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Effect of Educational Intervention on Non-Pneumatic Antishock Garment Application Skills Among Midwives in Ilorin-West, Nigeria

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Abstract

Postpartum hemorrhage (PPH) remains a leading cause of maternal mortality, especially in low-resource settings. The non-pneumatic antishock garment (NASG) has been recognized as an effective intervention for stabilizing women experiencing obstetric hemorrhage. However, its utilization remains suboptimal due to inadequate training among midwives. This study assesses the effect of an educational intervention on NASG application skills among midwives in Ilorin-West, Kwara State, Nigeria. A quasi-experimental, pre- and post-intervention study was conducted among 53 midwives working in primary healthcare centres. A structured training package was developed, including lectures, hands-on demonstrations, and simulations. Baseline knowledge and skills were assessed using structured questionnaires and direct observation checklists. The intervention was implemented over four weeks, and post-intervention assessments were conducted to evaluate improvements. Data were analyzed using SPSS, with paired t-tests used to measure statistical significance. Pre-intervention assessments showed a limited understanding of NASG application and removal, with only 18.9% of participants correctly identifying the order of segment application. Post-intervention, knowledge and skill levels significantly improved ($p<0.01$), with 90.6% demonstrating correct application. Major barriers identified included limited availability of NASG, lack of refresher training, and inadequate institutional support. The educational intervention significantly enhanced midwives' competency in NASG application, emphasizing the need for continuous training and policy-driven adoption in maternity care settings. Scaling up this intervention may contribute to reducing maternal mortality due to PPH in Nigeria and similar resource-limited settings.

Keywords: *Educational Intervention, Maternal Mortality, Midwifery Training, Non-Pneumatic Antishock Garment, Postpartum Hemorrhage.*

Introduction

Maternal mortality remains a significant public health challenge, particularly in low- and middle-income countries (LMICs), where postpartum hemorrhage (PPH) is the leading cause of maternal death. Hemorrhage accounts for approximately 27.1% of maternal deaths worldwide, with most fatalities occurring within 24 hours of delivery [1]. Despite advancements in obstetric care, delays in recognizing hemorrhage, accessing tertiary healthcare facilities, and receiving definitive interventions continue to exacerbate mortality rates [2].

One intervention that has shown promise in reducing maternal deaths due to hemorrhage is the Non-Pneumatic Anti-Shock Garment (NASG). The NASG is a simple, low-cost, first-

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aid device designed to stabilize women suffering from severe obstetric hemorrhage by applying circumferential pressure to the lower body, thereby redistributing blood to vital organs such as the brain, heart, and lungs [3]. Studies have demonstrated that NASG use in emergency obstetric care can reduce mortality from hemorrhagic shock by up to 79% when applied promptly [4]. Despite its effectiveness, however, NASG utilization remains suboptimal, largely due to inadequate training among healthcare providers, particularly midwives [5].

The Sustainable Development Goals (SDGs) have set a global target of reducing maternal mortality to fewer than 70 deaths per 100,000 live births by 2030 [6]. Achieving this goal requires integrating evidence-based interventions, such as NASG, into routine obstetric practice. Midwives play a critical role in PPH management, yet many lack the necessary knowledge and skills to correctly apply and remove the NASG [7, 8]. Addressing this gap through structured educational interventions is crucial to improving maternal outcomes.

This study aims to assess the impact of an educational intervention on midwives' knowledge and skills regarding NASG application in Ilorin-West, Kwara State, Nigeria. By evaluating the effectiveness of a structured training program, this research seeks to provide evidence to support the widespread adoption of NASG in primary healthcare settings.

Methods

A quasi-experimental pre- and post-intervention study was conducted among midwives working in primary healthcare centres in Ilorin-West, Kwara State, Nigeria. The study was implemented over four weeks, from July to August 2024, across 26 primary healthcare facilities. A total enumeration sampling technique was used to recruit 53 midwives actively involved in maternal healthcare services. Participants were required to have at least one year of obstetric experience, while midwives on extended leave or those unwilling to participate were excluded from the study.

The educational intervention was designed to enhance the midwives' knowledge and skills in NASG application and removal. The training program consisted of four main components: lecture sessions, where participants were introduced to maternal mortality, PPH management, and NASG principles; hands-on demonstrations, in which midwives practiced NASG application using mannequins and simulated clinical scenarios; DVD instructional videos, reinforcing step-by-step NASG application techniques; and breakout sessions, allowing small-group discussions and peer assessments.

