Competence of health care providers on care of newborns at birth in a level-1 health facility in Yaoundé, Cameroon

Francisca Monebenimp1,2, Makudjou Tenefopa1, Valere Mve Koh, Innocent Kago3

1University Teaching Hospital of Yaoundé and Faculty of Medicine and Biomedical Sciences, University of Yaoundé I, Cameroon, 2University Teaching Hospital of Yaoundé and Faculty of Medicine and Pharmacy, University of Douala, Cameroon, 3Cameroon Pediatric Society, Yaoundé, Cameroon

Corresponding author: Dr. Francisca Monebenimp, CHU Yaoundé, P.O. Box 2666 Yaoundé, Cameroon

Key words: Neonatal care, competence, health care providers, health facility, Cameroon

Received: 03/11/2011 - Accepted: 13/01/2012 - Published: 14/03/2012

Abstract

Introduction: This is an observational study which was carried out at a level one health facility in Yaoundé from June to July 2009. The aim was to evaluate the competence of health care providers towards newborns’ care at birth. Methods: Ten health care providers took care of three hundred and thirty-five pregnant women who were enrolled for the study after informed verbal consent in the delivery room. Results: Out of 340 offspring delivered and taken care of, 179 (52.6%) were male and 161 (47.4%) were female. Only two out of ten health workers had a WHO Essential Newborn Care (ENC) training. None of them had received any refresher course for the past two years. The mean gestational age of women was 39.5±3.5 weeks. Resuscitation was carried out on 21 (6.2%) of the newborns including 7 (33.3%) who had birth asphyxia. Health care providers scored 100% in performing the following tasks: warming up the baby, applying eye drops, injecting vitamin K, identifying the neonate, searching for any apparent life threatening congenital malformations, preventing for infection after procedures and initiating breastfeeding. The score was 24% at neonatal resuscitation tasks. Low level of education was associated with poor competence on applying ENC tasks (p<0.001). Lack of WHO ENC training was associated with poor competence on ENC tasks (p<0.001) and poor skills on resuscitation (p=0.03). Conclusion: There is a need to reinforce the capacity of health care providers by training in WHO ENC course with emphasis on providing skills on resuscitation in order to reduce the burden of neonatal intrapartum-related deaths.
Introduction

About 99% of the four million neonatal deaths per year occur in low income countries [1]. Hospitals in many developing countries appear not well prepared to ensure newborn survival because of insufficient staff, poor hygienic conditions and organization to support the provision of care [2]. Several observations reveal that facility-based basic resuscitation may avert 30% of intrapartum-related neonatal deaths [3]. Several trials have shown that health workers in some countries can perform neonatal resuscitation with an estimated effect of 20% reduction of these deaths [3]. The World Health Organization Essential Newborn Care (WHO ENC) course has set minimum standards for training midwives in this domain. It has been shown that in facilities where midwives have received this training there has been a decrease in early neonatal mortality rates [4]. In Cameroon, the neonatal mortality rate was 40 per 1000 live births in 2004 [5]. WHO ENC implementation had started slowly in some areas and it is not known how health personnel perform these specific activities. In this study we want to assess the competence of health workers towards newborns’ care at birth in a level-one health facility to know what the gaps are so as to reinforce their capacity.

Methods

Study setting

This is an observational study carried out from June to July 2009 at the Centre for social animation and Health (CASS) of Nkoldongo, Yaoundé. This is a catholic health facility that reported a large recruitment of pregnant in 2008 with 3733 deliveries [6]. Women coming in this centre for antenatal care (ANC) visits and presenting with high risk pregnancies are immediately referred to a higher level health facility for follow up. The facility has a labor room, a delivery room and a postpartum ward having respectively three, two and 33 beds. There are 10 health care providers who work permanently in the delivery room grouped in three teams with an eight hour shift schedule. The health workers were all registered nurses but one that was an aid nurse at the beginning of her carrier had a long experience in nursing. There is a pediatrician who comes twice a week for neonatal visits and two nurses that coordinate activities of the unit. The delivery room had a radiant warmer, source of oxygen, bag and mask, and consumables for infection prevention.

