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Using Culture Results from Hands and Razor Blades to Sensitise Traditional Birth Attendants (TBAs) on Infection Prevention Practices

Dorothy O. Chanda, Seter Siziya[2], Kumar Sridutt Baboo[2], Charles Michelo[2]

[1]School of Nursing Sciences, Ridgeway Campus, University of Zambia
[2] School of Public Health, University of Zambia

***Corresponding Author's Contact Address, Dorothy O. Chanda PhD., RN. University of Zambia. P.O. Box 50110, Lusaka- Zambia. Email address chanda.doro@gmail.com and dorothy.chanda@unza.zm**

ABSTRACT

This article describes findings from one component of a multi-phased study on infection prevention knowledge and practices of Traditional Birth Attendants (TBAs) from 2006-2012.

The study included two activities within the training programme for TBAs, using a modified Ministry of Health (MoH) TBA Training Curriculum. One component of this curriculum involved sensitising the TBAs on two poor infection prevention practices - poor hand washing and cutting babies' umbilical cords using any dirty, rusted, sharp instrument after tying it with traditional *ulushishi* (fibre from inside of tree bark). These practices cause maternal and infant morbidities.

Seventy-eight out of one hundred intervention TBAs, whose right hands were swabbed for laboratory analysis, were chosen by simple random sampling. The training had theoretical and practical components. They were trained in four groups consisting of twenty-five TBAs in each group.

The results showed no growth on the six razor blades after forty-eight hours of incubation, thus proving their sterility. The results from the hand swabbing showed one-hundred and seven isolates that can potentially infect mothers and babies during the birthing process. This result convinced the TBAs on the importance of hand washing. This was evidenced after the training, because the proportion of TBAs who washed their hands before delivering their clients, among the intervention group, was significantly different ($p<0.001$) compared to the control group (52) 48.6 per cent.

Increased evidence-based hand washing and using sterile blades in Clean Delivery Kits (CDKs), during deliveries may have reduced infant and maternal infection rates among the intervention TBAs. Therefore, the results would inform the infection prevention policy on evidence-based practices. Although this sensitisation contributed to evidence-based hand washing practices, among TBAs and the subsequent lowering of the TBA clients' morbidity rates in the Chongwe district, this study needs replication in other rural communities.

Keywords: Hand washing, Traditional Birth Attendants, Infection prevention, health education, teaching strategies, puerperal sepsis, neonatal sepsis.

INTRODUCTION

Hand washing, which is critical for infection prevention, must be addressed among traditional birth attendants in the community. In Bangladesh, Goodburn [1] noted that 'Training TBAs to wash their hands is not an effective strategy to prevent maternal postpartum infection. Therefore, there is a need to evaluate the most effective strategy in demonstrating the presence of germs on hands even if they look clean. This strategy should motivate them to adopt proper hand-washing practices. Despite the above statement, Goodburn [1] declared that trained TBAs are more likely to practice hygienic delivery than untrained ones. More rigorous evaluation is needed, not only of TBA training programmes as a whole but also of the effectiveness of the individual components of the training [1].

Thus far, no other studies have been identified that specifically evaluated the use of cultures as a teaching strategy in TBA training programmes except those that have been used for health professionals, using cultures to demonstrate the presence of microorganisms on the skin of patients and hands of health professionals for prevention of hospital-acquired infections in health care settings [2].

Training of TBAs requires adequate resources like Clean Delivery Kits (CDKs) that contain the necessary items like cord ties, razor blades, gloves, antiseptic solutions soaps for hand washing, bowls, disposable plastic bags, and plastic sheets. To train TBAs, the health care system needs the provision of CDKs for them to conduct safe and clean deliveries. PATH [3] promoted the use of contents in CDKs during the birthing process. Chongwe Action Plan [4] shows that infant morbidity due to infections stood at 27 per cent and puerperal sepsis in mothers stood at 21 per cent. Also, it was noted that TBAs use the traditional practice of cutting the cord with dirty, rusty instruments after tying it with *ulushishi* fibre from inside of tree barks) due to a lack of CDKs. Poor hand-washing practices prevail among traditional birth attendants due to inadequate water supply in rural settings and inadequate training in infection prevention practices [5]. These poor practices result in high infection rates among mothers and babies delivered by TBAs. It has been noted that 30 per cent of newborn deaths are due to sepsis (20%), tetanus (3%) and diarrhoea (7%), which could possibly be prevented by hand washing and using sterile razors [6].

