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Knowledge and Practice in Emergency Obstetric and Neonatal Care (EmONC) Providers in Kinshasa, Democratic Republic of Congo

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Abstract

Context: Maternal and newborn mortality remains a public health concern worldwide. Although its ratio decreased by around 44% from 1990 to 2015, this rate remains high in developing regions, particularly in sub-Saharan Africa. **Objectives**: To evaluate the level of knowledge and practice of Emergency Obstetric and Neonatal Care (EmONC) of health providers in maternity hospitals in Kinshasa and to identify the causes of the non-practice of EmONC. **Methods**: A descriptive study was conducted from September 1, 2016 to January 31, 2017 in 21 medical facilities drawn from the 6 health districts of the city of Kinshasa. We analyzed data obtained by interviewing 675 healthcare providers from different professional categories working in gynecology departments and in delivery rooms. The 50% acceptability criterion was set to assess their knowledge and practice. **Results**: Among the providers, 385 of them (57%) had already heard of EmONC and most of them were general practitioners with a rate of 55.8% of all participants, but specialists were the ones who defined them well. Supervision by trained colleagues was the main source of information on EmONC with 32.5%, while structured training only concerned 24% of our providers and 43% of providers had no training in EmONC. The level of knowledge was deemed satisfactory with 56.4% for the whole population but below the average for general practitioners. 32.2% of our sample did not practice the EmONC and the lack of training was the main reason for this non-practice. **Conclusion**: EmONC as a strategy

in the fight against maternal mortality is not known. Its functions are known within the framework of basic training and current practice. Structured training only concerned 24% of our service providers and 43% of them had no training in EmONC.

Keywords

Obstetric and Neonatal Care, Emergency, Maternity, Kinshasa

1. Introduction

Maternal and neonatal mortality continues to be a major public health concern in most low-income countries [1]. The strategy to fight this scourge is based on three pillars, namely family planning (FP), antenatal care and skilled delivery assistance, as well as Emergency obstetric and neonatal care (EmONC) [2].

According to WHO, UNFPA, UNICEF and Adverting Maternal Death and Disability (AMDD), in 2011, achieving the Sustainable Development Goals (SDGs) requires a strong health system able to provide good quality essential services. Therefore, to reduce maternal mortality, there must be emergency obstetric care (EOC) services and all women should have the opportunity to access them. Although FP and the presence of a qualified nursing staff during childbirth are important in reducing maternal and neonatal mortality, EmONC has a decisive role in the onset of obstetric complications during pregnancy, childbirth, postpartum and to save the life of the child during childbirth [3].

As part of the H4 + initiative bringing together the organizations of the United Nations system (WHO, UNICEF, UNFPA, UNAIDS, WB), launched in 2009 in the DRC, a roadmap was drawn up in order to foster the decrease in maternal and neonatal mortality, and the promotion of quality EmONC was one component.

The National Reproductive Health Program (PNSR) received technical and financial assistance from UNFPA, which enabled the country to provide four EmONC training modules: facilitator module, monitoring and supervision guide, provider module, pre and post test guide following the new methodological approach including practice through the use of mannequins. In the provinces, the PNSR organized training sessions in EmONC in order to strengthen the technical capacities of health training providers [4].

Since the launch of the popularization of EmONC in the DRC, only EmONC needs assessment surveys have been carried out in the country. Among them, we can list the survey carried out in March 2010, in Kongo central (health zones of Matadi, Nzanza and Mbanza), by a joint H4 + Initiative mission and Ministry of Public Health; the one of June 2011, carried out by UNFPA-RDC in the health zones of Binza Ozone, Mont Ngafula II and Nsele in Kinshasa [4]; the survey carried out in April 2011 in the province of Kwango (health zones of Kwango, Kenge and Mosango) and in Kinshasa [5] as well as the survey carried out by the School of Public Health (ESP) in Kinshasa, in three provinces of the DRC (Kin-

shasa, Bas-Congo and Bandundu) and reported in 2012.

These various surveys have shown that there are only a very small proportion of the structures having the capacity to ensure the EmONC correctly. And among factors that prevent progress were the disparity and verticalization of essential maternal and newborn care interventions. This justified the need and the urgency of developing a body of integrated standards and guidelines for these interventions, in line with the sector strategy, which would be used to build the capacities of healthcare providers.

