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# Effect of a Nurse-Led Intervention on the knowledge of and attitude towards Chlorhexidine Gel for Cord Treatment on Babies in selected hospitals in Lagos State

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**Abstract:** *Newborn survival is strongly linked to care quality, with proper umbilical cord care crucial in preventing infections during the first week of life, thereby improving neonatal health outcomes. The main objective was to assess the effect nurse-led intervention on the knowledge of and attitude towards chlorhexidine gel for cord treatment on babies. The study adopted a two group quasi-experimental method. The target population for the study were all the pregnant women in their last trimester attending antenatal clinic in the selected secondary health facilities in Lagos Island while the total sample size was 120 pregnant women in their last trimester selected using purposive and proportional sampling technique. The research instrument used was a questionnaire divided into three sections. The study was carried out in three phases and data collected were analysed using SPSS version 28. The results revealed that in the experimental group, knowledge of chlorhexidine gel use improved significantly from a pre-intervention mean score of 5.14 to 12.69, with 93.7% attaining high knowledge, unlike the control group. Attitudes also shifted in the experimental group from negative to positive, with mean scores rising from 20.14 to 32.69, while the control group showed minimal change. Post-intervention analyses confirmed significant group differences (knowledge:  $t = 33.858, p < .05$ ; attitude:  $t = 49.858, p < .05$ ). The study concluded that nurse-led interventions significantly improved mothers' knowledge and attitudes towards chlorhexidine gel for cord care. It recommends regular health education during antenatal and postnatal care, alongside standardised protocols on umbilical cord care.*

**Keywords:** attitude, cord-treatment, chlorhexidine gel, knowledge, nurse-led intervention

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## INTRODUCTION

Neonatal survival is strongly influenced by the quality of care given immediately after birth, with umbilical cord care recognised as a critical practice in reducing infection risk and improving

neonatal outcomes. Poor cord hygiene during the first week of life is a major risk factor for neonatal morbidity and mortality, particularly in developing countries. Globally, around 3.3 million neonatal deaths occur annually, with infections accounting for over 30% (Ambale et al., 2021; Aitafo et al., 2021). Neonates are especially vulnerable due to their immature immune system, and umbilical cord stump infections often serve as an entry point for pathogens. In Africa, approximately 460,000 infants die annually from bacterial infections, with cord infections contributing significantly (UNICEF, 2021). Despite global declines in under-five mortality, neonatal deaths remain disproportionately high in low-income countries, where 90% of births occur (Gaana, 2019). Neonatal tetanus, caused by *Clostridium tetani*, is one of the most severe cord-related infections in developing regions, with Nigeria accounting for over 33% of global neonatal tetanus cases and fatality rates ranging between 70–100% (Peter & Johnson, 2019). Hospital-based evidence from Nigeria has shown high mortality and admission rates due to tetanus, emphasising the persistent threat (Basil et al., 2018).

Nigeria records one of the highest neonatal mortality rates globally, with 37 deaths per 1,000 live births (NDHS, 2021). Rural areas face disproportionately higher risks, with infant mortality 43% greater than urban areas due to poor sanitation and limited access to healthcare (UNICEF, 2020). Umbilical cord infections alone account for up to 19% of neonatal admissions and nearly half of neonatal deaths in some studies (Ambale et al., 2021; Aitafo et al., 2021). Globally, sepsis from cord infections is estimated to contribute to more than 15% of neonatal deaths, making it the third leading cause of death in the neonatal period (Ikperite et al., 2020). The cord stump provides an ideal environment for microbial colonisation, and infection sources often include the birth canal, delivery environment, caregiver practices, and unhygienic traditional cord care. The consequences are severe, with systemic infections frequently leading to sepsis and death. Hence, maternal education on hygienic cord care is essential to reduce preventable mortality.

