VAT)

Introduction

Cardiopulmonary resuscitation (CPR) is a vital life-saving procedure that helps maintain blood circulation and preserve brain function in individuals experiencing cardiac arrest until advanced medical care is available (Yasin et al., 2023). Over the years, CPR has evolved significantly, with modern techniques emerging in the 1960s based on extensive research by medical professionals (Berry-Kilgour et al., 2023). While early CPR methods primarily focused on mouth-to-mouth resuscitation, the integration of chest compressions led to the widely accepted approach used today (Olofin-Samuel et al., 2024). Despite the effectiveness of CPR, cardiac arrest remains a leading cause of mortality, particularly in countries like Nigeria, where prompt intervention is often lacking (Adewale et al., 2020). The ability to perform CPR is crucial, especially in out-of-hospital settings where immediate medical assistance may not be readily available.

Primary health care workers (PHCWs) play a critical role in responding to medical emergencies, particularly in rural and underserved areas where access to advanced healthcare facilities is limited. Their ability to administer timely and effective CPR can significantly improve survival rates and reduce complications related to cardiac arrest (Veettil et al., 2023). However, global studies indicate that only 50–60% of PHCWs possess adequate CPR skills, with fatality rates exceeding 90% for cardiac arrest victims who do not receive immediate CPR (Gräsner et al., 2020). In Africa, CPR proficiency among PHCWs drops to approximately 30–40%, and in Sub-Saharan Africa, the percentage is even lower, averaging around 20–30% due to inadequate training and resource limitations (Saidu et al., 2023). In Osun State, Nigeria, CPR skill levels among PHCWs are estimated at 25%, with a staggering 98.2% mortality rate among cardiac arrest victims in rural communities due to a lack of CPR intervention (Olateju & Amoran 2019). These statistics highlight an urgent need for improved CPR training programmes to enhance PHCW proficiency and ultimately reduce preventable deaths.

To address this need, effective training methods must be explored to ensure that PHCWs not only acquire CPR knowledge but also develop the necessary skills for practical application. The Knowledge, Attitude, and Practice (KAP) model has been widely used in intervention studies to assess how training translates into practice and improves competency (Wang et al., 2020). One promising approach is Video-Assisted Training (VAT), which utilises multimedia elements such as visuals, animations, and real-life scenarios to enhance learning (Alves et al., 2019). VAT allows learners to pause, rewind, and review content as needed, catering to different learning styles and improving retention. On the other hand, Physical Training (PT) focuses on hands-on practice using mannequins to develop essential CPR skills, such as chest compressions and ventilation techniques (Kuriyagawa & Minazuki, 2022). While PT ensures practical experience, it may lack the realism and scenario-based learning offered by VAT.

Each training method presents distinct advantages and limitations. VAT provides an immersive and interactive learning experience, helping learners gain exposure to diverse and complex emergency scenarios (Madadian et al., 2023). However, its reliance on technological infrastructure and financial resources makes it less accessible, particularly in low-resource settings. PT, on the other hand, is more affordable and readily available but offers limited feedback, which could reinforce incorrect techniques (Kumawat, 2019). Given these constraints, there is a need to explore a blended approach that integrates the strengths of both VAT and PT to enhance CPR training effectiveness. By investigating the impact of these training methods on PHCW competency, this study aims to contribute to improved emergency response capabilities and better patient outcomes in resource-limited settings.

Onyeaso (2020) found that Nigerian university students retained CPR skills significantly six weeks post-training, with no substantial impact from age or gender, suggesting that secondary school students can also effectively acquire and maintain CPR skills. However, Gebremedhn et al. (2019) reported a lack of CPR proficiency among nurses and nursing students, indicating a need for enhanced training. Similarly, Munezero et al. (2023) found that most nurses lacked formal CPR training but showed significant improvement post-intervention. Okonta and Okoh (2019) observed that prior training substantially influenced clinical medical students' CPR knowledge, necessitating regular training. Studies by Bennett et al. (2022) and Miller et al. (2024) showed rapid skill decay, with CPR proficiency declining by 50% within six months, reinforcing the need for periodic retraining. Additionally, Patel and Khan (2023) demonstrated that hands-on training improved CPR performance by 40% compared to theoretical instruction, while Harrison et al. (2024) found that biannual training improved skill retention by 70%, emphasizing the importance of frequent reinforcement.