Evaluating the effectiveness of EmONCs in reducing maternal and neonatal morbidity and mortality requires a good level of knowledge and, above all, good practice of EmONCs by healthcare providers. However, no survey has assessed the level of knowledge and practices of providers in EmONC, essential prerequisites for their effectiveness. To fill this gap, we initiated this study aiming to assess the level of knowledge and practice of EmONC among healthcare providers in Kinshasa Hospitals and Maternities; and also to identify the causes of a poor level of knowledge and practice in the EmONC.

2. Methods

This descriptive study took place from September 1, 2016 to January 31, 2017 in 21 health facilities, chosen by lot in the 6 health districts of the City-Province of Kinshasa (Gombe, Funa, Kalamu, Lukunga, N'djili and Nsele). The health facilities concerned were Barumbu Mother and Child Center, Ngaliema Clinic, Vijana Reference Health Center, Ngiri Ngiri State Hospital Center, Bumbu Mother and Child Center, Mama Pamela State Hospital Center, University Clinics of Kinshasa, Ngaba Mother and Child Center, Camp Kabila Health Center, Saint Gabriel Hospital Center, Saint Joseph Hospital, Esengo Maternity, Kintambo Maternity, Kokolo Central Military Hospital, Kitokimosi Reference Health Center, King Baudouin General Reference Hospital, Mokali Reference Health Center, Kikimi Reference Health Center, Maluku General Reference Hospital, Major Leka Health Center, Etonga Health Center. The choice was also based on the high number of deliveries performed there and/or the ability of medical and paramedical staff to participate in research.

Our simple random sample consisted of 675 providers recruited from among 1069 assigned in the delivery rooms of the above-mentioned 21 health structures. Providers who agreed to be part of the study and answer the questionnaire were included in this study. Those who did not respond to the questionnaire were excluded. Data for the study were collected by interview with providers and their responses transcribed on the data collection sheets. The variables collected were related to the characteristics of the providers (qualification, level of study) and the EmONCs (general knowledge of the EmONCs, *i.e.* having heard of the EmONCs and the source of information, knowledge of the different EmONC B and EmONC C functions, the actual practice of the different EmONC functions as well as the possible reasons for the non-practice of these EmONC functions).

Knowledge about the EmONCs refers to having heard of, being trained on,

and being able to cite the functions of the EmONCs. Was considered as trained in EmONC, any service provider having followed a structured training in EmONC or having been supervised by a trained colleague; and was considered to be properly practicing the EmONC functions, any provider capable of practicing the 9 EmONC functions at the time of obstetric and neonatal emergencies management. The level of knowledge about the EmONC expressed in % was evaluated by the ratio between the number of provider having followed a structured training in EmONC and that of the providers supervised by colleagues trained on the total number of the providers having heard of the EmONC.

The level of practice of EmONC functions expressed in % was evaluated by the total number of providers who recognized practicing these functions out of the number of providers who heard of EmONC. For each parameter evaluated, a score was given. The acceptability threshold was set at 50%. Knowledge and practice rates were found to be satisfactory if they reached or exceeded 50%. They were judged to be mediocre if they did not reach 50% [6].

Data analysis

Data were verified, numbered and entered using Microsoft Office Excel® 2007 software; then exported to SPSS (Statistical Package for Social Sciences) version 21.0 for appropriate statistical analyzes. The results were presented within tables; the qualitative variables were summarized in proportions and the quantitative variables in averages with their standard deviations.

For ethical concerns, after approval from the ethics committee of the Department of Gynecology and Obstetrics of the University Clinics of Kinshasa, an informed consent of the providers was required before carrying out the interview. The data was collected in full confidence and processed anonymously.

3. Results

A total of 675 providers recruited from among 1069 assigned in the delivery rooms of the above-mentioned 21 health structureswere included in this study. The provider's participation rate in our study was 63%. The Kalamu health district had the highest participation with 24.6% while Kintambo Maternity of the Lukunga district was the most represented structure with 12.7%, followed by Ngiri Ngiri SHC (Funa) with 11.1% and Barumbu MCC (Gombe) with 10.2% (**Table 1**).

The majority of providers questioned (56.6% were general practitioners, followed by birth attendant with 26.5%. In relation to the number of years practicing in the delivery room, the majority of our population, 48.4%, had at least four years of experience (**Table 2**). Seven structures had providers of all qualifications, these are Kintambo Maternity, Ngiri Ngiri SHC, MCC of Barumbu, UCK, Saint Gabriel Hospital, Mama Pamela SHC and Ngaliema Clinic (**Table 3**).

When asked about their knowledge of the EmONC, that is to say if they had heard of the EmONC and the source of information, it emerged that the following

Table 1. Distribution of the population in hospital structures.

