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Effectiveness of didactic training on the cognitive knowledge of health professionals on neonatal resuscitation in southern Nigeria

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Abstract *Background:* Nigeria has a high neonatal mortality rate. Most of these deaths can be prevented by providing adequate training for health providers with available and functional basic resuscitation equipments. Our aim was to assess the effect of training on the cognitive knowledge of health practitioners on neonatal resuscitation.

Method: We conducted neonatal resuscitation trainings for selected health professionals from all the senatorial districts of Akwa Ibom State, based on the Neonatal Resuscitation programme (NRP) of the American Academy of Paediatrics (AAP). The facilitators were trained and certified in the NRP train-the trainers program of the AAP conducted by the Paediatric Association of Nigeria (PAN). Pre -and post-test were organized during the training and the test scores analyzed to assess any improvement in the knowledge of the health professionals on neonatal resuscitation.

Results: One hundred and eighty-one health professionals were trained over a two year period. Sixty five (35.9%) were doctors, while 116 (64.9%) were nurses. Physicians had similar pre- test but significantly higher post- test scores compared to the nurses: 46.35±15.34 vs 43.70± 14.51; p=0.34 and 76.14±13.02*v*s 66.29±15.7; p=0.04 respectively. All the health professionals showed significantly higher post-test scores compared to the pre-test scores; p=0.001 respectively. There was also a negative relationship between the number of practice years and the pre-training scores for the physicians and nurses; spearman rho= -0.18; p=0.45 and -0.43;p=0.003 respectively.

Conclusion: Neonatal resuscitation training leads to an improvement in the cognitive knowledge of health practitioners. All health practitioners should be trained irrespective of number of practice years. Further studies are required to assess its long term impact on neonatal mortality.

Keywords: Neonatal Resuscitation Training, knowledge, health

Introduction

Nigeria has a high neonatal mortality rate of 39 per 1000 live births with the highest percentage(32%) dying within the first 24 hours of birth[1]. Many of these deaths occur due to prematurity and low birth weight, infections and birth asphyxia around the time of delivery.

The need for neonatal resuscitation is most urgent in low -resource settings, where access to intra-partum obstetric care is poor and the incidence, mortality, and burden of long term impairment from birth asphyxia is highest[2,3,4]. Basic neonatal resuscitation, including bag-and-mask ventilation, is sufficient for most babies who would be saved by resuscitation in low-resource settings[5].

Therefore achieving high coverage with basic neonatal resuscitation should be prioritized as advanced resuscitation is infrequently required and may have limited additional mortality impact in low resource setting[6,7].

Structured resuscitation programmes in the form of formal resuscitation courses are used worldwide to attempt to optimise standards of clinical practice in resuscitation management, minimise error and decrease patient morbidity and mortality[8]. These trainings usually differ in their content and target audience but are similar in the delivery of lectures, use of simulation and assessments[8]. Studies have shown that both knowledge and skills are significantly improved after structured resuscitation training compared with pre-training levels[8,9]. Didactic training using the Neonatal resuscitation Program (NRP) of the American Association of Paediatrics (AAP) has

been recognised as an avenue for the acquisition of resuscitation knowledge and skills by health workers who attend mothers and babies at delivery[9]. Various studies have shown that neonatal resuscitation training can be followed immediately by significant improvement in health workers practices[9,10,11,12]. However little attention has been paid to furnishing health workers with these skills inspite of the widespread inappropriate, ineffective forms of practice[13,14].

In Akwa Ibom state it has been observed that the knowledge on neonatal resuscitation was acquired during the undergraduate or postgraduate training of most healthcare professionals as there is no periodic resuscitation training currently available in the state.
Based on this observation, this study was therefore, conducted to determine the effect of training on the knowledge of health professionals in Akwa Ibom state, after a training workshop using the AAP neonatal resuscitation program. It is hoped that the outcome of this study will further reinforce the necessity of periodic training in neonatal resuscitation for all health workers involved in attending to mothers and their babies at delivery.

Materials and methods

This was a cross sectional descriptive study of all health workers who attended a two day neonatal resuscitation training (NRT) using the NRP of the AAP conducted in Akwa Ibom State. The inclusion criteria for the study were no previous attendance in a similar training within the last two years and completion of both pre-test and post-test. The participants were drawn from the three senatorial districts of the state. The sampling method was a simple randomised sampling. Twenty participants per senatorial district were drawn per training session with a total of four trainings. The participants were doctors and nurses from the primary through the tertiary health care facilities. The trainings took place between June 2010 and November 2012.

The facilitators (three doctors and two nurses) had been trained and certified in the Neonatal Resuscitation Programme (NRP) train-the trainers program of the AAP conducted by the Paediatric Association of Nigeria (PAN) in collaboration with the Latter Day Saints Charities (LDSC) based in the United States of America (USA). The studies were approved by the ethical committee of the University of Uyo Teaching Hospital.