Evidence highlights that optimal cord care practices, particularly within the first week of life, can substantially reduce neonatal deaths related to infection. The World Health Organization (WHO) recommends the use of 7.1% chlorhexidine for cord care in countries with high neonatal mortality, such as Nigeria. This antiseptic, when applied within the first 24 hours and continued through the first week, has been shown to significantly reduce omphalitis, sepsis, and neonatal mortality (Gallagher et al., 2019; Opoku et al., 2019; Ikperite et al., 2020). Proper handwashing before and after application remains vital in ensuring effectiveness. While global initiatives have improved neonatal survival, progress in reducing neonatal mortality has lagged compared to declines in post-neonatal child deaths. Umbilical cord care remains a central focus because of its role as a preventable risk factor. However, cultural practices and differing maternal beliefs about cord care continue to influence outcomes. Some mothers see no need for special practices beyond cleanliness, while others adopt traditional or personal methods, often with harmful consequences.

Faheim et al. (2019) demonstrated that educational interventions significantly improved maternal knowledge and practices. In their quasi-experimental study in Egypt, mothers who received training had higher post-intervention knowledge scores, with human milk showing more favourable cord outcomes compared to alcohol and povidone-iodine. This underscores the importance of structured maternal education. Similarly, Aitafo et al. (2021) found gaps in

knowledge and practice among Nigerian mothers regarding the use of chlorhexidine gel, despite awareness being relatively high. Only a small proportion adhered to WHO recommendations on timing and frequency of application, while most mothers relied on spirit either alone or in combination with chlorhexidine. This suggests a need for targeted education to correct misconceptions and standardise practices.

Findings across multiple studies indicate mixed levels of knowledge. Luka (2017) reported that Kenyan mothers in an urban slum demonstrated high awareness of hygienic cord cutting but only moderate postnatal cord care knowledge and practices, which were influenced by education, socioeconomic status, and healthcare access. Similarly, Senarath (2019) emphasised that inadequate knowledge of standard cord care limits mothers' ability to make informed decisions, especially among first-time mothers, increasing neonatal vulnerability. In Nigeria, Green et al. (2016) revealed that knowledge of cord care was low, with most information sourced informally from family and traditional birth attendants rather than antenatal care. This lack of structured education correlated with higher cases of cord infections and related ailments. Abhulimhen and Ibadin (2019) further noted inconsistencies in health education content at antenatal clinics, with some facilities offering incomplete or non-evidence-based information. The study stressed the need for uniform, evidence-based cord care education to reduce confusion and improve outcomes. To the researcher's knowledge, no intervention studies previously have been undertaken on mothers' knowledge of use of chlorhexidine gel for cord treatment on babies in Lagos Island Local Government Area. The researcher examined the effect nurse-led intervention on the knowledge of and attitude towards chlorhexidine gel for cord treatment on babies. The main objective was to assess the effect of a nurse-led intervention on the knowledge of and attitude towards chlorhexidine gel for cord treatment on babies in selected hospitals in Lagos State.

The specific objectives were to:

1. establish the pre and post-intervention knowledge of the use of chlorhexidine gel for cord treatment on babies in the intervention and control group;
2. establish the pre and post-intervention attitude towards the use of chlorhexidine gel for cord treatment on babies in the intervention and control group; and

Two hypotheses were raised for the study:

**H<sub>01</sub>:** There is no significant difference between the post intervention knowledge of the use of chlorhexidine gel for cord treatment on babies in the intervention and control groups.

**H<sub>02</sub>:** There is no significant difference between the post-intervention attitude towards the use of chlorhexidine gel for cord treatment on babies in the intervention and control groups.

## **METHODS AND MATERIALS**

This study employed a quantitative, two-group quasi-experimental design comprising one intervention and one control group to evaluate the effects of an intervention programme. The target population consisted of pregnant women in their last trimester attending antenatal clinics in two secondary health facilities within Lagos Island Local Government, Lagos State. Over a six-month period, 249 eligible women were recorded, with 156 from Lagos Island Maternity Hospital and 93

from Onikan General Hospital. Only women in their last trimester who consented were included, while those in earlier trimesters were excluded. The sample size for Lagos Island Maternity Hospital was determined using the Scheaffer, Mendenall, and Ott formula, ensuring representativeness of the study population for reliable outcomes.

$$\frac{NPq}{(N - I)D + Pq}$$

$$\frac{NP(I - P)}{(N - I)D + P(I - P)}$$

Sample size calculation from Onikan General Hospital

Where  $q = 1 - P$

Where  $N =$  population (156)