Health district	Hospital structures	n (675)	%	n (675)	%
Gombe	Barumbu MCC	69	**10.2**	122	18.1
	Ngaliema Clinic	28	4.1		
	Vijana RHC	25	3.7		
Funa	Ngiri Ngiri SHC	75	**11.1**	156	23.1
	Bumbu MCC	46	6.8		
	Mama Pamela SHC	35	5.2		
	UCK	46	6.8		
Kalamu	Ngaba MCC	42	6.2	166	24.6
	Camp Kabila HC	36	5.3		
	Saint Gabriel Hospital	25	3.7		
	Saint Joseph Hospital	10	1.5		
Lukunga	Esengo Maternity	7	1	151	22.4
	Kintambo Maternity	86	**12.7**		
	Kokolo CMH	42	6.2		
	Kitokimosi RHC	23	3.4		
N'djili	King Baudouin GRH	29	4.3	63	9.3
	Mokali RHC	21	3.1		
	Kikimi RHC	13	1.9		
Nsele	Maluku GRH	11	1.6	17	2.5
	Major Leka HC	3	0.4		
	Etonga HC	3	0.4		

CMH: Central Military Hospital; GRH: General Reference Hospital; HC: Health Center; MCC: Mother and Child Center; RHC: Reference Health Center; SHC: State Hospital Center; UCK: University Clinics of Kinshasa

Table 2. Qualifications and years of experience of providers in the delivery room.

Characteristics	n (675)	%
Qualifications of providers		
Obstetrician-gynecologist	14	2.1
General practitioner	382	**56.6**
Birth attendant	179	26.5
Midwife	100	14.8
Year of experience in the delivery room (year)		
1	149	22.1
2	105	15.6
3	94	13.9
≥4	327	**48.4**

Table 3. Number of providers according to their qualification in health facilities.

Medical structure	n	Obstetrician-gynecologist		General practitioner		Birth attendant		Midwife	
Camp Kabila HC	36	-	-	22	***61.1%***	8	22.2%	6	16.7%
Kokolo CMH	42	-	-	17	40.5%	**23**	***54.8%***	2	4.8%
Ngiri Ngiri SHC	**75**	2	2.7%	**46**	**61.3%**	**25**	33.3%	2	2.7%
Barumbu MCC	**69**	1	1.4%	**49**	***71%***	10	14.5%	9	13%
Bumbu MCC	46	-	-	29	***63%***	8	17.4%	9	19.6%
Ngaba MCC	42	-	-	29	***69%***	6	14.3%	7	16.7%
Ngaliema Clinic	28	1	3.6%	7	25%	2	7.1%	**18**	***64.3%***
UCK	46	**3**	***6.5%***	29	***63%***	11	23.9%	3	6.5%
Etonga HC	3	-	-	-	-	2	***66.7%***	1	33.3%
Saint Joseph Hospital	10	-	-	9	***90%***	-	-	1	10%
Kitokimosi RHC	23	1	4.3%	13	***56.5%***	9	39.1%	-	-
Kikimi RHC	13	-	-	5	***38.5%***	4	30.8%	4	30.8%
Major Leka HC	3	-	-	-	-	3	***100%***	-	-
Maluku GRH	11	-	-	6	***54.5%***	3	27.3%	2	18.2%
Esengo Maternity	7	-	-	-	-	5	***71.4%***	2	28.6%
Kintambo Maternity	**86**	**3**	3.5%	**49**	***57%***	**21**	24.4%	**13**	15.1%
Mokali RHC	21	-	-	4	19%	12	***57.1%***	5	23.8%
Mama Pamela SHC	35	1	2.9%	26	***74.3%***	4	11.4%	4	11.4%
King Baudouin GRH	29	-	-	16	**55.2%**	8	27.6%	5	17.2%
Saint Gabriel Hospital	25	2	**8%**	10	***40%***	10	***40%***	3	12%
Vijana RHC	25	-	-	16	**64%**	5	20%	4	16%
Total	675	14	2.1%	382	***56.6%***	179	26.5%	100	14.8%

CMH: Central Military Hospital; GRH: General Reference Hospital; HC: Health Center; MCC: Mother and Child Center; RHC: Reference Health Center; SHC: State Hospital Center; UCK: University Clinics of Kinshasa.

structures: Etonga HC (100%); Esengo maternity (100%); Kikimi RHC (82.9%); Saint Joseph Hospital (90%); Mama Pamela SHC (82.9%); UCK (82.6%); King Baudouin GRH (86.2%) had the highest rates of providers with information on the EmONC. Also, 6 structures presented significant frequencies of the workforce who had not heard of the EmONC. These were Kokolo CMH with 71.4%, Kintambo Maternity with 72.1%, Vijana RHC with 60%, Kitokimosi RHC with 60.9%, Ngaba MCC with 59.5% and finally Ngiri Ngiri SHC with 56% (Table 4). As for the source of information, the majority of gynecologists and obstetricians (54.5%) had learned the EmONC during a structured training, general practitioners and midwives had heard of EmONC by word of mouth while the majority

Table 4. Distribution of providers according to health facilities and possession of information on the EmONC.