Procedure

A train -the –trainer educational programme utilized various teaching methods for participants learning including clinical practice sessions and demonstrations to train health professionals.

Health professionals included nurses and doctors drawn from primary, secondary and tertiary health facilities. The neonatal resuscitation course content included an in depth hands on training in basic knowledge and skills including initial resuscitation steps, bag and mask ventilation, chest compression, endotrachael intubation, medications, ethics and end of life care. Mannequins were used for the hands on demonstrations and each participant was encouraged to practice the skills taught and observed. The training lasted for two days. The neonatal resuscitation knowledge of participants was assessed by a pre- and post-test organized before and after the training and the test scores analyzed to see if there was any improvement in the knowledge of the health professionals on neonatal resuscitation. The questions for the test tools were derived from the Neonatal resuscitation textbook of the AAP[5].

Data analysis

The statistical package STATA 10, (StataCorp,Tx, USA) was used to analyze the data. The chi-square test and student t-test were applied in testing the differences in the pre and post-test scores and also the differences in scores between the nurses and doctors. The spearman rho test was used to check for associations between the test scores and years of practice.Results were summarized as means and standard deviations and presented in tables or as graphs. A p-value of <0.05 was taken as statistically significant.

Results

A total of 236 health professionals were trained, 76 (32.2%) were doctors, while 160 (67.8%) were nurses. Fifty five participants were excluded; because they did not complete the pre- and post-test [50(90.9%)] or they had been previously trained in the last two years [5 (9.1%)]. Therefore a total of 181 health professionals were involved in the study. Sixty five (35.9%) were doctors, while 116 (64.9%) were nurses. Table 1 shows that 31 (49%) of the doctors trained were medical officers working in the secondary and primary health facilities, while 70 (60%) of the nurses trained were in the senior cadre (Rank of Assistant Chief Nursing Officer and above). The median year of practice for doctors was four years, with a range of two months to 27 years (inter-quartile range of two to eight years), while that of the nurses was 20 years with a range of six months to 34 years (inter-quartile range of eight to 27 years). Twenty two (12.15%) health professionals out of which six were doctors and 16 were nurses had previously attended any neonatal resuscitation training. Of the total number of health workers trained 138 (51 doctors and 87 nurses) had a complete pre- and post- test scores. The mean pre-test score for all the health professionals was 44.59±14.60%, while the mean post test score was 68.39± 15.73.

Table 2 shows that doctors had higher and statistically significant ($p=0.04$) scores in the post test than the nurses. Table 3 shows that the post-test scores were significantly higher than the pre-test scores for all the

health professionals; p=<0.0001for the doctors and nurses respectively. Figure 1 and 2 shows the negative association between the practice years with the pre-test score for the doctors and nurses.

Table 1: Specialty of Doctors and Rank of Nurses attending the neonatal resuscitation training

Doctors		Nurses	
Specialty	No (%)	Rank	No (%)
Anaesthesia	6(8.80)	*Senior cadre	59 (51.0)
Medical officer	31(49.10)	**Middle level cadre	33 (27.5)
Obstetrician	14 (21.05)	#Junior Cadre	5 (21.5)
Paediatrician	14 (21.05)		
Total	65(100)	Total	116 (100)

*Senior Cadre: Assistant Director Nursing Services, Chief Nursing Officer, Assistant Chief Nursing Officer
**Middle level Cadre: Principal Nursing Officer, Senior Nursing Officer
#Junior Cadre: Nursing Officer I, Nursing Officer II

Table 2: Mean pre-test and post test scores for both doctors and nurses

Scores	Doctors Mean ±SD (%)	95% CI	Nurses Mean± SD (%)	95% CI	p-value
Pretest	46.35±15.34	41.68-51.05	43.70± 14.51	40.56-46.86	0.340
Post test	76.14±13.02	71.28-81.00	66.29±15.71	62.95-66.60	0.040

Table 3: The difference between the mean pre- and post-test scores for the doctors and the nurses.

Health professional	Pretest	Post test	P value
Doctor	46.35±15.34	76.14±13.03	<0.0001
Nurse	43.70±14.51	66.29± 15.71	<0.0001

Fig 1: Association of practice years and pre-test scores for doctors

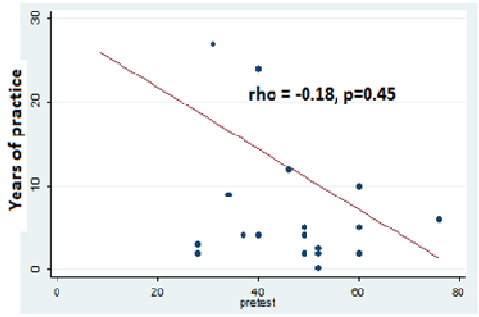
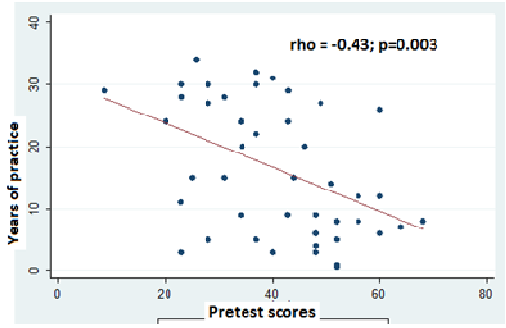