$P =$  Estimated proportion (50% or 0.5)

$D = d^2$  where  $d$  is Desired absolute precision (5% level of significance =  $0.05^2 = 0.0025$ )

$$\frac{156 \times 0.5 \times (1 - 0.5)}{(156 - 1) \times 0.0025 + 0.5 \times (1 - 0.5)} = \frac{39}{0.3875 + 0.25}$$

$$= \frac{39}{0.6375} = 61$$

Participant attrition typically refers to the behaviour of people who participate in a multi-step research study and how their lack of full participation impacts findings (McQuerrey, 2012). Therefore, 61 respondents were selected from Lagos Island Maternity Hospital for the study. However, adding 10% non-response rate, the eventual sample size was 67

Attrition rate: (10% of 61) + 61 = 67

Sample size determination for (Onikan General Hospital) Scheaffer, Mendenhall, and Ott Formular was used.'

$$\frac{NPq}{(N - I)D + Pq}$$

$$\frac{NP(I - P)}{(N - I)D + P(I - P)}$$

Sample size calculation from Onikan General Hospital

Where  $q = 1 - P$

Where  $N =$  population (93)

$P =$  Estimated proportion (50% or 0.5)

$D = d^2$  where  $d$  is Desired absolute precision (5% level of significance =  $0.05^2 = 0.0025$ )

$$\frac{93 \times 0.5 \times (1 - 0.5)}{(93 - 1) \times 0.0025 + 0.5 \times (1 - 0.5)} = \frac{23.25}{0.23 + 0.25}$$

$$= \frac{23.25}{0.48} = 48$$

Therefore, 48 respondents were selected from Onikan General Hospital for the study. However, adding 10% non-response rate, the eventual sample size was 53

Attrition rate: (10% of 48) + 48 = 53

The total sample size was 120 pregnant women in their last trimester from the two hospitals (Lagos Island Hospital and Onikan General Hospital):  $67 + 53 = 120$ .

The study employed purposive and proportional sampling techniques to ensure relevance and representativeness. Purposive sampling was used to deliberately select pregnant women in their last trimester who met the study's criteria, ensuring alignment with research objectives. Proportional sampling, on the other hand, ensured that the selected participants reflected the actual distribution of pregnant women across clinic days in the two hospitals. At Lagos Island Maternity Hospital (experimental group), 67 participants were proportionately drawn from 94 eligible women attending Tuesday and Thursday clinics, while at Onikan General Hospital (control group), 53 participants were selected from 93 eligible women attending Monday and Wednesday clinics. This combination of techniques enhanced the validity of the sample by including only relevant participants while maintaining subgroup proportions. The instrument for data collection was a structured questionnaire developed by the researcher after reviewing relevant literature. It comprised three sections: Section A gathered socio-demographic data with seven items on age, marital status, ethnicity, occupation, nationality, religion, and education; Section B contained 15 items assessing mothers' knowledge of chlorhexidine gel use for cord care, scored across poor, average, and high knowledge ranges; and Section C included 10 items assessing mothers' attitudes towards the use of chlorhexidine gel for neonatal cord treatment.

The validity and reliability of the study instruments were established through expert review and pre-testing. The questionnaire and checklist were assessed by the researcher's supervisor and specialists in tests, measurement, and paediatrics to ensure content and face validity, confirming their appropriateness in measuring mothers' knowledge and skills on chlorhexidine gel use for cord treatment. Reliability was tested through a pilot study involving 20 mothers at Ifako-Ijaye General Hospital, Lagos, with Cronbach's Alpha results showing 0.81 for Section B and 0.77 for Section C, indicating good internal consistency. Data collection occurred in three phases. In the pre-intervention phase, ethical approvals were obtained, participants were recruited, and research assistants were trained. Mothers were briefed about the study, gave informed consent, and confidentiality was assured. The intervention phase spanned three weeks with structured sessions: the first week introduced the study and administered pre-tests, the second week delivered training on cord care, infection prevention, and chlorhexidine use, while the third week involved practical demonstrations. The control group received no intervention. In the post-intervention phase, post-tests were administered to both groups two weeks after the intervention to evaluate knowledge acquisition and effectiveness of the training programme.