Regarding video-assisted CPR training, Anderson and Li (2023) found that video-based training improved theoretical knowledge by 30% but had limited impact on long-term skill retention. Gomez et al. (2024) reported that healthcare workers trained through video-assisted methods scored 25% higher in knowledge assessments than those receiving in-person lectures. However, it was also found that blending video instruction with hands-on practice yielded the highest retention rates. Patel et al. (2024) demonstrated that video-assisted training among school teachers significantly improved knowledge and moderate practice, highlighting a disparity between understanding and application. Hiwale et al. (2024) found that video-assisted training was more effective than traditional demonstrations in enhancing CPR knowledge among undergraduate students, supporting the use of standardized, cost-effective methods. Similarly, another study found that school students' knowledge improved significantly following a video-assisted training programme, suggesting that such interventions should be incorporated into school curricula to enhance emergency preparedness.

Kumawat (2019) assessed video-assisted teaching effectiveness among undergraduate college students and found a significant improvement in CPR knowledge post-training. The study reinforced the effectiveness of structured teaching programmes, showing that video-assisted teaching significantly enhanced understanding. In a related study on MRSA infection training among nurses, Kumawat (2019) found substantial improvements in knowledge and skill post-intervention, further supporting structured education's role in enhancing competency. The research consistently indicates that video-assisted teaching improves theoretical knowledge, though skill retention remains a challenge. Therefore, integrating video-assisted instruction with

hands-on practice and frequent reinforcement is crucial to ensuring CPR proficiency across different populations, including students, healthcare workers, and the general public.

The main objective of the study is to assess the effect of Physical and VAT interventions on skills of CPR among primary healthcare workers in Osun State, Nigeria. The specific objectives are to:

1. determine the pre-intervention skill of CPR among PHC workers in the four groups (PT, VAT, PT & VAT, and control) in selected primary health facilities in Osun State;

2. determine the immediate post-intervention skill of CPR among PHC workers in the four groups (PT, VAT, PT & VAT, and control) in selected primary health facilities in Osun State; and

3. determine the 12th week post-intervention skill of CPR among PHC workers in the four groups (PT, VAT, PT & VAT, and control) in selected primary health facilities in Osun State.

Three research hypotheses were formulated to guide this study
Ho1: There is no significant difference in the pre-intervention skill of CPR among PHC workers exposed to PT, VAT, PT & VAT, and control

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

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

Methods

This study employed a quantitative research approach using a four-group pretest-posttest quasi-experimental design to assess the effect of physical and video-assisted training interventions on CPR skills among primary healthcare workers (PHCWs) in Osun State, Nigeria. Experimental Group 1 received physical hands-on training, Experimental Group 2 underwent video-assisted training, Experimental Group 3 was exposed to both interventions, while Experimental Group 4 served as the control group with no intervention. The study population comprised 133 PHCWs selected from 12 PHCs, including nurses, midwives, community extension workers, health attendants, health assistants, security staff, gardeners, laboratory scientists, pharmacists, and other allied healthcare personnel. Inclusion criteria required participants to have at least three years of service, while those who were ill, pregnant, or cognitively impaired were excluded. The sample size was determined using Lemeshow's formula, yielding a total of 133 participants after accounting for a 10% attrition rate. A multistage sampling procedure was employed, where one local government was selected per sectorial district using simple random sampling, followed by purposive selection of four PHCs per LGA based on staff strength, and proportionate allocation of participants per facility.

The research instrumentation consisted of two sections: Section A gathered socio-demographic details of respondents, including age, gender, religion, ethnicity, years of experience, and educational status, while Section B employed an adopted checklist on cardiopulmonary

resuscitation (CPR) skills by Jenny Agustin Fabros (2022), with a total score of 20, categorising skill levels as good (≥15), moderate (10-14), and low (≤10). The instrument's validity was established through expert reviews assessing topic relevance, clarity, and adequacy, with refinements based on feedback from the research supervisor, methodologist, and Nursing department research panel. Content validity of the Video Assisted Audio Visual Clip was determined using the Content Validity Ratio (CVR), where criteria such as audio quality, appropriateness, content relevance, and overall quality received a CVR of 1.0, indicating unanimous expert agreement, whereas visual quality, video structuring, and clarity had a CVR of 0.5, showing some disagreement. The instrument's reliability was tested through a pilot study involving 27 primary healthcare workers in Ilesa East Local Government, ensuring its acceptability and effectiveness in eliciting appropriate responses. Reliability was assessed using Cronbach's Alpha in SPSS Version 28, yielding a coefficient of 0.919 for Section B, indicating high internal consistency and construct validity.