This has been a concern in the Chongwe District of Zambia [5]. Despite providing a much-needed service to the Chongwe community, the TBAs have inadequate knowledge of certain important concepts in HIV/AIDS infection prevention and the basic art of practising safe and clean delivery [5]. The TBAs can only acquire this training through practical, evidence-based training. Sibley and Sipe [7] confirmed the effectiveness of TBA training because it was associated with a 6 per cent decrease in perinatal mortality and an 11 per cent decrease in mortality from birth asphyxia.

Chanda [8] confirmed that inadequately–trained TBAs without evidence-based practices, like swabbing their hands to convince them of the presence of microorganisms on their hands as well as proving the sterility of razor blades found in CDKs, can be detrimental because they can transmit blood-borne pathogens like Human Immune Virus and Acquired Immune

Deficiency Syndrome (HIV/AIDS), hepatitis B and C viruses to mothers and babies during delivery.

Studies have shown that many TBAs do not use good hand-washing practices or sterile instruments and can transmit blood-borne pathogens like HIV and AIDS virus [9]. Hernández *et al.* [10] conducted TBA training for TBAs who could not read and write for the Ministry of Health in Honduras. The training included hand washing, although no cultures were taken. The learning was evaluated by questioning the TBAs directly on what they learnt. The study, thus, promoted the training of TBAs on hand-washing practices that were not evidence-based. In Africa, to draw attention to the importance of infection prevention in TBAs practices. Swai and Elinami [11] showed the high number of deliveries in homes in various African countries by stating that TBAs deliver over 60 per cent of births in rural Tanzania, 30 per cent to 40 per cent in South Africa, and 70 per cent in Ghana. While in Zambia. Maimbolwa [12] stated that 53 per cent of deliveries are conducted in homes, hence the need to sensitise TBAs on sanitising hands and CDKs before assisting in delivery.

MATERIAL AND METHODS

Study location and demographics

The study was conducted in Chongwe Rural Health Center, located in a rural area of southern Zambia. This health centre is the largest in the district and is the referral centre for all other district health centres. The health centre had one medical doctor. There were only four Registered Midwives and thirty-nine Enrolled Midwives handling twenty-four health centres and four health posts in Waterfalls, Kasenga, Ngwerere and Chikumbi making a total of twenty-eight health facilities in Chongwe district with 3.3 per cent fertility rate.

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STUDY DESIGN

The sample for the larger study, whose design included the quasi-experimental and focus group discussions, included 100 TBAs that were identified by community members and word-of-mouth (the snowballing technique) and who were invited to participate in a 6-week educational programme (consisting of 160 hours for the theoretical component of the training between 2008-2009. Four groups were trained. The first group of training commenced from 25/05-07/06 /2008. The second group started from 30/06/2008 -11/07/2008. The third group started from 15/09/2008-26/09/2008, while the fourth group started from 02/02/2009 – 13/02/2009.

Infection Prevention was a significant component of the training for the intervention TBAs in Chongwe. Topics that were covered included universal infection prevention measures. Besides

current concepts taught, other topics included were:

(a) Microorganisms (germs) that can cause infections to the mother and the baby.
(b) Identifying the harmful traditional and cultural beliefs and practices during pregnancy, labour, delivery, puerperal period and care of the baby that may lead to infections in the mother and baby.

The programme was offered to four separate groups of twenty-five TBAs each. The second week of the theory component of the six week program included a unit on infection prevention and hand washing. At the beginning of this unit, the researcher collected swabs for the culture of the right hands of 78 of the 100 TBA participants. The samples were collected from 22 TBAs during the first group, 14 from the second group, 20 from the third group, and 22 from the fourth group. The samples were collected after the TBAs had finished having lunch and washed their hands. Another strategy to teach infection prevention involved swabbing and culture of a sample of six razor blades from six Clean Delivery Kits (CDKs). This strategy demonstrated the safety and sterility of razors from these kits to encourage their use.

