

Assessing Adherence to the World Health Organization's Essential Newborn Care Guidelines amongst the Midwives in a District Hospital in Rwanda: A Descriptive study

Authors: A. Ndayambaje^{1,*}; R. Wong^{1,2}; J. Logan¹; C. Kirk³

Affiliations: ¹University of Global Health Equity, Rwanda; ²Yale University, USA; ³Partners In Health, Rwanda

ABSTRACT

BACKGROUND: Globally, every year 2.7 million newborns die within the first 28 days, with more than 80% of deaths occurring in low-resource countries. In 2016, 16 per 1000 neonates died in Rwanda, accounting for 36% of the total child mortality. The WHO's Essential Newborn Care is a package consisting of chronological evidence-based practices that can help prevent up to 75% of neonatal mortality in low resource settings.

This study assesses the adherence to the Essential Newborn Care guidelines amongst midwives at Gakoma District Hospital in Rwanda. The results of this study hope to inform on appropriate interventions to improve care and survival rate of neonates at the hospital.

METHODS: Direct observation was conducted to assess the Essential Newborn Care compliance at Gakoma District hospital using a checklist with 62 Essential Newborn Care criteria grouped into 16 categories in December 2018.

RESULTS: Compliance to Essential Newborn Care for 32 observed deliveries was 63.4%. The compliance rates for the 62 individual criteria ranged from 0% to 100%, with 24 (38.7%) criteria scoring compliance of 80% or higher. The compliance rates were highest for discharge care (96.1%), weighing the baby (92%), and documenting findings (91%). However, the compliance of completing immunization (0%), identification of the baby (19%) and thermal protection (25%) need improvement.

CONCLUSION: The overall level of compliance was lower than the recommended 80%. Stable provision of life-saving commodities in the birth unit and establishing a skin-to-skin contact schedule with proper communication and training to mothers about Essential Newborn Care is needed.

Keywords: Compliance, Nurse-Midwives, Newborn, Rwanda, Infant

INTRODUCTION

Annually, 2.5 million newborns around the world die during the first 28 days of life [1, 2]. Furthermore, 83% of such deaths occur within the first seven days of life [3, 4]. The global annual cost due to neonatal morbidity and mortality is estimated to be 5.7 billion US dollars [5, 6, 7]. Low-income countries bear the highest burden of global annual cost [1, 3, 8, 9, 10]. In 2016, 77% of the global neonatal mortality occurred in Southern Asia and sub-Saharan Africa [1]. The risk of dying among preterm infants born in Africa was 12 times higher than among those who were born in Europe [9, 11]. In low-income countries, approximately

90% of preterm neonates born before 28 weeks gestation died compared with less than 10% in high-income countries [9,10].

Many of these newborn deaths can be easily prevented [8]. One strategy for preventing newborn deaths is by providing Kangaroo Mother Care (KMC) [12,17]. In addition, performing intra-partum fetal monitoring and providing adequate resuscitation within the first minute after birth can prevent neonatal morbidity and mortality from occurring, as a result of Hypoxic Ischaemic Encephalopathy (Birth Asphyxia) [4,6,12,18]. Another simple yet important intervention is hand washing which can prevent over 68% of neonatal infections [14, 19 ,21].

***Corresponding author:** Andre Ndayambaje email: andayambaje@ughe.org, University of Global Health Equity (UGHE); **Potential Conflicts of Interest (Col):** All authors: no potential conflicts of interest disclosed; **Funding:** All authors: no funding was disclosed; **Academic Integrity.** All authors confirm that they have made substantial academic contributions to this manuscript as defined by the ICMJE; **Ethics of human subject participation:** The study was approved by the local Institutional Review Board. Informed consent was sought and gained where applicable; **Originality: Originality:** All authors: this manuscript is original has not been published elsewhere;

Review: This manuscript was peer-reviewed by three reviewers in a double-blind review process; **Type-editor:** Dennis Hopkinson (USA)

Received: 26th November 2019; **Initial decision given:** 18th December 2019; **Revised manuscript received:** 05th May 2020; **Accepted:** 27th July 2020.