Medical structure	Heard about EmONC		Total
	Yes	No	
Camp Kabila HC	27 (75%)	9 (25%)	36
Kokolo CMH	12 (28.6%)	30 **(71.4%)**	42
Ngiri Ngiri SHC	33 (44%)	42 **(56%)**	75
Barumbu MCC	41 (59.4%)	28 (40.6%)	69
Bumbu MCC	33 (71.7%)	13 (28.3%)	46
Ngaba MCC	17 (40.5%)	25 **(59.5%)**	42
Ngaliema Clinic	14 (50%)	14 (50%)	28
UCK	**38 (82.6%)**	8 (17.4%)	46
Etonga HC	**3 (100%)**	-	3
Saint Joseph Hospital	**9 (90%)**	1 (10%)	10
Kitokimosi RHC	9 (39.1%)	14 **(60.9%)**	23
Kikimi RHC	**12 (92.3%)**	1 (7.7%)	13
Major Leka HC	2 (66.7%)	1 (33.3%)	3
Maluku GRH	9 (81.8%)	2 (18.2%)	11
Esengo Maternity	**7 (100%)**	-	7
Kintambo Maternity	24 (27.9%)	62 **(72.1%)**	86
Mokali RHC	16 (76.2%)	5 (23.8%)	21
Mama Pamela SHC	**29 (82.9%)**	6 (17.1%)	35
King Baudouin GRH	**25 (86.2%)**	4 (13.8%)	29
Saint Gabriel Hospital	15 (60%)	10 (40%)	25
Vijana RHC	10 (40%)	15 **(60%)**	25
Total	385 (57%)	290 (43%)	675

CMH: Central Military Hospital; GRH: General Reference Hospital; HC: Health Center; MCC: Mother and Child Center; RHC: Reference Health Center; SHC: State Hospital Center; UCK: University Clinics of Kinshasa.

of midwives had been supervised by colleagues trained with 45.6%. The following health facilities had at least half of the providers trained in a structured way in EmONC, these are Etonga HC with 66.7%, Major Leka HC with 50% and Kintambo Maternity with 50% (Table 5).

The 385 providers who had already heard of the EmONCs, when asked about the different functions making up the EmONCs B and C, it appeared that the assessment of knowledge of the different functions of the EmONCs by providers gave very low scores ranging from 30% to 49.4%. Lesser known functions include

Table 5. Distribution of providers according to medical structures and according to the source of information on the EmONC.

Medical structure	n (385)	Sources of information on EmONC			
		Structured training in EmONC	Supervision by trained colleagues	Self-observation training	Heard of word of mouth
Camp Kabila HC	27	4 (14.8%)	3 (11.1%)	14 (51.9%)	6 (22.2%)
Kokolo CMH	12	4 (33.3%)	-	3 (25.0%)	5 (41.7%)
Ngiri Ngiri SHC	33	6 (18.2%)	12 (36.4%)	3 (9.1%)	12 (36.4%)
Barumbu MCC	41	13 (31.7%)	11 (26.8%)	5 (12.2%)	12 (29.3%)
Bumbu MCC	33	11 (33.3%)	8 (24.2%)	3 (9.1%)	11 (33.3%)
Ngaba MCC	17	3 (17.6%)	1 (5.9%)	1 (5.9%)	12 (70.6%)
Ngaliema Clinic	14	3 (21.4%)	1 (7.1%)	1 (7.1%)	9 (64.3%)
UCK	38	5 (13.2%)	18 (47.4%)	3 (7.9%)	12 (31.6%)
Etonga HC	3	**2 (66.7%)**	1 (33.3%)	-	-
Saint Joseph Hospital	9	1 (11.1%)	3 (33.3%)	2 (22.2%)	3 (33.3%)
Kitokimosi RHC	9	2 (22.2%)	1 (11.1%)	4 (44.4%)	2 (22.2%)
Kikimi RHC	12	2 (16.7%)	9 (75%)	1 (8.3%)	-
Major Leka HC	2	**1 (50%)**	1 (50%)	-	-
Maluku GRH	9	1 (11.1%)	2 (22.2%)	-	6 (66.7%)
Esengo Maternity	7	2 (28.6%)	4 (57.1%)	1 (14.3%)	-
Kintambo Maternity	24	**12 (50%)**	8 (33.3%)	-	4 (16.7%)
Mokali RHC	16	4 (25%)	7 (43.8%)	5 (31.3%)	-
Mama Pamela SHC	29	8 (27.6%)	16 (55.2%)	1 (3.4%)	4 (13.8%)
King Baudouin GRH	25	4 (16%)	15 (60%)	3 (12%)	3 (12%)
Saint Gabriel Hospital	15	1 (6.7%)	2 (13.3%)	1 (6.7%)	11 (73.3%)
Vijana RHC	10	3 (30%)	2 (20%)	-	5 (50%)
Total	385	92 (23.9%)	125 (32.5%)	51 (13.2%)	117 (30.4%)