Data collection

A pre-validated data collecting form was used to gather information from health workers and from mothers’ obstetrical and gynaecological files. This was on health workers’ level of education, refresher course status and training on WHO ENC. The level of education was low when a health worker ended at primary school, middle or high when he or she reached respectively secondary or university level. For mothers, the gestational age, history of pregnancy related to the number of antenatal care visits, intermittent treatment for malaria and HIV serology were recorded. Competence of health care providers was assessed by direct observation of how the newborn was handled. The only observer, an intern at the end of medical training, who had a training on WHO ENC noted whether the health worker identified the newborn at delivery, searched for any congenital malformations mostly that were apparent and life threatening such as imperforated anus, choanal atresia when there was difficult breathing and no passage while introducing a 4F nasogastic tube in the nostrils, abdominal wall hernia, to cite only these. Essential newborn care management, resuscitation in case of difficulty in initiating breathing and prevention of infection were also assessed as described below. It should be mentioned that the health workers were aware of the fact that the observer was collecting data, without knowing specifically which one. National guidelines adapted from WHO recommendations [7] were used. There were 19 items distributed as follow: Identification of neonates which included recording of the gestational age, weight, sex and the Apgar score at 1 and 5 minutes. The search of any congenital malformations was included. ENC tasks were cord care (cutting the cord with sterile material and tying it with sterile thread), fight against hypothermia (drying up the newborn, putting him wrapped close to mother or under the radiant warmer) and injection of vitamin K, eye care (wiping the eyes with sterile gauze before applying eye drops and not wiping again) and breast feeding were part of the assessment. Resuscitation had several steps but the focus was on checking the equipment, positioning of the head of the neonate (neutral position), aspiration, positioning of the mask (nose and chin under the mask) and ventilation (making sure the chest was moving up when insufflating air). Prevention of infection included hand washing, decontamination and disinfection of the used equipment. Scoring was made by assigning 1 point each time a task was applied. For tasks that needed more skills such as resuscitation, 1 point was given when the execution of the task was incomplete, 2 points when it was made correctly but the steps were not adequately followed and 3 points when the task was mastered correctly and precisely. Identification of neonates had 6 points, ENC tasks 7, resuscitation 17 and prevention of infection had 3 points. For easy calculation, scores were presented in percentage. For each subset, the mean score for a health worker was calculated and the total score was an aggregate or sum of the subset scores.

It was assumed that 32% of newborns will be resuscitated it was assumed that 32% of newborns will be resuscitated as found by Takpara et al in Benin [8], with an error of 5%, the sample size calculated was 340. Pregnant women, after giving their verbal informed consent were enrolled consecutively in the study. At the end, each health worker had to take care of 34 newborns. To make it simple, the sample size was divided among the 10 health care providers. When a health care provider reached the number of 34, the observation was discontinued for he or she. Data were analysed using Epi Info software version 3.5.1 and SPSS version 12.0. Chi square test was used to compare proportions and the level of significance was set at 0.05. A univariate analysis was conducted to identify potential variables associated with competence. ANOVAs test was also used to compare mean scores.