Copyright: © The Author(s). This is an Open Access article distributed under the terms of the Creative Commons Attribution License (CC BY-NC-ND) (click here), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited. **Publisher:** Rwanda Biomedical Centre (RBC)/Rwanda Health Communication Center, P.O.Box 4586, Kigali.

ISSN: 2079-097X (print); 2410-8626 (online)

Citation for this article: A. Ndayambaje; R. Wong; J. Logan et al. Assessing adherence to the world health organization's essential newborn care guidelines amongst the midwives in a district hospital in Rwanda – A descriptive study. Rwanda Medical Journal, Vol. 77, no. 3, pp. 33-38, 2020.

In light of these simple yet often ignored interventions, the World Health Organization (WHO) created the Essential Newborn Care (ENC) guidelines. These are a set of cost-effective and high impact evidence-based practices that can prevent up to 75% of neonatal mortalities [9, 22]. ENC is a list of practices that every newborn need in order to cope with immediate challenges related to extra-uterine life within seven days after birth [23-26].

These practices are easy to implement without incurring extra cost [20,23,25]. Although proved to save lives, there is low compliance in practicing ENC and this mostly occurs in sub-Saharan Africa [26, 27]. The compliance rates of practicing ENC in Sub-Saharan African countries range from 30% to 65% [28, 29], all of which are below the recommended 80% compliance rate [30].

Two studies have been conducted in Rwanda on assessing ENC compliance within health facilities and it was found that the national ENC compliance rate ranged between 56-58% [2,15]. The two studies did not include Gakoma District Hospital among the assessed health facilities.

Aims: This study aims to increase the understanding of the compliance rates and thus contribute to the design of appropriate interventions to improve care and survival rate of neonates at the Gakoma District Hospital.

METHODS

Setting: The study was conducted in the maternity unit in Gakoma District Hospital in Rwanda. The hospital serves a catchment area of 154,000 people, and its nine midwives take care of an average of 100 deliveries per month. In 2016, the hospital was identified as being among ten hospitals with the highest neonatal mortality rates in Rwanda, with 22% of babies being admitted in Neonatal Care Units dying due to sepsis, birth asphyxia, complications related to preterm births and hypothermia [31].

Design: An observational descriptive study was undertaken to assess compliance with the WHO's ENC guidelines among nurses and midwives at the hospital. Three midwives and ENC Master Trainers from national referral hospital and Schools of Nursing and Midwifery, University of Rwanda conducted the direct observation in December 2018 to assess the ENC compliance rate.

Sample: All women aged 18 years and above who were admitted for labor in the childbirth unit at the hospital during the study period were eligible for inclusion. Women who gave birth to still-born babies and those who were transferred away from Gakoma District Hospital before giving birth were excluded.

Development of the ENC check list: In respond to the United Nations Secretary-General called on governments, United Nations agencies and other stakeholders to take actions towards achieving Millennium Development Goals 4 and 5 relating to women and children's health. The World Health Organization (WHO), the United Nations Children's Fund (UNICEF) and other partners developed have developed the Essential Newborn Care – an effective, low-cost, yet easily to implement steps to care for

mothers during labor and delivery and for newborn infants after birth [30].

Data Collection Method: An ENC checklist was developed based on the Essential Newborn Care guidelines and this checklist was used to assess compliance [32]. The checklist contained 62 criteria, grouped into 4 categories. Each criterion had the option of "completed", "incomplete" and "not applicable".

Measures: The key measure of the study was the compliance rate of the WHO's ENC guidelines. The compliance rate was further analyzed by category and by criterion.

Data Management and Analysis: Compliance was presented as a percentage score, with a score of 80% being classified as good compliance as suggested by the American Academy of Pediatrics [30]. Descriptive statistics were used to summarize the findings. All data analyses were conducted using SPSS v.21.