The swabs from the hands and razor blades were dipped in sterile normal saline and then put in the sterile transport media to ensure the viability of any microorganisms. These were transported to the UTH Microbiology Laboratory for analysis. The results of the cultures were then shared with the entire group during week two.

Although there were no formal evaluations collected about the participants' perceptions of the swabbing activity, this report summarises anecdotal observations made by the researcher when the culture results were presented, and an unsolicited comment from one of the participants during focus group discussions conducted at the end of the 6-week programme.

Ethical and Cultural Considerations

The research proposal for evaluating the 6-week educational programme was approved by the Research and Ethics Committee of the School of Medicine at the University of Zambia. The researcher explained the purpose and process of taking the swabs to the study participants and told them that their decision to participate in this activity was voluntary. All of the 78 participants who were randomly selected provided oral consent to participate in the swabbing activity.

RESULTS

Socio-demographic Characteristics of the TBAs

Table 1 shows socio-demographic characteristics of respondents. The majority, 37 (47.4%) of TBAs, were forty-two to fifty-one years of age. Their mean age was 47.4 years. The youngest respondent was twenty-nine years, while the oldest was sixty-two years. The majority, 61(78.2%), were married, while 17 (21.8%) were single. Respondents had an average of six children. Half (62.8%, n=49) of the 78 respondents had primary school education, while only 2.6 per cent had never attended school. Most of the respondents (97.4%, n=76) were literate. They could read and write both in English and their local languages. Only 8 (2.6%) could not read or write in their local language. Occupation-wise, more than half (52.6%, n=41) did subsistence farming besides delivering babies. Only (12.8%, n=10) were housewives.

Table 1: Age Categories of 100 TBAs in the study and the 78 Selected for Swabs

Age Group	Swab Group	%	Total Intervention Group (Frequency/Percent)
22-31 Years	4	5.1	-
32-41 Years	14	19.9	14 (14%) (30-43 years of age)
42-51 Years	37	47.4	53 (26%)
52-61 Years	19	24.4	33 (33%) (55 and over years)
62 + Years	4	5.1	-
Total	**78**	**100**	
Marital status			
Married	61	78.2	77/77%)
Single (widows)	17	21.8	23/(23%)
Total	78	100	100
Education Level			
Never been to school	2	2.6	4 (4%)
Primary	49	62.8	63 (63%)
Secondary	27	34.6	33 (33%)
Total	**78**	**100**	**100**

Table 2 shows that more than half (74.4%, n=58) TBAs conducted an average of one delivery per week, while most (91.0%, n=71) out of 78 TBAs conducted four deliveries per month and (85.9%, n= 67) out of seventy-eight conducted eighteen deliveries yearly.

Table 2: Deliveries conducted per week, month and year by age category

Age Group	Weekly	Monthly	Yearly
22-31 Years	0	1	2
32-41 Years	12	14	13
42-51 Years	30	34	32
52-61 Years	14	19	17
62+ Years	2	3	3
Total	**81**	**273**	**1225**
Average deliveries	**1.4**	**3.9**	**18.3**

Table 3: shows the microorganisms isolated from the right hands of each group of the 78 TBAs who underwent the hand swabbing activity.

The isolates were:

(a) Enteric organisms included Enterobacter species and Enterococcus. Coli. Proteus mirabilis, Klebsiella, Enterococcus, Klebsiella pneumoniae, Citrobacter, and streptococcus species. (Brooks *et al.,* 201022, Spicer, 2008, 23).

(b) The Environmental organisms were Pseudomonas aeruginosa, Bacillus species, Acinetobacter and Burkhoderia (Brooks etal, 201022 Spicer, 2008,23).

(c) The skin organisms were Coagulase negative staphylococcus, Staphylococcus aureus, Micrococci and Diphtheroids (Brooks *et al.*, 201022; Spicer, 200823).

However, Klebsiella pneumoniae and Streptococcus pneumonia, which can be fatal in newborns, were found in the hands of 2 per cent of the 78 intervention TBAs.