Results

During the two months period, the ten health care providers recruited 335 pregnant women who delivered 340 live newborns. Among these newborns, 179 (52.6%) were male. Table 1 shows the demographic characteristics of the health workers. None of them had received any refresher course in the past two years and only 2 (20%) had training on WHO ENC. Nine (90%) health providers were female and 9 (90%) had a college level of education. Concerning antenatal history (Table 2), among the enrolled pregnant women, 3 (0.9%) did not attend any antenatal clinic and 130 (38.8%) of women had less than four antenatal consultations. At least two echographies were completed by 233 (69.5%) women.
The mean gestational age was 39.5±3.5 weeks. Only 158/335 (47.2%) took adequate malaria prophylaxis, 41 (12.1%) had malaria in pregnancy and 21 (6.3%) had a positive test for Human Immunodeficiency Virus. Looking at intapartum follow up, 4 (1.2%) women had a prolonged labor. 25 (7.4%) had premature rupture of membranes, 17 (5%) had meconium stained amniotic fluid. Cord around the neck was noticed in 6 (1.8%) newborns. The Apgar score was below 5 at one minute for 21(6.2%) neonates and at five minutes for 7 (2.46%) newborns. Taking in to consideration newborns who did not breathe at birth, 7 (33.3%) had birth asphyxia and out of them 4 (57.1%) newborns had a poor status. The transferred newborns died on the same day of referral to the UTH. The absence of good transportation referral system in the country might be an associate factor leading to death for these two newborns (personal communication). The prevalence of premature deliveries was 7.4% which was less than 11.11 % found in the same period at the UTH of Yaoundé [15]. This could reflect the quality of counseling during antenatal consultations as the awareness might be enhanced on self referral to a higher level health facility for better management of prematurity. That could also be an explanation for the low rate of birth asphyxia compared to the one of 35.1% noticed at this referral hospital in town [15]. All these deaths could be averted if effective basic neonatal resuscitation was conducted [4,16] presumably as the two health workers who had a former WHO ENC training were not the one who took care of these asphyxiated babies. The study demonstrated that lack of WHO ENC training of the health care providers was significantly associated with poor competence on ENC tasks and poor skills on resuscitation. This could explain the high number of newborns death encountered. This supported the finding that ENC training of health workers was significantly associated with a decrease in early neonatal mortality [4] in particular ENC training of midwives in low risk clinics was significantly associated with decreased 7-day mortality rates (relative risk: 0.59 (95% confidence interval: 0.48–0.77); P < .001) [17]. A clinical trial on the implementation of WHO ENC...
conducted in six countries Argentina, Democratic Republic of Congo, Guatemala, India, Pakistan, and Zambia revealed that apart from the significant reduction of stillbirths, there was no significant reduction from baseline in the rate of perinatal and neonatal death [18]. It seemed important to address the issue that these countries had an ongoing ENC program that could explain why the effect could not be seen as pointed out by the authors, henceforth in our setting where this approach is not spread nationwide, the effect of such a program would be more cost-effective as demonstrated in South East Central and Southern East Africa [19]. One might point that this level one health facility situated in the capital city had the advantage of being supervised by a consultant pediatrician twice a week. That could have influenced the knowledge and the competence of health care providers either way [20]. Misclassification bias could be noticed as far as scoring was concerned mostly in resuscitation domain. Cardiac massage was not part of the assessment but most of the newborns who did not breath at birth got it even though all of them might not have been in need. This could have happened because of the persistence of hypoxia due to poor ventilation technique [3,21]. Nevertheless, these results could not be easily generalized to other level one health facilities at country level because the capital city location also, the small sample size was a limitation for the inferences made.

**Conclusion**

This study showed that the majority of health workers had no WHO ENC training. Health care providers were competent at providing basic essential newborn care. They lacked skills for proper handling of newborns that do not breathe at birth. There is an urgent need to reinforce the capacity of health care providers in this health facility as far as resuscitation is concerned and this could be extended to the overall country in order to meet MDG 5 by the year 2015.

**Competing interests**

The authors declare no competing interests.

**Authors’ contribution**

All the authors have contributed to this research in ways that are consistent with the ICMJE authorship criteria. All the authors have read and approved the final version of the manuscript.

**Acknowledgement**

We thank the staff of the delivery room of the CASS of Nkolndongo for their help in the conducting this work.