Ethics Approval and Consent: The study was approved by University of Global Health Equity Institutional Review Board (code of 0053).

Sample size: As this was a descriptive, non-analytical, study no sample size calculation was undertaken.

RESULTS

Participants: During the data collection period, 57 mothers were admitted to the maternity unit, 43 met the selection criteria, seven did not consent, and 4 were transferred out before delivery, resulting in a total 32 deliveries that were observed.

Compliance: The overall ENC compliance was 63% (Table 1). The average compliance rate to ENC provided to the mother before giving birth (Category 1) was 58%. There were 15 criteria within this category and their compliance rates ranged between 31% and 91% (Table 2). Category 2 referred to the ENC provided to newborn within 1 minute after birth. The average compliance was 76%. There were 8 criteria within this category and their compliance rates ranged from 38% to 97% (Table 3). The average compliance rate to ENC provided to the newborn within one hour after

Table 1: Summary of compliance results

Sample (n=32)		Criteria	Compliance
Overall compliance	Average		63%
Category compliance	Highest		76%
	Lowest		57%
	Categories with compliance ≥80%		0 (0%)
Individual criteria compliance	Highest		100%
	Lowest		0%
	Criteria with compliance ≥80%		24 (38.7%)

birth (Category 3) was 57%. There were 9 criteria within this category and their compliance rates ranged between 19 and 94% (Table 4). The average compliance rate to ENC provided to moth-

er and newborn after 1 hour to 24 hours after birth (Category 4) was 62%. The compliance rates of the 6 criteria within category 4 ranged between 0 and 100% (Table 5).

Table 1: Category 1 - ENC provided to the mothers before giving birth

Criteria	Compliance
1. Explain to the woman and her support person what will be done and encourage questions	84%
2. Review the woman's chart. For example: prenatal card, partograph	75%
3. Test for HIV if status is unknown	84%
4. Prepare the mother for ISSC and exclusive breastfeeding	31%
5. Help the mother to clean her hands and chest for ISSC and breastfeeding	50%
6. Provide emotional support and reassurance to the mother and family	91%
7. Check that there is all the needed equipment, instruments, and supplies	66%
8. Warm the baby linen and clothes by placing under/near the heater, if available, before delivery	75%
9. Make sure that all surfaces the woman and baby come into contact with are clean and dry	72%
10. Make sure the room is well-lit. Have an emergency battery powered torch	72%
11. Explain the mother how a newborn will be placed on Skin to Skin Contact after birth	19%
12. Provide emotional support to the mother and the family	78%
13. Wear all required Personal Protective Equipment for conducting delivery	53%
14. Wash hands thoroughly with soap and water and dry them with a clean, dry cloth (or air-dry)	37%
15. Wear sterile (preferable) surgical or HLD gloves on both hands	41%
Category 1 Average 58%	

Table 3: Category 2 - ENC provided to a newborn within 1 minute after birth

Criteria	Compliance
1. When the head is delivered, wipe the mouth and nose with gauze	56%
2. Place fully born baby on a clean, dry towel or blanket on the mother's abdomen	84%
3. Inject mother with 10 IU oxytocin for AMTSL within the first minute after birth	38%
4. Wipe the baby's eyes and face thoroughly, do not dry the hands.	87%
5. Stimulate the baby while drying by rubbing up and down along the baby's spine	97%
6. Remove the wet cloth and place the baby skin-to-skin on the mother's chest	84%
7. Cover the baby with a clean, dry cloth including the head. Use a hat if available	94%
8. Assess the baby's breathing while drying and stimulating.	66%
Category 2 Average 76%	