To measure the effectiveness of the intervention, pre- and post-intervention assessments were conducted. Knowledge assessments utilized a structured questionnaire, while skill competency was evaluated using an observation checklist. Additionally, a barrier identification survey was administered to understand the challenges midwives faced in NASG utilization. Data were analyzed using SPSS version 23.0, with paired t-tests employed to compare pre- and post-intervention scores. A p-value of <0.05 was considered statistically significant.

Ethical approval was obtained from the Kwara State Ministry of Health Ethical Review Committee, and informed consent was secured from all participants. Confidentiality was strictly maintained throughout the study.

Results

A total of 53 midwives participated in the study, with a mean age of 52 ± 8.56 years. The majority (98.1%) were female, and 71.7% had over 21 years of professional experience (Table 1).

Table 1. Socio-demographic Data of Respondents (N=53)

Socio-demographic	Frequency	Percent
Age range (years)		
23-35	4	7.5
36-48	6	11.3
49-61	43	81.1
Gender		
Male	1	1.9
Female	52	98.1
Years of experience range		
1-10	8	15.1
11-20	7	13.2
21-34	38	71.7

***Mean age (years)** = 52 ± 8.56 Standard deviation; **Mean years of experience** = 23 ± 9.20 Standard deviation*

The pre-intervention assessments revealed that knowledge of the NASG application was low. Only 18.9% of participants correctly identified the order of NASG segment application, while 69.8% were unaware of the appropriate waiting time before removing each NASG segment. Following the educational intervention, there was a statistically significant improvement in knowledge levels ($p<0.01$). Post-training, 90.6% of participants demonstrated correct application of the NASG, while 96.2% correctly identified the indications and contraindications for NASG use (Table 2).

Table 2. Knowledge of Respondents on the Application of NASG (N = 53)

Knowledge of the NASG Application	Pre-intervention				Post-intervention			
	Incorrect		Correct		Incorrect		Correct	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
The primary purpose of a NASG	25	47.2	28	52.8	3	5.7	50	94.3
Part of the body that NASG does not cover	37	69.8	16	30.2	2	3.8	51	96.2
Order of NASG segments application	43	81.1	10	18.9	5	9.4	48	90.6
Number of segments of a typical NASG	53	100	0	0.0	15	28.3	38	71.7
Recommended duration for keeping the NASG in place	21	39.6	32	60.4	1	1.9	52	98.1
Contraindication for NASG use	32	60.4	21	39.6	14	26.4	39	73.6
Which of the following is NOT a benefit of using an NASG	41	77.4	12	22.6	11	20.8	42	79.2
The primary mechanism by which the NASG reduces bleeding	44	83	9	17	13	24.5	40	75.5
Procedure to be done before applying the NASG	31	58.5	22	41.5	9	17	44	83

Figure 1 shows that in terms of skill competency, 81.1% of participants initially struggled with proper NASG application during pre-intervention assessments. However,

following the training, 94.3% successfully demonstrated correct application techniques, and 96.2% exhibited proficiency in NASG removal procedures. These findings underscore the positive impact of structured training on midwives' ability to effectively utilize the NASG in emergency obstetric situations.