Fig 2 : Association of practice years and pre-test scores for nurses



Discussion

Our study has shown that the post-test scores of health professionals who participated in a two day NRT training using the NRP of the AAP were significantly higher than their Pre-test scores. The higher post-test compared to pre-test scores for all health practitioners confirms that there was a significant improvement in the cognitive knowledge of health practitioners after the course. This trend has also been observed in earlier studies[15,16]. Opiyo et al also observed an improvement in cognitive knowledge and skills over a seven week period and a reduction in harmful resuscitation practices between the trained and untrained health workers[10].

The similar pre-test scores of doctors compared to nurses in our study is in contrast to the study carried out in Ghana and South Africa where nurses and midwives demonstrated the least cognitive knowledge before training[16,17]. This may be explained by the general dearth of knowledge on the current consensus on neonatal resuscitation prevalent in the area as these series of training happen to be the first in the state. Even in developed countries a study has shown that basic life support skills of many health professionals who have previously received resuscitation training is of poor quality[18]. However the index study also showed that physicians had the highest improvement in cognitive knowledge after the training in contrast to earlier studies[16,17]. This may not be unrelated to the extensive information given in a relatively short period of time. It is also possible that this finding is a reflection of pre-existing knowledge as a derivative of school curricula.

This study has shown that nurses are as expected more numerous than physicians and as such proper neonatal resuscitation training of nurses will optimize the impact on maternal and newborn health in the facilities where they work. Due to their sheer number they tend to be the frontline health care practitioners in the absence of a doctor. This has been demonstrated in a study which showed that early newborn care training of midwives decreased early neonatal mortality in the facilities and the impact was larger in infants of mothers without secondary education[15]. The index study also showed a skewed pattern in terms of number during the training in favour of nurses of senior cadre. The major flaw in this is the issue of selection bias. This bias results from the fact that the more senior nurses are the nurse administrators and are most likely to select fellow colleagues and or friends nurses for training experiences. It may also result from the fact that heads of units were mostly selected with the aim that they will step down the trainings to the more junior members of their unit. This however may raise a lot of questions on the cadre of health professionals that should be trained with some quarters advocating the training of junior nurses on neonatal resuscitation as they are believed to be involved in the direct resuscitation while the senior nurses are more involved with administration.

Our finding of a negative correlation between the

number of practice years and the pre-course cognitive levels of physicians and nurses makes a case for the continuous and regular training of all health practitioners on neonatal resuscitation irrespective of cadre and years of practice. This finding may not be unrelated to revision in the content of school curricula over time in line with current best evidence and practice. Durojaiye *et al* also observed that despite a high level of experience and previous paediatric training many candidates in their study who were involved in a one day paediatric life support course lacked the basic knowledge in the resuscitation of seriously ill or injured children. Even after the course, the median time for the retention of the knowledge gained was four months[19].

Our study has added to the body of evidence that neonatal resuscitation training has an important role in the improvement of resuscitation knowledge in developing countries. However, the effect of these training can only be assessed if it is widespread and if there are available, accessible and functioning equipment for basic resuscitation in the health facilities in resource poor settings.

Further studies are needed to evaluate the long term effects of these trainings and assess the duration of retention of knowledge of these trainings. This is of particular importance because some studies have shown that deterioration in skills and to a lesser extent knowledge is highly likely as early as three months following structured resuscitation training[9,18], hence there may be a need for booster or refresher sessions to improve an individual's ability to retain resuscitation skills after initial training.

Our study had various limitations including our inability to get all participants to take the pre-and post- test and also our inability to do a follow-up assessment of the impact of the training on the day to day practice of neonatal resuscitation among participants.

We therefore recommend that for low resource settings as ours, with a high neonatal mortality rate, the impact of neonatal resuscitation training on the neonatal mortality and morbidity should be assessed by further studies. These studies should assess the long term impact and consider the cost and cost effectiveness of training in order to optimise health policy decisions. The incorporation of neonatal resuscitation training into continuous medical education programmes and professional medical education is also highly recommended.

Conclusion

In conclusion our study has shown that neonatal resuscitation training leads to an improvement in the cognitive knowledge of health professionals. Health professionals especially the older ones may need more frequent booster trainings to aid their resuscitation practices. To ensure a high proportion of resuscitation episodes are managed correctly, the Federal and State ministries of health should be involved in the training of a large proportion of health professionals.

Author's contribution

We write to confirm that all authors have made substantial contributions in the conception and design of the study, acquisition of data, revision of article critically for intellectual content and the final approval of the version to be submitted.

The undersigned authors certify that the article is original, is not under consideration by any other journal and has not been previously published.

Conflicts of Interest: None

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