Table 4: Category 3 - ENC provided to a newborn within one hour after birth

Criteria	Compliance
1. Care of the umbilical cord (after implementing AMTSL)	51%
2. Care of the eyes	78%
3. Identification of the baby	19%
4. Maintain the baby's body temperature/thermal protection	25%
5. Administer vitamin K1	66%
6. Commence exclusive breastfeeding	44%
7. Weigh the baby	92%
8. Decontamination, cleaning, and sterilization	44%
9. Record the weight of the baby in the relevant records/registers and inform the mother	94%
Category 3 average 57%	

Table 3: Spectrum of intestinal parasites among the food handlers

Criteria	Compliance
1. Monitor and record mother (B/P, pulse, fundus, bleeding, bladder) and baby (breathing, suck, temp, cord) every 15 minutes for 2 hours, every 30 minutes for 1 hour, and then every 1 hour for 3 hours	53%
2. Educate the mother about danger signs (apnea, fever, jaundice, convulsion, poor feeding, poor tone)	31%
3. Re-examine the baby and mother regularly and record the findings	90%
4. Discuss on postpartum contraception and administration if mother is willing to take it	100%
5. Discuss with the mother the post discharge follow plan and contact of CHW in community	100%
6. Immunization (BCG and oral Polio-0 vaccine)	0%
Category 4 average	
62%	

DISCUSSION

This study assessed the compliance rate of the World Health Organization's ENC guidelines at Gakoma District Hospital. The overall compliance rate was 63.4% - which is below the recommended 80% that is advised by the American Academy of Pediatrics [30].

There were two other similar studies conducted in Rwanda. Both studies used direct observations to measure the level of compliance of Essential Birth Practices (EBP) before delivery, during delivery and 24 hours after delivery [2, 15]. There were a few other similar studies in other African countries. The results of these studies showed compliance ranged from 27% to 65% [2, 15, 28]. Despite variations, none had reached the recommended 80%, indicating the ENC compliance rates in the sub-Saharan African countries were generally below satisfactory levels, compromising neonatal wellbeing. Therefore, quality improvement initiatives are needed to identify interventions for improvement.

According to the 2017-2018 Health Package at District Hospitals recommendation, all newborns should receive BCG and Polio vaccines before discharge [31]. Our study results showed 0% compliance rate to this practice. After further investigation, we found the root cause was related to supply issue. In the hospital, vaccine supply was scarce but available. Each vaccine flacon was sufficient to inject 20 newborns. However, once a flacon is opened, the remaining vaccine cannot be stored. Since supply was insufficient, many staff did not want to open a flacon of vaccine for just a small number of newborns (on average the hospital had 4 to 5 newborns per day) and discard the remainder of the unused vaccine. Instead, they would ask the mothers to return as outpatients when enough babies could share the same bottle of vaccine. Consequentially, this caused many babies to not get the vaccine before discharge. Hospital leadership may need to consider acquiring smaller dose vaccines. In order to better understanding about the situation, assessing if those babies actually returned after discharge for vaccination should be conducted.

Only 19% of babies were given identification bands. It is a simple task that can help prevent fatal medical and legal errors

including giving wrong medications, providing wrong laboratory results and the worst-case scenario, exchanging the babies between different mothers [25]. Incomplete identification is a common problem in many health facilities in Rwanda [15]. Hospitals should consider investing in purchasing sufficient identification bands or adequate alternatives.

Thermo protection for babies was another area found to have low compliance. It was recommended to have at least one period of uninterrupted skin to skin contact [1, 30]. Care of the neonate in the first minute of life was good (Table 2). However, in our study, only 22% of newborns were kept skin-to-skin contact. The gap in performing immediate skin-to-skin contact was also reported at other hospitals in Rwanda [15]. It has been observed that during our study, many midwives interrupted the skin to skin contact because they were taking other measurements such as weighing the babies. Ironically, the compliance rate of taking and recording the weight of a newborn was above 90%. Efforts to create more complementary schedules to reduce conflicting ENC tasks should be considered. Research in Rwanda has shown that infants that are hypothermic and admitted to the neonatal unit of a tertiary hospital had nearly double mortality compared to those who had normal temperatures [34]. Therefore, adequate thermal protection is a priority intervention [34].