**Tables**

**Table 1**: Demographic characteristics of the health care providers in a level-one health facility, CASS (Centre for Social Animation and Health ), June to July 2009

**Table 2**: Distribution of pregnant women in relation with antenatal and intra partum history in the level-one health facility, CASS (Centre for Social Animation and Health ), June to July 2009

**Table 3**: Health care providers’ completed tasks by domain assessed in a level-one health facility, CASS (Centre for Social animation and Health ), June to July 2009

**Table 4**: Mean scores competence of health care providers by domain assessed in a level-one health facility, CASS (Centre for Social Animation and Health ), June to July 2009

**Table 5**: Factors associated with competence using mean scores of health workers by level of education in a level-one health facility, CASS (Centre for Social Animation and Health ), June to July 2009

**Table 6**: Factors associated with competence using mean scores of health workers by training in Essential Newborn Care in a level-one health facility, CASS (Centre for Social Animation and Health ), June to July 2009

**References**

1. Black RE, Morris SS, Bryce J. Where and why are 10 million children dying every year?. Lancet. 2003; 361 (9376):2226-2234. [This article on PubMed](https://pubmed.ncbi.nlm.nih.gov/12918453/)

2. Opondo C, Ntoburi S, Wagai J, Wafula J, Wasunna A, Were F, Wamae A, et al. Are hospitals prepared to support newborn survival? - An evaluation of eight first-referral level hospitals in Kenya. Trop Med Int Health. 2009 Oct;14(10):1165-72. [This article on PubMed](https://pubmed.ncbi.nlm.nih.gov/19655329/)
3. Wall S, Lee ACC, Niermeyer S, English M, Keenan WJ, Carlo W et al. Neonatal resuscitation in low-resource setting: what, who and how to overcome challenges to scale up?. Int J Gynaecol Obstet. 2009; 107(suppl 1): S47-S64. This article on PubMed

4. Chomba E, McClure E. Effect of WHO Newborn Training in neonatal mortality by education. Ambul Pediatr. 2008; 8 (5) : 300-304. This article on PubMed

5. Institut National de la Statistique (INS) et ORC Macro 2004. Enquête démographique et de santé du Cameroun 2004. Juin 2005. Available at www.measuredhs.com/pubs/fr163/fr163-cm04.pdf. Accessed November 1 2011

6. Association Centro Orientatmento Educativo Cameroun. Rapport d'activités 2008. Centre d'animation sociale et sanitaire de Nkolndongo Yaoundé (CASS) p 14-15

7. Ministry of public Health. Supervisory/Evaluation Checklist for neonatal resuscitation in the delivery room. Cameroon 2008

8. Takpara B, Ayivi M, Chobli M, Hinson AV, Alihonou E. La réanimation du nouveau-né : aspects actuels et perspectives à la clinique universitaire de Gynécologie et d’Obstétrique du Centre National Hospitalier Universitaire de Cotonou. Le Bénin Médical. 1998 ; (8) : 24-27

9. Sheybani C. Portrait géographique du personnel infirmier à Genève: population en danger? January 2008. Available at http://www.Unige.Ch/ses/demog/publicationsetrpports/memoiremaster/sheybanivers5.pdf. Accessed November 1 2011

10. Delaporte F. La formation aux professions de santé en 1999-2000. DREES. 2000 Collecte statistique n° 15. Seriestat 37

11. Organisation Mondiale de la Santé. Premiers soins de réanimation du nouveau-né : guide pratique, Genève ; 1998 document WHO/RHT/MSN/98.1

12. Sidibe T, Sangho H, Doumbia S, Sylla M, Keita M, Keita HD et al. Mortalité néonatale dans le district de Kolokani (Mali). Journal de Puériculture. 2006 ; 19 (7) : 272-276

13. Carlo WA, Wright LL, Chomba E, McClure EM, Carlo ME, et al. Educational impact of the neonatal resuscitation program in low-risk delivery centers in a developing country. J Pediatr. 2009 Apr;154(4):504-508.e5. This article on PubMed