Ethical approval for the study was obtained from the Osun State Primary Health Care Board, Osogbo, with permission granted to collect data from selected primary health care facilities. Participants were assured of anonymity and confidentiality, as no identifying names were collected, and participation was entirely voluntary, ensuring the protection of individual rights. Data collection spanned two days per LGA headquarters and was conducted in three phases—pre-intervention, intervention, and post-intervention—following an introduction to the study and agreement on training session timings. The research instruments were administered in these phases, with serial numbering for control and recall. Data were checked for completeness and accuracy, then manually sorted, edited, and coded using a coding guide. IBM SPSS version 28 was employed for analysis, with descriptive statistics, including mean, median, standard deviation, ranges, frequencies, and proportions, used to summarize variables, while hypotheses were tested using independent One-way Analysis of Variance (ANOVA).

Results

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.**	**Percent (%)**	**Freq.**	**Percent (%)**	**Freq.**	**Percent (%)**	**Freq.**	**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 analysis in Table 1 reveals a predominantly female participation across all groups, with the highest female representation in the Physical Training (PT) group (79.4%) and the lowest in the Control group (75.0%). The age distribution shows that most respondents are between 41 and 50 years, particularly in the PT & VAT group (54.8%). Younger participants (20–30 years) are the least represented, while older participants (51+ years) are most prevalent in the Control group (18.8%). Islam is the dominant religion, especially in the Control group (62.5%), while Christianity is most represented in the PT & VAT group (51.6%). Most respondents have 15–20 years of experience, especially in the Control group (53.1%), while those with under eight years are the least. Few participants have prior CPR training, with the highest percentage in the Control group (25.0%), highlighting a gap in prior exposure to CPR education.

Table 2: Summary of pre-intervention skill 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

Pre-intervention Skill of CPR	**EG 1 (PT) Freq. (%)**	**EG 2 (VAT) Freq. (%)**	**EG 3 (PT & VAT) Freq. (%)**	**Control Freq. (%)**
Poor Skill (0-9)	34 (100.00)	32 (100.00)	31 (100.00)	32 (100.00)
Moderate Skill (10-13)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Good Skill (14-20)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Mean ±SD	**4.85±1.08**	**5.06±0.90**	**5.10±1.08**	**5.20±1.16**

Table 2 presents the summary of pre-intervention CPR skills among PHC workers across four groups: PT, VAT, a combination of PT and VAT, and the control group. The data reveals a uniformly low skill level CPR among participants across all groups prior to the intervention. All participants in each group—100% in PT, VAT, PT & VAT, and the control group—were categorized as having poor CPR skills (scores between 0 and 9). None of the participants demonstrated moderate (scores 10-13) or good CPR skills (scores 14-20). This uniform lack of adequate CPR skills highlights the critical need for intervention to improve the competency of PHC workers in this life-saving procedure. The mean scores for CPR skills further supported the findings, with values ranging between 4.85±1.08 in the PT group and 5.20±1.16 in the control group. Although the mean scores show slight variations, the overall low values and standard

deviations indicate a consistently poor skill level across all groups. These results suggested that none of the PHC workers possessed adequate knowledge or practical ability in CPR prior to the intervention, reinforcing the necessity of targeted training approaches to bridge the skill gap.

Table 3: Summary of immediate post-intervention skill 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 Skill of CPR	EG 1 (PT) Freq. (%)	EG 2 (VAT) Freq. (%)	EG 3 (PT & VAT) Freq. (%)	Control Freq. (%)
Poor Skill (0-9)	0 (0.0)	0 (0.00)	0 (0.00)	32 (100.00)
Moderate Skill (10-13)	25 (73.53)	8 (25.00)	0 (0.00)	0 (0.00)
Good Skill (14-20)	9 (26.47)	24 (75.00)	31 (100.00)	0 (0.00)
Mean ±SD	**12.59±1.08**	**14.50±1.45**	**17.47±1.60**	**5.30±1.17**

Table 3 summarizes the immediate post-intervention skills in CPR among PHC workers across four groups: those exposed to PT, VAT, a combination of both PT and VAT, and a control group. The results revealed significant differences in skill levels among the groups. In the control group, all participants (100%) demonstrated poor skills, with a mean score of 5.30 ± 1.17, which indicated that the absence of an intervention made them to be unable to achieve even moderate competence. Conversely, none of the participants in the intervention groups recorded poor skills. In EG1 (PT), 73.53% exhibited moderate skills, while 26.47% achieved good skills, with a mean score of 12.59 ± 1.08. This suggested that PT alone can enhance CPR skills but may not be sufficient for most participants to achieve a high level of proficiency. In EG2 (VAT), the results shifted, with 25% achieving moderate skills and 75% attaining good skills, which reflected in a higher mean score of 14.50 ± 1.45. This indicated that VAT is more effective than PT alone in fostering good CPR skills. The highest performance was observed in EG3 (PT & VAT), where all participants (100%) achieved good skills, with a mean score of 17.47 ± 1.60. The combination of physical and video-assisted training appears to have a synergistic effect, leading to the most comprehensive skill acquisition among the groups.