A previous study showed that mothers who were educated and prepared on skin to skin contact before giving birth had better practice on performing the task [28]. In our study, only 19% of mothers were educated and counselled about immediate skin to skin contact before labor and this partially contributed to such low skin to skin contact practice. Immediate skin to skin contact is an important practice to reduce hypothermia in neonates [1]. This is particularly important to Gakoma District Hospital as hypothermia was one of the major causes of neonatal deaths at the hospital in 2016 [31]. A potentially important intervention is using Global Health Media Videos which have been shown to be effective at improving parental confidence and knowledge [35]. Improvement in assessing the temperature of neonates is needed as only 16% of the newborns were assessed, despite thermometers being available in the unit. Many midwives checked the baby's body temperature by just feeling their skin using their hands. Quality improvement projects that focus on the proper way of taking and recording the newborn's temperature should be initiated.

Immediate skin to skin contact should also be encouraged as it is associated with an increased rate in the initiation of exclusive breastfeeding [2]. Newborns can only start breastfeeding when exposed to the chest of the mothers. Our study showed only 44% of the mothers had initiated exclusive breastfeeding. The results provided evidence to support the recommendation to prepare and educate mothers on this topic. Another low compliance item was related to care of umbilical cords. Proper technique to tie umbilical cords can reduce fatal neonatal bleeding [9].

As suggested by other previous studies, factors affecting ENC compliance include staffing, supplies, health care providers' knowledge, skills and attitude, and information provided to the mothers [15, 17]. Our study results suggested similar barriers. It is important to address all these barriers in order to maximize the compliance rate. Some interventions may need more resources and time, such as installing functioning sinks with running water and purchasing identification bands or umbilical cord devices. Other issues related to ENC compliance could be addressed more immediately with minimum resources needed. For example, educating and counseling mothers to practice skin-to-skin care and how to identify neonatal danger signs at home such as poor feeding, fever, seizures, jaundice and apnea. A study conducted in Ethiopia reported an increase of 75% in ENC compliance when 456 mothers were educated and prepared along the journey of labor [33]. The study reported that

mothers who were informed and educated during delivery were more comfortable and helpful in the practice of ENC after discharge, especially the practice of ISSC and early and exclusive breastfeeding [1, 24, 33].

This study successfully measured the baseline compliance rate but does have a few limitations related to small sample size and a short period of data collection. Furthermore, the study was conducted in only one health facility so the results cannot be generalized to reflect the national compliance rate of ENC despite the result being similar to the reported national compliance rate in 2017 [2].

CONCLUSION

This study used a checklist to assess the level of compliance of midwives to the World Health Organisation's Essential Newborn Care guideline and found that the overall level of compliance was lower than the recommended 80%. The main areas of poor performance were identified in communication and education of the mothers about ENC practices, identification of newborns and disease prevention practices at birth. Based on the study results, we recommend that the hospital should look into purchasing smaller volume vaccines for single patient use and identification bracelets, as well as investing in refurbishing the hand washing infrastructure of the units. Quality improvement efforts improve systems around care of newborns should be undertaken, implemented and shared national to improve care.