Table 3: The microorganisms isolated from the right hands of each group of the 78 TBAs who underwent the hand swabbing exercise in descending order of magnitude

Microorganism isolated	Total no of 36 isolates from 22TBAs	Total no of 20 isolates from 14 TBAs	Total no of 29 isolates from 20TBAs	Total no of 22 isolates from 22 TBAs	Total = 107 Isolates from 78 TBAs
Coagulase-negative staphylococcus	15	3	15	0	33 (30.8%)
Staph aureus	4	2	2	8	16 (14.9%)
Strep spp	5	1	2	1	7 (6.5%)
Enterobacter species	3	1	2	0	6 (5.6%)
Pseudomonas aeruginosa	0	0	0	5	5 (4.7%)
Micrococci	2	2	0	0	4 (3.7%)
E. Coli	2	2	0	0	4 (3.7%)
Proteus mirabilis	0	0	0	3	3 (2.8%)
Enterococcus	0	0	3	0	3 (2.8%)
Bacillus species	0	0	3	0	3 (2.8%)
Klebsiella	1	1	0	0	2 (1.9%)
Acinetobacter	1	1	0	0	2 (1.9%)
Burkholderia	1	1	0	0	2 (1.9%)
Diphtheroid	1	1	0	0	2 ((1.9%)
Klebsiella pneumonia	0	0	0	1	1 (0.9%)
Strep Pneumoniae	0	0	0	1	1 (0.9%)
No growth	1	0	0	3	1 (0.9%)
Citrobacter species	0	0	1	0	1 (0.9%)
No of TBA Cohorts	22	14	20	22	78

Table 4 shows no growth on all the blade specimens after 48 hours of incubation.

Table 4: Bacteriological screening of ordinary razor blades used in the TBAs Kits on 26/09/07 and 02/10/07

Type of razor blade	Colour	Date of specimen	Culture results after 48 hours
Gillette	Silver Blue 1	26/09/07	No growth
Gillette	Silver Blue 11	26/09/07	No growth
Laser super	Stainless 1	26/09/07	No growth
Laser super	Stainless 11	26/09/07	No growth
Vit gut super max	Stainless	02/10/07	No growth
Topaz	Stainless	02/10/07	No growth

Table 5 shows that at baseline, there was no significant difference (P=0.148) between the two groups in the proportion of TBAs who wash their hands before delivering to their clients (28) 23.5 per cent and (38) 31.9%) respectively. After the post-course, the proportion of TBAs who wash their hands before delivering their clients in the intervention group was significantly different (P<0.001) than that of the control group (52) 48.6 per cent and (100) 100%).

Table 5: Practice of TBAs who wash their hands before delivering their clients

Pre-course				Post-course		
Factor	**Site1**	**Site2**	**P-value**	**Site 1**	**Site 2**	**P-value**
	Mpanshya n (%)	Chongwe n (%)		Mpanshya n (%)	Chongwe n (%)	
Did you wash your hands before wearing gloves, delivering your client and afterwards?						
Yes	28 (23.5%)	38 (31.9%)	0.148	52 (48.6%)	100 (100%)	<0.001
No	91 (76.5%)	81 (68.1%)		55 (51.4%)	0 (0%)	
Total	119 (100)	119 (100)		107 (100)	100 (100)	

Table 6: shows that at pre-course, there was no significant difference (P=0.280) between the Mpanshya control and Chongwe intervention groups (91) 86.7 per cent, (95) 91.3 per cent of TBAs regarding using the cord ties when available in their clean delivery kits or improvised washed and cleaned pieces of chitenge and those who used the traditional *ulushishi.* After the intervention, the level of practice in the intervention group was not significantly different (P=0.463) from that of the control group [(94) 87.9 per cent, (91) 91.0%]. One possible reason for the similarity between the two groups could be the non-availability of cord ties in the CDKS. During the pre-course, there was no significant difference (P=0.562) between the two groups in their practice of cutting the cord with umbilical cord scissors when available or a new blade in the CDK that was not boiled, (31) 26.1%, (35) 29.4%). After the intervention, the level of practice among the intervention TBAs, who used umbilical cord scissors or a new razor blade in the CDK that was not boiled, was significantly different (P<0.001) from that of the control group [(78) 72.9%, (100) 100%].