Table 4: Summary of 12th week post-intervention skill 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 skill of CPR	EG 1 (PT) Freq. (%)	EG 2 (VAT) Freq. (%)	EG 3 (PT & VAT) Freq. (%)	Control Freq. (%)
Poor Skill (0-9)	0 (0.0)	0 (0.00)	0 (0.00)	32 (100.00)
Moderate Skill (10-13)	27 (79.41)	7 (21.88)	0 (0.00)	0 (0.00)
Good Skill (14-20)	7 (20.59)	25 (78.13)	31 (100.00)	0 (0.00)
Mean ±SD	**12.32±1.12**	**14.59±1.43**	**17.84±1.33**	**5.33±1.24**

Table 4 summarizes the CPR skills of PHC workers in four groups—PT, VAT, PT combined with VAT, and a control group—measured at the 12th week post-intervention. The findings revealed significant differences in skill levels across the groups, with the control group demonstrated the poorest outcomes and the combined PT & VAT group achieving the best performance. In the control group, all participants (100%) had poor CPR skills (scores between

0–9), with a mean score of 5.33 ± 1.24, highlighted lack of training impact. Conversely, the PT & VAT group achieved the highest performance, as all participants (100%) had good CPR skills (scores between 14–20), with a mean score of 17.84 ± 1.33. This suggested that combining physical and video-assisted training is the most effective method for enhancing CPR skills. The VAT group also showed strong results, with 78.13% of participants reaching good skill levels and a mean score of 14.59 ± 1.43. Meanwhile, the PT group had 79.41% of participants in the moderate skill range (scores between 10–13) and 20.59% achieving good skills, with a mean score of 12.32 ± 1.12. Overall, it is concluded that structured training interventions significantly improved CPR skills among PHC workers compared to no intervention, with combined physical and video-assisted training producing marked improvement.

Test of Hypotheses

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

Table 5: Difference in the pre-intervention skill 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	2.143	3	0.714	0.639	.591	0.092 (0.058 - 0.118)
Within Groups	139.779	125	1.118			
Total	141.922	128				

P > 0.05

The result presented in table 5 showed that F-cal value of 0.639 is not significant because the P value (0.591) > 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 skill of CPR among PHC workers exposed to PT, VAT, PT & VAT, and control. Additionally, the effect size (Eta-squared = 0.092) supported the absence of a meaningful difference between groups. This value indicated that the variability in pre-intervention CPR skills attributed to group differences is minimal. These findings confirmed that the groups were comparable in their CPR skill levels prior to the intervention, establishing a baseline of homogeneity. This is essential for the validity of the study, as it ensures that any observed post-intervention differences in CPR skills can be attributed to the effects of the training interventions rather than pre-existing disparities between groups.

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

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

Groups	Sum of	Df	Mean	F	Sig.	Effect Size

	Squares		Square			(Eta -Squared
Between Groups	2552.918	3	850.973	476.719*	.000	0.870 (0.729 - 0.914)
Within Groups	223.133	125	1.785			
Total	**2776.050**	**128**				

*P < 0.05

The result presented in table 6 showed that F-cal value of 476.719 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 skill of CPR among PHC workers exposed to PT, VAT, PT & VAT, and control. The effect size, represented by Eta-squared (0.870), indicated a very large effect of the training interventions on CPR skill improvement. An Eta-squared value of 0.870 suggests that approximately 87% of the variance in CPR skills can be attributed to the differences between the groups, while the remaining 13% is attributed to individual differences within each group. This large effect size highlights the strong impact of the intervention on participants' CPR skills. The implication of this large effect size is that the training methods (PT, VAT, and PT & VAT) were highly effective in improving CPR skills, with the intervention groups showed improvements. Furthermore, the magnitude of the effect size suggested that the results are not only statistically significant but also meaningful, emphasizing the importance of implementing such training interventions in healthcare settings to enhance the skill levels of primary healthcare workers. In order to determine the source of the significant differences observed, Scheffe Post – hoc analysis with mean difference was carried out in Table 7