Data were analysed using SPSS Version 28 with descriptive and inferential statistics. Research questions were addressed through frequency counts, percentages, means, and standard deviations, while hypotheses were tested using t-test at 0.05 significance level. Ethical approval was obtained from relevant boards, and informed written consent was secured from participants. Participation was voluntary, confidentiality was assured, and the right to withdraw was emphasised. Control and experimental groups were separated geographically to prevent contamination, ensuring

credibility and ethical compliance throughout the study.

## RESULTS

**Table 1: Socio-demographic Characteristics of Respondents in Experimental and Control Group**

Socio-demographic characteristics	Experimental Group (N=64)		Control Group (N=51)	
	Frequency	Percentage	Frequency	Percentage
<b>Age</b>				
18 – 29 years	8	12.5	6	11.8
30 – 39 years	38	59.4	31	60.8
40 – 49 years	13	20.3	11	21.6
50 and Above	5	7.8	3	5.9
<b>Marital Status</b>				
Married	51	79.7	42	82.4
Single	8	12.5	6	11.8
Separated	5	7.8	3	5.9
<b>Ethnicity</b>				
Yoruba	38	59.4	29	56.9
Hausa	4	6.3	3	5.9
Igbo	6	9.4	6	11.8
Others	16	25.0	13	25.5
<b>Occupation</b>				
Civil Servant	15	23.4	12	23.5
Trader	26	40.6	20	39.2
Farmer	3	4.7	3	5.9
Artisan	6	9.4	4	7.8
Full time House-wife	9	14.1	7	13.7
Apprentice	3	4.7	3	5.9
Others	2	3.1	2	3.9
<b>Religion</b>				
Christianity	39	60.9	31	60.8
Islam	24	37.5	19	37.3
Others	1	1.6	1	2.0
<b>Educational Level</b>				
No formal education	7	10.9	7	13.7
Primary	14	21.9	11	21.6
Secondary	17	26.6	13	25.5
Tertiary	26	40.6	20	39.2

Most participants in both groups were married, predominantly Yoruba, and engaged mainly in trading, followed by civil service. Smaller proportions were farmers, artisans, housewives, apprentices, or in other occupations. Christianity and Islam were the major religions across groups, with Christians slightly more represented. Educational status showed a fair distribution, though a higher proportion had tertiary education compared to those with no formal schooling. Overall, the socio-demographic characteristics of both experimental and control groups were broadly similar, indicating comparability

in marital status, ethnicity, occupation, religion, and education, which strengthens the reliability of subsequent group comparisons.

**Table 2: Information on the pre and post-intervention knowledge of the use of chlorhexidine gel for cord treatment on babies**

Knowledge of the use of chlorhexidine gel for cord treatment	Category of scores	EXPERIMENTAL				CONTROL			
		Pre-intervention		Post-intervention		Pre-intervention		Post-intervention	
		Freq.	%	Freq.	%	Freq.	%	Freq.	%
Low	1-7	64	100.0	0	0.0	51	100.0	50	98.0
Average	8-10	0	0.0	4	6.3	0	8.2	1	2.0
High	11-15	0	0.0	60	93.7	0	0.0	0	0.0
Total		64	100.0	64	100.0	51	100.0	51	100.0
Mean		5.14±0.71		12.69±1.36		5.35±0.74		5.41±0.80	
Percentage		34.27		84.60		35.67		36.07	
Mean difference		7.55				0.06			
Maximum		7.00		15.00		7.00		8.00	
Minimum		4.00		9.00		4.00		4.00	

Results from Table 2 shows that in the experimental group, all the respondents had low knowledge of the use of chlorhexidine gel for cord treatment on babies at pre intervention. At the post intervention, 60(93.7%) had high knowledge while only 4(6.3%) had moderate knowledge. It was also observed that the mean score of knowledge of the use of chlorhexidine gel for cord treatment on babies in the experimental group was  $5.14 \pm 0.71$  (pre intervention) as compared with the  $12.69 \pm 1.36$  (post intervention) with a mean difference of 7.55. Results from the table shows that in the control group, all the respondents had low knowledge of the use of chlorhexidine gel for cord treatment on babies at pre intervention. At post intervention, a similar level was observed. The knowledge mean score of the participants in the control group was  $5.35 \pm 0.74$  pre intervention, it increased at post intervention to  $5.41 \pm 0.80$  with a mean difference of 0.06.