REFERENCES

- [1] WHO (2018). Newborns: reducing mortality. Retrieved from www.who.int. Sep 2019
- [2] de Graft-Johnson J, Vesel L, Rosen HE, Rawlins B, Abwao S, Mazia G, Bozsa R, Mwebesa W, Khadka N, Kamunya R, Getachew A. Cross-sectional observational assessment of quality of newborn care immediately after birth in health facilities across six sub-Saharan African countries. *BMJ open*. 2017 Mar 1;7(3):e014680.
- [3] Devine S, Taylor G. Every Child Alive: The urgent need to end newborn deaths. Unicef; 2018.
- [4] Halim A, Dewez JE, Biswas A, Rahman F, White S, van den Broek N. When, where, and why are babies dying? Neonatal death surveillance and review in Bangladesh. *PLoS one*. 2016 Aug 1;11(8):e0159388.
- [5] Fink G. Benefits and Costs of the Infant Mortality Targets for the Post-2015 Development Agenda. *Prioritizing Development: A Cost Benefit Analysis of the United Nations' Sustainable Development Goals*. 2018 Jun 7;1990(2013):266.
- [6] Islam MK, Gerdtham UG, World Health Organization. The costs of maternal-newborn illness and mortality.
- [7] Musabirema P, Brysiewicz P, Chipps J. Parents perceptions of stress in a neonatal intensive care unit in Rwanda. *curatoris*. 2015;38(2):1-8.
- [8] World Health Organization. WHO recommendations on interventions to improve preterm birth outcomes.
- [9] WHO. Born Too Soon. The Global Action Report on Preterm Birth. Geneva: World Health Organization. 2012.
- [10] Blencowe H, Cousens S, Chou D, Oestergaard M, Say L, Moller AB, Kinney M, Lawn J. Born too soon: the global epidemiology of 15 million preterm births. *Reproductive health*. 2013 Nov;10(1):S2.
- [11] Lawn JE, Mongi P, Cousens S. Africa's newborns-counting them and making them count. Opportunities for Africa's newborns: practical data, policy and programmatic support for newborn care in Africa. 2006.
- [12] Hug L, Sharrow D, You D. Levels & trends in child mortality: report 2017. Estimates developed by the UN Inter-agency Group for Child Mortality Estimation.
- [13] Shah PS, Lui K, Sjörs G, Mirea L, Reichman B, Adams M, Modi N, Darlow BA, Kusuda S, San Feliciano L, Yang J. Neonatal outcomes of very low birth weight and very preterm neonates: an international comparison. *The Journal of pediatrics*. 2016 Oct 1;177:144-52.
- [14] Marchant T, Willey B, Katz J, Clarke S, Kariuki S, Ter Kuile F, Lusingu J, Ndyomugenyi R, Schmiedel C, Watson-Jones D, Schellenberg JA. Neonatal mortality risk associated with preterm birth in East Africa, adjusted by weight for gestational age: individual participant level meta-analysis. *PLoS medicine*. 2012 Aug 14;9(8):e1001292.
- [15] Tuyishime E, Park PH, Rouleau D, Livingston P, Banguti PR, Wong R. Implementing the World Health Organization safe childbirth checklist in a district Hospital in Rwanda: a pre-and post-intervention study. *Maternal health, neonatology and perinatology*. 2018 Dec;4(1):7.
- [16] Phillips R. The sacred hour: Uninterrupted skin-to-skin

contact immediately after birth. *Newborn and Infant Nursing Reviews*. 2013 Jun 1;13(2):67-72.

[17] Negussie BB, Hailu FB, Megenta AD. Knowledge and Practice of Essential Newborn Care and Associated Factors among Nurses and Midwives Working at Health Centers in Jimma Zone, Ethiopia, 2016. *J Nurs Care*. 2018;7(446):2167-1168.

[18] Majeed R, Memon Y, Majeed F, Shaikh NP, Rajar UD. Risk factors of birth asphyxia. *Journal of Ayub Medical College Abbotabad*. 2007;19(3):67-71.

[19] Ramasethu J. Prevention and treatment of neonatal nosocomial infections. *Maternal health, neonatology and perinatology*. 2017 Dec;3(1):5.

[20] Malhotra S, Zodpey SP, Vidyasagar AL, Sharma K, Raj SS, Neogi SB, Pathak G, Saraf A. Assessment of essential newborn care services in secondary-level facilities from two districts of India. *Journal of health, population, and nutrition*. 2014 Mar;32(1):130.