14. Ariff S, Soofi SB, Sadiq K, Ferore AB, Khan S, Jafarey SN, et al. Evaluation of health workforce competence in maternal and neonatal issues in public health sector of Pakistan: an assessment of their training needs. BMC Health Serv Res. 2010; 10 (1): 319. This article on PubMed

15. Kameni Nouton AB : Mortalité périnatale chez le nouveau-né au Centre Hospitalier Universitaire de Yaoundé. Thèse de doctorat en médecine, Université de Yaoundé I, Cameroun 2011

16. Bang AT, Bang RA, Baitule SB, Reddy HM, Deshmukh MD. Management of birth asphyxia in home deliveries in rural Gadchiroli: the effect of two types of birth attendants and of resuscitation with mouth-to-mouth, tube mask or bag-mask. Journal of Perinatology. 2005; 25: S82-S91. This article on PubMed

17. Carlo WA, McClure EM, Chomba E, Chakraborty H, et al. Newborn care training of midwives and neonatal and perinatal mortality rates in a developing country. Pediatrics. 2010 Nov;126(5):e1064-71. This article on PubMed

18. Carlo WA, Goudar SS, Jehan I, Chomba E, Tshefu A, Garces A et al. Newborn-care training and perinatal mortality in developing countries. N Engl J Med. 2010; 362: 614-23. This article on PubMed

19. Bradley S, McAuliffe E. Mid-level providers in emergency obstetric and newborn health care: factors affecting their performance and retention within the Malayan health system. Hum Resour Health. 2009; 7: 14. This article on PubMed

20. Kinoti SN. Asphyxia of the newborn in East Central and Southern East Africa. East Afr Med J. 1993 Jul;70(7):422-33. This article on PubMed

21. Perlman JM, Risser R. Cardiopulmonary resuscitation in the delivery room - Associated events. Arch Pediatr AdoleSc Med. 1995; 149 (1): 20-25. This article on PubMed
**Table 1:** Demographic characteristics of the health care providers in a level-one health facility, CASS, June to July 2009

| Parameters                              | frequency | Percentage |
|-----------------------------------------|-----------|------------|
| Female sex                              | 09        | 90         |
| Married status                          | 10        | 100        |
| Primary level of education              | 01        | 10         |
| College level of education              | 09        | 90         |
| Training in WHO ENC                     | 02        | 20         |
| Refresher course in the past two years  | 0         | 0          |

CASS: Centre for Social Animation and Health; ENC: Ante Natal Care

**Table 2:** Distribution of pregnant women in relation with antenatal and intra partum history in the level-one health facility, CASS (Centre for Social Animation and Health), June to July 2009

| Parameters                                              | frequency | Percentage |
|---------------------------------------------------------|-----------|------------|
| **Prenatal history**                                    |           |            |
| Gestational age < 37 weeks                              | 25        | 7.4        |
| Gestational ≥ 42 weeks                                  | 23        | 6.8        |
| At least 4 ANC                                          | 205       | 38.8       |
| None obstetrical echography                            | 96        | 28.7       |
| At least 2 echographies                                 | 233       | 69.5       |
| No antimalarial prophylaxis                             | 20        | 06         |
| One dose of intermittent treatment for malaria          | 118       | 35.2       |
| Two doses of intermittent treatment of malaria          | 158       | 47.5       |
| HIV Positive serology                                   | 21        | 6.3        |
| No HIV testing                                          | 10        | 03         |
| Malaria in pregnancy                                    | 41        | 12.1       |
| Multiple pregnancy                                      | 10        | 2.9        |
| **Intra partum history**                                |           |            |
| Cord around the neck                                    | 06        | 1.8        |
| Premature rupture of membranes                          | 25        | 7.4        |
| Prolonged labor                                         | 04        | 1.2        |
| Meconium stained amniotic fluid                         | 17        | 05         |