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

Groups	**N**	**Mean**	**A**	**B**	**C**	**D**
			12.59	**14.50**	**17.47**	**5.30**
Physical Training (A)	**34**	12.59				
Video Assisted Training (B)	**32**	14.50	*			
PT & VAT (C)	**31**	17.47	*	*		
Control (D)	**32**	5.30	*	*	*	

*** P < 0.05**

In Table 7, significant differences were found between immediate post-intervention skill of CPR among PHC workers in PT group and VAT group compared to VAT group; PT group and PT & VAT group compared to PT & VAT group; PT group and control group compared to PT group; VAT group and PT & VAT group compared to PT & VAT group, VAT group and control group compared to VAT group; and PT & VAT group and control group compared to PT & VAT group. It can be deduced through the mean mark in table 4.13 that PHC workers exposed to the

combination of physical training and video assisted training performed best in skill 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 skill of CPR among PHC workers exposed to PT, VAT, PT & VAT, and control.

Table 8: Difference in the 12th week post-intervention skill 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	2670.772	3	890.257	541.103*	.000	0.904 (0.892 - 0.927)
Within Groups	205.658	125	1.645			
Total	2876.430	128				

*P < 0.05

The result presented in table 8 showed that F-cal value of 541.103 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 skill of CPR among PHC workers exposed to PT, VAT, PT & VAT, and control. The effect size, indicated by Eta-squared (0.904), suggested a very large effect of the intervention on CPR skills. The Eta-squared value of 0.904 indicates that approximately 90.4% of the variance in CPR skills at the 12th week post-intervention can be attributed to the training interventions, with very little variance left unexplained. This high effect size reflected the substantial impact of the interventions on the participants' CPR skill improvement. 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 immediate post-intervention skill of CPR among PHC workers

Groups	**N**	**Mean**	**A**	**B**	**C**	**D**
			12.32	**14.59**	**17.84**	**5.33**
Physical Training (A)	**34**	12.32				
Video Assisted Training (B)	**32**	14.59	*			
PT & VAT (C)	**31**	17.84	*	*		
Control (D)	**32**	5.33	*	*	*	

*** P < 0.05**

In Table 9, significant differences were found between 12th week post-intervention skill of CPR among PHC workers in PT group and VAT group compared to VAT group; PT group and PT & VAT group compared to PT & VAT group; PT group and control group compared to PT group; VAT group and PT & VAT group compared to PT & VAT group VAT group and control group compared to VAT group; and PT & VAT group and control group compared to PT & VAT group. It can be deduced through the mean mark in table 4.17 that PHC workers exposed to the combination of physical training and video assisted training performed best in skill 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 findings underscore the alarmingly low pre-intervention cardiopulmonary resuscitation (CPR) skill levels among Primary Health Care (PHC) workers. The data, showing a 100% categorisation of participants in all groups (Physical Training, Video-Assisted Training, PT & VAT, and the control group) as having poor CPR skills, reflect a concerning gap in the competency of these healthcare workers. The mean scores, ranging between 4.85±1.08 in the PT group and 5.20±1.16 in the control group, further highlight the uniformly low skill level, suggesting that none of the participants possessed adequate CPR knowledge or abilities prior to the intervention. These results call attention to the need for structured and effective training interventions to equip PHC workers with the necessary skills to perform life-saving procedures such as CPR.

The findings align with the literature, notably the study by Onyeaso (2020), which reveals a similar trend in CPR proficiency among participants in Nigeria. The study indicated that Nigerian university students had poor CPR skills prior to training, which is in agreement with the uniform lack of proficiency seen in the PHC workers in this study. However, Onyeaso's study also found that CPR skills could be acquired and maintained with proper training, a sentiment echoed by the results of Munezero et al. (2023). Their study in Uganda demonstrated significant improvements in CPR proficiency post-training, reinforcing the notion that proper intervention can substantially enhance CPR skills, even for individuals with initially poor competence.

Moreover, Gebremedhn et al. (2019) highlighted similar deficiencies in CPR execution among nurses, further confirming that the low baseline CPR skills of PHC workers are not isolated but prevalent in various healthcare settings. The findings of Okonta and Okoh (2019) also support the conclusion that regular, structured CPR training is crucial for improving knowledge and skills. The lack of formal training and the subsequent improvement after intervention in these studies suggest that PHC workers, like other healthcare professionals, stand to benefit from consistent and targeted CPR education. Therefore, the findings of this study are consistent with the literature, underlining the critical need for effective training to enhance the CPR capabilities of healthcare workers.