[21] Rosenthal VD, Guzman S, Safdar N. Reduction in nosocomial infection with improved hand hygiene in intensive care units of a tertiary care hospital in Argentina. *American journal of infection control*. 2005 Sep 1;33(7):392-7.

[22] Bang AT, Bang RA, Reddy HM, Deshmukh MD, Baitule SB. Reduced incidence of neonatal morbidities: effect of home-based neonatal care in rural Gadchiroli, India. *Journal of perinatology*. 2005 Mar 18;25(S1):S51.

[23] Berhe M, Medhaniye AA, Kahsay G, Birhane E, Abay M. Essential neonatal care utilization and associated factors among mothers in public health facilities of Aksum Town, North Ethiopia, 2016. *PloS one*. 2017 Apr 19;12(4):e0175902.

[24] Misgna HG, Gebru HB, Birhanu MM. Knowledge, practice and associated factors of essential newborn care at home among mothers in Gulomekada District, Eastern Tigray, Ethiopia, 2014. *BMC pregnancy and childbirth*. 2016 Dec;16(1):144.

[25] Saaka M, Ali F, Vuu F. Prevalence and determinants of essential newborn care practices in the Lawra District of Ghana. *BMC pediatrics*. 2018 Dec;18(1):173.

[26] Negussie BB, Hailu FB, Megenta AD. Knowledge and Practice of Essential Newborn Care and Associated Factors among Nurses and Midwives Working at Health Centers in Jimma Zone,

Ethiopia, 2016. *J Nurs Care*. 2018;7(446):2167-1168.

[27] Gomez PP, Nelson AR, Asiedu A, Addo E, Agbodza D, Allen C, Appiagyei M, Bannerman C, Darko P, Duodu J, Effah F. Accelerating newborn survival in Ghana through a low-dose, high-frequency health worker training approach: a cluster randomized trial. *BMC pregnancy and childbirth*. 2018 Dec;18(1):72.

[28] Berhe AK, Tinsae F, Gebreegziabher G. Knowledge and practice of immediate newborn care among health care providers in eastern zone public health facilities, Tigray, Ethiopia, 2016. *BMC pediatrics*. 2017 Dec;17(1):157.

[29] Aluvaala J, Nyamai R, Were F, Wasunna A, Kosgei R, Karumbi J, Gathara D, English M. Assessment of neonatal care in clinical training facilities in Kenya. *Archives of disease in childhood*. 2015 Jan 1;100(1):42-7.

[30] American Academy of Pediatrics. (2014). *Essential care for Every Baby Parent Guide* (Vol. 24). Retrieved from <http://www.bokus.com/bok/9780281058532/essential-care/>

[31] Ministry of Health, R. of R. (2016). *Annual Health Statistics Booklet 2016*. Retrieved from http://www.moh.gov.rw/fileadmin/user_upload/HMIS/2016_Annual_Statistical_booklets_V7_22_02_2018.pdf

[32] USAID/Jhpiego (2017). *Essential Newborn Care checklist, the latest version available on* <https://www.usaidassist.org/sites/assist/files/enc-at-birth-checklist-uganda-mnch-facility-colaborative.pdf>.

[33] Berhea TA, Belachew AB, Abreha GF. Knowledge and practice of Essential Newborn Care among postnatal mothers in Mekelle City, North Ethiopia: A population-based survey. *PloS one*. 2018 Aug 22;13(8):e0202542.

[34] Fedine Urubuto, Faustine Agaba, Jaesok Choi, Raban Dusabimana, Raissa Teteli, Muzungu Kumwami, Craig Conard, Cliff O'Callahan & Peter Cartledge (2019) Prevalence, risk factors and outcomes of neonatal hypothermia at admission at a tertiary neonatal unit, Kigali, Rwanda – a cross-sectional study, *The Journal of Maternal-Fetal & Neonatal Medicine*, DOI: 10.1080/14767058.2019.1671334

[35] Global Health Media (n.d) 20 videos on Essential Newborn Care: <https://globalhealthmedia.org/videos/>