Table 6: Practice how the tTBA cared for the cord during and after delivery to prevent infections

Pre-course				**Post-course**		
	Site1	**Site2**	**P-value**	**Site 1**	**Site 2**	**P-value**
Variable	Mpanshya n (%)	Chongwe n (%)		Mpanshya n (%)	Chongwe n (%)	
What did you use to tie the baby's cord after delivery?						
Cord ties or when none pieces from washed and clean chitenge materials cut between the two tied knots measured from my gloved finger.	91 (86.7)	95 (91.3)	**0.280**	94 (87.9)	91 (91.0)	**0.463**
Used other means (ulushishi – stripped inside of tree bark)	14 (13.3)	9 (8.7)		13 (12.1)	9 (9.0)	
Total	**105 (100)**	**104 (100)**		**107 (100)**	**100 (100)**	
What did you use to cut the cord?						
The new blade was not boiled, the old blade boiled, the old scissors boiled, or umbilical cord scissors boiled	31 (26.1)	35 (29.4)	**0.562**	78 (72.9)	100 (100)	**0.001**
Didn't use any of the above	88 (73.9)	84 (70.6)		29 (27.1)	0 (0)	
Total	**119 (100)**	**119 (100)**		**107 (100)**	**100 (100)**	

DISCUSSION

The first activity, which saw the swabbing of the razor blades that showed no growth on them, is intended to prevent trained TBAs from transmitting Clostridium Tetani – the microorganism that causes tetanus in the neonates. No other studies were identified in which cultures were taken of CDK contents as a teaching strategy to promote their use among TBAs. The results of the razor cultures supported the value of using CDKs since none of these cultures demonstrated any harmful pathogens. This result helped convince the TBAs to desist from using cultural and traditional processes of cutting umbilical cords with dirty blades that may cause neonatorum tetani in newborns.

The second activity (table 3) included the hand culture results from the 78 Traditional Birth Attendants, whose findings indicate that 96 per cent of the TBAs' hands carried organisms that could potentially cause infections in newborns whose immune status is not fully developed. The author emphasises that the cultures were conducted after they had washed their hands after lunchtime. The evidence-based practice was demonstrated by the statistically significant number of intervention TBAs who wash their hands before delivery.

The researcher can conclusively say that the microorganisms can potentially cause neonatal infections and puerperal sepsis, especially in their immune-compromised clients [14]. This result proves that hands carry germs which can be transmitted to mothers and babies

during the birthing process and hence should be emphasised during TBA training and refresher courses.

The results of the razor cultures supported the value of using CDKs since none of these cultures demonstrated harmful pathogens. This is supported by Hill Z *et al.* [15], who noted that replacing CDKs with TBAs would facilitate the use of its contents – the razor blades inclusive; otherwise, the change in their practice would be difficult.

The findings reported here suggest that swabbing hands and instruments in CDKs can be a practical component of an infection control educational programme for TBAs. This innovative teaching strategy generates "evidence" about the presence of microorganisms on hands and their absence on razors in CDKs so that TBAs can see the importance of hand washing and using clean razors. No other studies were identified that specifically evaluated the use of cultures as a teaching strategy in TBA training programmes except those that have been used for health professionals, using cultures to demonstrate the presence of microorganisms on the skin of patients and hands of health professionals in Infection Prevention and Control [15].

The limitation of this study was that no data was collected to evaluate the swabbing and culture activity as a specific component of the overall TBA educational programme. Another limitation is that this study was conducted in only one district of Zambia, therefore, the results cannot be generalised to the country's general population.

CONCLUSION

Despite the limitations, the anecdotal comments from participants, and the results of the cultures themselves, suggest that swabbing and culturing can be an effective component of educational programmes for TBAs. Further research is needed to determine the effectiveness of specific components of infection control educational programmes for TBAs on actual infection control practices.

ACKNOWLEDGEMENTS

Sincere gratitude to Lynda Wilson, RN, PhD, FAAN, of the University of Alabama at Birmingham, for assistance with the final editing of the manuscript and Dr, Butlerys of CDC. My sponsors - The Center for Infectious Disease Research in Zambia (CIDRZ). Prof Mutale W. Chanda- of the School of Mines UNZA, and the UNZA Department of Nursing Sciences Faculty of the School of Medicine, UNZA.

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