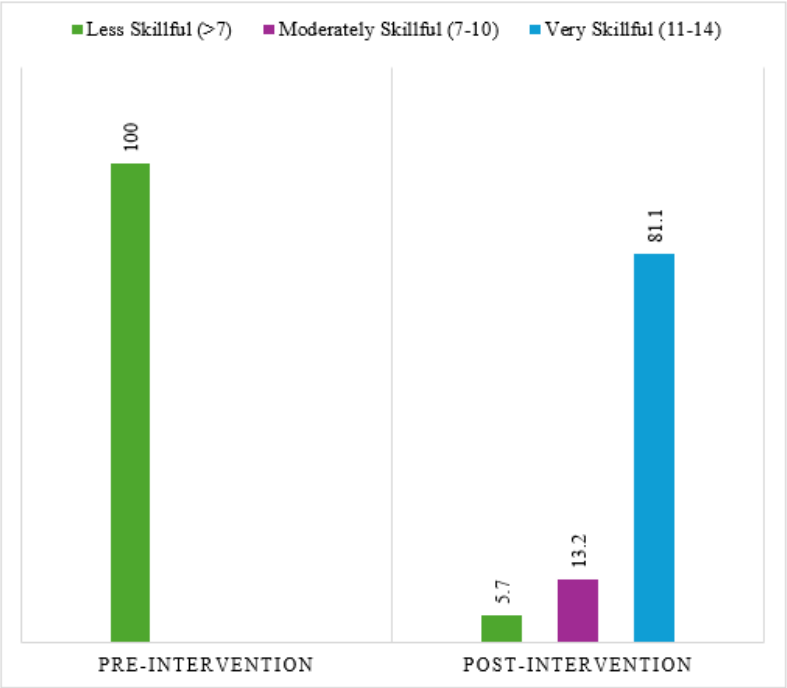

Figure 1. Level of Skill of Respondents on the Application of NASG (N = 53)

Despite the improvement in knowledge and skills, several barriers to NASG utilization were identified. The most significant challenge was the limited availability of NASG devices (73.3%), followed by inadequate refresher training (64.2%) and poor institutional support (58.1%). Participants highlighted the need for continued training programs and government-led policies to ensure that NASG is consistently available in all primary healthcare centres (Table 3).

Table 3. Barrier to NASG Utilization (N = 53)

Items	Not a Barrier		Minor Barrier		Neutral		Moderate Barrier		Major Barrier	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Pre-Intervention										
Limited availability of NASG Supplies	10	18.9	3	5.7	6	11.3	8	15.1	26	49.1
Inadequate training on NASG applications	6	11.3	3	5.7	9	17	7	13.2	28	52.8
Lack of Awareness among healthcare providers about NASG benefits	3	5.7	11	20.8	4	7.5	8	15.1	27	50.9
Cultural or Social Beliefs affecting the	10	18.9	8	15.1	14	26.4	8	15.1	13	24.5

acceptance of NASG among patients										
Resistance from patients or their families towards using NASGs	15	28.3	5	9.4	15	28.3	7	13.2	11	20.8
Lack of clear guidelines or protocols for NASG utilization	16	30.2	6	11.3	9	17	9	17	13	24.5
Post-Intervention										
Limited availability of NASG Supplies	4	7.5	2	3.8	0	0.0	6	11.3	41	77.4
Inadequate training on NASG applications	12	22.6	1	1.9	0	0.0	6	11.3	34	64.2
Lack of Awareness among healthcare providers about NASG benefits	11	20.8	2	3.8	0	0.0	3	5.7	37	69.8
Cultural or Social Beliefs affecting the acceptance of NASG among patients	11	20.8	21	39.6	9	17	6	11.3	6	11.3
Resistance from patients or their families towards using NASGs	13	24.5	19	35.8	5	9.4	3	5.7	13	24.5
Lack of clear guidelines or protocols for NASG utilization	17	32.1	3	5.7	1	1.9	12	22.6	20	37.7

Discussion

The findings of this study demonstrate that structured educational interventions significantly improve midwives' knowledge and skills in NASG application. Similar results were reported by Akingbohungbe et al., who observed a 78% increase in NASG utilization following targeted training programs [9, 10].

Comparative studies conducted in Ethiopia and Tanzania have shown variable NASG adoption rates (16.7%–64.2%), emphasizing the role of training in improving uptake [11, 12]. A study by Liu et al. highlighted that NASG training among midwives significantly increased competency and confidence in managing obstetric hemorrhage, thereby reducing delays in emergency response [13].

From a policy perspective, this study underscores the need for capacity-building initiatives to promote NASG adoption in Nigeria. Integrating NASG training into midwifery education curricula and ensuring its availability in all healthcare facilities could significantly impact maternal survival rates [14].

One limitation of this study is its regional focus, as findings may not be generalizable to all parts of Nigeria. Additionally, the study only assessed short-term improvements in knowledge and skills, without evaluating long-term retention or actual NASG application in clinical practice. Future research should include

longitudinal studies to assess sustained impact and explore cost-effectiveness analyses for scaling up NASG programs nationwide [15].

Conclusion

This study confirms that educational interventions play a crucial role in enhancing midwives' competency in NASG application and removal. By improving knowledge and skills, such training programs can contribute to reducing maternal mortality and improving emergency obstetric care in resource-limited settings. Scaling up these interventions at the national level and ensuring the availability of NASG in all maternity units is imperative for achieving better maternal health outcomes in Nigeria.

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Conflict of Interest

The authors declare no conflicts of interest.

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