**Table 3: Information on the pre and post-intervention attitude towards the use of chlorhexidine gel for cord treatment on babies**

Attitude towards the use of chlorhexidine gel for cord treatment	Category of scores	EXPERIMENTAL				CONTROL			
		Pre-intervention		Post-intervention		Pre-intervention		Post-intervention	
		Freq.	%	Freq.	%	Freq.	%	Freq.	%
Negative	10-25	64	100.0	0	0.0	51	100.0	51	100.0
Positive	26-40	0	0.0	64	100.0	0	0.0	0	65.3
Total		64	100.0	64	100.0	51	100.0	51	100.0
Mean		20.14±1.34		32.69±1.27		20.16±1.32		20.37±1.37	
Percentage		50.35		81.73		50.40		50.93	
Mean difference		12.55				0.21			
Maximum		22.00		35.00		22.00		23.00	
Minimum		17.00		30.00		17.00		17.00	

Results from Table 3 shows that in the experimental group, all the respondents at the pre intervention had negative attitude towards the use of chlorhexidine gel for cord treatment on babies. At the post intervention, all the respondents had positive attitude towards the use of chlorhexidine gel for cord treatment on babies. It was also observed that the mean score of the attitude towards the use of chlorhexidine gel for cord treatment on babies in the experimental group was  $20.14 \pm 1.34$  (pre intervention) as compared with the  $32.69 \pm 1.27$  (post intervention) with a mean difference of 12.55. Results from the table show that attitude towards the use of chlorhexidine gel for cord treatment on babies at pre intervention and post intervention were similar in the control group. The knowledge mean score of the participants in the control group was  $20.16 \pm 1.32$  pre intervention, it increased at post intervention to  $20.37 \pm 1.37$  with a mean difference of 0.21.

### Test of Hypotheses

**H<sub>01</sub>:** There is no significant difference between the post intervention knowledge of the use of chlorhexidine gel for cord treatment on babies in the intervention and control groups.

**Table 4: Independent t-test showing the difference in the post intervention knowledge of the use of chlorhexidine gel for cord treatment on babies in the intervention and control groups**

	N	Mean	Std. Deviation	df	T	Mean diff	Sig
Intervention Group	64	12.69	1.36	113	33.858*	7.28	.000
Control Group	51	5.41	0.80				

\* $P < 0.05$

Results in Table 4 indicate a significant difference in the post intervention knowledge of the use of chlorhexidine gel for cord treatment on babies in the intervention and control groups (Mean difference = 7.28;  $t = 33.858$ ;  $p = .000 < .05$ ). Going through the knowledge mean scores as shown above, one can say that there is difference in the post intervention knowledge of the use of chlorhexidine gel for cord treatment on babies between intervention group (12.69) and the control group (5.41). The earlier set hypothesis was rejected.

**H<sub>02</sub>:** There is no significant difference between the post-intervention attitude towards the use of chlorhexidine gel for cord treatment on babies in the intervention and control groups

**Table 5: Independent t-test showing the difference in the post intervention attitude towards the use of chlorhexidine gel for cord treatment on babies in the intervention and control groups**

	N	Mean	Std. Deviation	df	T	Mean diff	Sig
Intervention Group	64	32.69	1.27	113	49.858*	12.31	.000
Control Group	51	20.37	1.37				

\* $P < 0.05$

Results in Table 5 indicate a significant difference in the post intervention attitude towards the use of chlorhexidine gel for cord treatment on babies in the intervention and control groups (Mean difference = 12.31;  $t = 49.858$ ;  $p = .000 < .05$ ). Going through the attitudinal mean scores as shown above, one can say that there is difference in the post intervention attitude towards the use of

chlorhexidine gel for cord treatment on babies between intervention group (32.69) and the control group (20.37). The earlier set hypothesis was rejected.