ANC: Ante Natal care
### Table 3: Health care providers’ completed tasks by domain assessed in a level-one health facility, CASS (Centre for Social Animation and Health), June to July 2009

| Parameters                                           | Frequency of completed tasks by the health workers (%) n=340 | Scores % |
|------------------------------------------------------|-------------------------------------------------------------|----------|
| **Identification of neonates**                       |                                                             | 100      |
| Gestational age                                      | 340 (100)                                                   |          |
| Weight                                               | 340 (100)                                                   |          |
| Sex                                                  | 340 (100)                                                   |          |
| Apgar score at 1 minute                              | 340 (100)                                                   |          |
| Apgar score at 5 minutes                             | 340 (100)                                                   |          |
| Search: congenital malformations                     | 340 (100)                                                   |          |
| **ENC tasks**                                        |                                                             |          |
| Cord care                                            | 340 (100)                                                   |          |
| Warming up                                           | 340 (100)                                                   |          |
| Vitamin K injection                                  | 340 (100)                                                   |          |
| Eye care                                             | 340 (100)                                                   |          |
| Breast feeding*                                      | 319 (93.8)                                                  |          |
| **Resuscitation**                                    |                                                             | 24       |
| Equipment verification                               | 2 (9.5)                                                     |          |
| Positioning of new-born                              | 2 (9.5)                                                     |          |
| Aspiration                                           | 21 (100)                                                    |          |
| Positioning of mask                                  | 2 (9.5)                                                     |          |
| Ventilation                                          | 2 (9.5)                                                     |          |
| **Prevention of infection**                          |                                                             | 100      |
| Hand washing                                         | 340 (100)                                                   |          |
| Decontamination of equipment                         | 340 (100)                                                   |          |
| Disinfection of equipment                            | 340 (100)                                                   |          |

* Newborns resuscitated; ENC: Ante Natal Care

### Table 4: Mean scores competence of health care providers by domain assessed in a level-one health facility, CASS (Centre for Social Animation and Health), June to July 2009

| Domain                             | Health workers mean scores (standard deviation) | Maximum score | P value |
|------------------------------------|-------------------------------------------------|---------------|---------|
| Identification of neonates         | 5.01 (0.07)                                     | 6             | 0.48    |
| ENC tasks                          | 5.19 (0.04)                                     | 7             | <0.001  |
| Resuscitation                      | 6.05 (0.22)                                     | 17            | 0.001   |
| Prevention of infection            | 3                                               | 3             | -       |

ENC: Ante Natal Care
Table 5: Factors associated with competence using mean scores of health workers by level of education in a level-one health facility, CASS, June to July 2009

| Parameters              | Level of education | P value |
|------------------------|--------------------|---------|
|                        | Primary            | Secondary |       |
| Identification of neonate | 5.03 (0.03)       | 5.00 (0.0) | 0.06  |
| ENC Tasks              | 5.00 (0.0)         | 5.21 (0.42) | < 0.001 |
| Resuscitation          | 6.00 (0.0)         | 6.05 (0.23) | 0.69  |
| Prevention of infection | 3.00 (0.0)         | 3.00 (0.0) | -     |

P< 0.05 is significant; ENC: Ante Natal Care

Table 6: Factors associated with competence using mean scores of health workers by training in Essential Newborn Care in a level-one health facility, CASS (Centre for Social Animation and Health), June to July 2009

| Parameters              | Training in ENC | P value |
|------------------------|-----------------|---------|
|                        | Trained         | No training |     |
| Identification of neonate | 5.00 (0.0)   | 5.01 (0.08) | 0.47  |
| ENC Tasks              | 5.91 (0.28)     | 5.01 (0.13) | < 0.001 |
| Resuscitation          | 6.25 (0.50)     | 6.00 (0.0)  | 0.03  |
| Prevention of infection | 3.00 (0.0)     | 3.00 (0.0)  | -     |

P< 0.05 is significant; ANC: Ante Natal Care