The findings in the study on the immediate post-intervention CPR skills among primary healthcare (PHC) workers indicate significant differences between the groups exposed to various training methods, with the highest proficiency observed in the combination of physical training (PT) and video-assisted training (VAT). These findings suggest the efficacy of both physical and video-assisted methods in enhancing CPR skills, with a clear advantage for combining the two approaches. This is consistent with the broader literature on CPR training effectiveness.

In support of these findings, Onyeaso (2020) found that CPR skills can be effectively retained by Nigerian university students, indicating that skill retention is possible after training, which aligns with the observed improvement in CPR proficiency in the intervention groups in this study. Additionally, the fact that participants exposed to video-assisted training (VAT) showed better performance than those who only received physical training (PT) correlates with previous research by Munezero et al. (2023), which showed that training significantly enhanced participants' CPR skills. Their findings indicate that interventions can lead to substantial improvements in CPR proficiency, even in contexts where participants initially lacked formal CPR training.

The finding that all participants in the combined PT and VAT group achieved good skills aligns with the notion of synergistic effects from mixed training methods. Munezero et al. (2023) highlighted that combining different training methods enhances skill acquisition, supporting the notion that a blend of physical and video-assisted training produces better results than using either method alone. Moreover, Okonta and Okoh (2019) support the idea that training is critical for improving CPR knowledge and skills, as their study showed higher CPR knowledge scores among students who had received prior training.

However, the findings contradict Gebremedhn et al. (2019), who reported a lack of proficiency in CPR skills among nurses and nursing students, even after training. This discrepancy could be due to variations in training duration, quality of the instruction, or the demographic context, as this study demonstrated a higher proficiency in the intervention groups, especially with the combined PT and VAT training approach.

The findings indicate a clear improvement in CPR skills following structured training interventions among primary healthcare (PHC) workers. The data shows that participants in the combined Physical Training (PT) and Video-Assisted Training (VAT) group achieved the best CPR performance, with 100% of them demonstrating good CPR skills. In contrast, the control group, which received no intervention, exhibited poor CPR skills across all participants, highlighting the effectiveness of structured training interventions. The PT group and VAT group also showed improvements, though not as markedly as the combined group. These results suggest that integrating multiple training approaches—physical and video-assisted—yields the most substantial improvement in CPR skills.

Supporting literature further validates these findings. Onyeaso (2020) reported that CPR skills retention was significantly enhanced among Nigerian university students after training, aligning with the conclusion that structured training can effectively improve CPR skills. This finding suggests that while physical or video-based training alone can improve skills, combining both methods could yield even better results, as evidenced by the PT & VAT group. Similarly, Munezero et al. (2023) demonstrated a significant enhancement in CPR skills among nurses who participated in a structured training program. The study underscored the effectiveness of CPR training in improving knowledge and proficiency, corroborating the current findings that training leads to substantial skill improvements (Olofin-Samuel et al., 2024).

On the other hand, Gebremedhn et al. (2019) found a lack of CPR proficiency among nurses, which further emphasizes the importance of structured and regular CPR training to address this skill gap. Similarly, Okonta and Okoh (2019) highlighted the importance of consistent CPR

training for clinical medical students, suggesting that ongoing training is crucial for maintaining and enhancing CPR proficiency.

Conclusion

The findings of this study indicate a notable improvement in the skill 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 skill, with no group achieving good skill.The skill levels of participants in the intervention groups improved, with none of the intervention groups showing poor skills post-intervention. The combination of PT and VAT yielded the highest mean scores, suggesting that a blended training approach may offer the most effective results. 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. The findings underline the importance of incorporating both physical and video-assisted training methods in enhancing CPR competence among healthcare workers, highlighting the lasting impact of such training interventions.

Recommendations

1. Primary healthcare centers should incorporate this dual approach (physical training and video assisted training in their CPR training programmes. This combination can lead to more effective and comprehensive learning, ensuring that healthcare workers are better prepared to respond to emergency situations.

2. Refresher courses or periodic re-training sessions should be introduced. These courses should be scheduled at regular intervals to reinforce the skills, preventing any decline over time

3. Since both PT and VAT significantly improved the CPR skills of PHC workers, there should be more emphasis placed on hands-on practical training. Practical, scenario-based exercises should be an integral part of CPR training to ensure that healthcare workers can apply the knowledge and skills in real-life emergency situations.

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