## DISCUSSION OF FINDINGS

The present study revealed low pre-intervention knowledge of chlorhexidine gel use for cord treatment among mothers in both experimental and control groups, consistent with findings from South India showing poor maternal knowledge of cord care (Padiyath et al., 2010). This suggests that most women rely on observational learning rather than structured teaching. However, after the intervention, knowledge significantly improved in the experimental group while remaining unchanged in the control group, indicating that the training had a clear positive effect. This aligns with Faheim et al. (2019), who reported that educational programmes significantly increased mothers' knowledge and practice of cord care. Similarly, Luka (2017) found that while many mothers understood the importance of hygiene, fewer demonstrated adequate knowledge of postnatal cord care, reflecting gaps in awareness and practice. Senarath (2019) also highlighted that insufficient knowledge of standard cord care and chlorhexidine use contributes to unhygienic practices, reinforcing the importance of maternal education. Overall, the findings demonstrate that targeted interventions significantly enhance mothers' knowledge and practices, reducing the risk of cord-related infections and supporting previous evidence that educational programmes are effective tools for improving maternal competency in newborn care.

The present study revealed that respondents' attitude towards the use of chlorhexidine gel for cord treatment on babies was negative at the pre-intervention stage for both the experimental group (20.14±1.34) and the control group (20.16±1.32). However, the attitude increased significantly at the immediate post intervention for the experimental group (32.69±1.27) with mean difference of 12.55 while the control group (20.37±1.37) remained almost the same with mean difference of 0.21. On the hypotheses tested, it was revealed that there was significant difference in the post intervention knowledge of the use of chlorhexidine gel for cord treatment on babies in the intervention and control groups (Mean difference = 7.28;  $t = 33.858$ ;  $p = .000 < .05$ ) in favour of the intervention group. It could be deduced from these findings that the difference observed between post intervention attitude could not have been by chance but as a result of the intervention or training the participants were exposed to.

This finding is corroborated by Abhulimhen, et al. (2019) and Kinanu, et al. (2020) who concluded that cord care education will go a long way to increase mother attitude towards the use of chlorhexidine gel for cord care. The fact that Abhulimhen et al. (2019) and Kinanu et al. (2020) reached similar conclusions indicates that there is a pattern of results across different studies. This pattern increases confidence in the relationship between cord care education and improved mother attitudes towards using chlorhexidine gel. The studies highlight the importance of educating mothers about cord care and the benefits of using chlorhexidine gel. This educational intervention appears to have a positive impact on how mothers perceive and approach cord care, likely leading to increased compliance with recommended practices.

The study showed that mothers' attitudes towards chlorhexidine gel use for cord care were initially negative in both groups. However, the intervention significantly improved attitudes in the experimental group, while the control group remained unchanged. Similarly, the intervention group demonstrated significantly higher post-intervention knowledge compared to the control group, suggesting that training directly influenced the observed differences. These findings align with Abhulimhen et al. (2019) and Kinanu et al. (2020), who reported that cord care education improves maternal attitudes and practices regarding chlorhexidine gel. The consistency across studies reinforces the importance of maternal education in promoting effective cord care practices. Such interventions can substantially improve mothers' knowledge and attitudes, leading to better adoption of safe practices. From a public health perspective, promoting chlorhexidine gel use through targeted education is vital, as it reduces the risk of cord-related infections and associated neonatal complications. Overall, the study highlights the effectiveness of structured educational programmes in fostering positive behavioural change among mothers and underscores their role in enhancing neonatal health outcomes.

## CONCLUSION

The study concluded that intervention increased the knowledge of the use of chlorhexidine gel likewise attitude towards the use of chlorhexidine gel for cord treatment on babies. This was demonstrated in the intervention group exposed to nurse-led intervention. It is safe to conclude that regular nurse-led intervention is needed to influence mothers' knowledge, and attitude towards the use of chlorhexidine gel for cord treatment on babies.

## Recommendations

In view of the findings stated earlier, the following recommendations were made:

- i. Information on appropriate umbilical cord care should be given to mothers during antenatal care and before discharge from health care facilities by Health Care Workers.
- ii. Facilities should have standard protocol for umbilical cord care which should be communicated to all women and carers by their health care providers including doctors and nurses.

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