CMH: Central Military Hospital; GRH: General Reference Hospital; HC: Health Center; MCC: Mother and Child Center; RHC: Reference Health Center; SHC: State Hospital Center; UCK: University Clinics of Kinshasa.

cesarean section, assisted delivery, blood transfusion, administration of anti-convulsants and removal of uterine debris. Specialists have better knowledge of all functions while general practitioners and midwives have low scores for all functions and midwives have acceptable scores for 3 of the 9 functions (Table 6). The level of knowledge of the EmONC in the surveyed health facilities was 56.4%. Considering qualification of providers, this level of knowledge was 75.6% for Birth attendant, 63.6% for gynecologists, 59.4% for midwives and 46.9% for general practitioners.

From the questioning of providers on their practice of the different EmONC functions, it emerged that, in general, the different functions of the EmONC are practiced satisfactorily by all professional categories with scores well above the

average except for assisted delivery which is better performed only by specialists with a score of 81.8% while the scores for the other categories have fluctuated between 30.2% and 48.9% (Table 7).

Reasons mentionned by providers sustaining/explaining the non-practice of the EmONC were the fact of having never heard of it, no training, training but technique not mastered, training but materials not available or other reasons depending on the function. With a non-practice score of 43.2%, the lack of training was the main reason cited by all providers to justify the non-practice of the EmONC. Note that for the caesarean, in addition to the lack of training, the non-practice was also justified by the non-mastery of the technique while the unavailability of materials explained the non-practice of assisted delivery (Table 8).

Table 6. Knowledge of the various EmONC functions according to the qualifications of the service providers.

Knowledge of EmONC Fx	Obstetrician-gynecologist	General practitioner	Birth attendant	Midwife	**Total**
IV-IM antibiotics	**54.5%**	**45.6%**	**50%**	**59.4%**	**49.4%**
Oxytocic administration	72.7%	35.8%	44.4%	**52.2%**	**41.8%**
IV-IM anticonvulsants	72.7%	29.8%	32.2%	44.9%	**34.4%**
Manual placenta extraction	72.7%	33%	40%	46.4%	**38.2%**
Evacuation of uterine debris	72.7%	32.1%	32.2%	46.4%	**35.8%**
Forceps-suction assisted delivery	**63.6%**	27%	25.6%	40.6%	**30.1%**
Basic NN resuscitation	72.7%	33.5%	41.1%	**52.2%**	**39.7%**
Cesarean section	72.7%	34.4%	31.1%	30.4%	**30%**
Blood transfusion	72.7%	30.7%	33.3%	37.7%	**33.8%**

Table 7. EmONC practice according to the qualification of the service provider.

EmONC Fx Practice	Obstetrician-gynecologist	General practitioner	Birth attendant	Midwife	**Total**
In general	**81.8%**	**60%**	**74.4%**	**81.2%**	**67.8%**
IV-IM antibiotics	90.9%	92.1%	93.3%	100%	93.8%
Oxytocic administration	100%	96.3%	98.9%	94.2%	96.6%
IV-IM anticonvulsants	100%	94.9%	96.7%	98.6%	96.1%
Manual placenta extraction	90.9%	92.6%	92.2%	88.4%	91.7%
Evacuation of uterine debris	100%	94.4%	93.3%	94.2%	94.3%
Forceps-suction assisted delivery	81.8%	**30.2%**	**48.9%**	**48.5%**	**39.3%**
Basic NN resuscitation	100%	92.1%	96.7%	97.1%	94.3%
Cesarean section	100%	85.1%	78.9%	78.3%	82.9%
Blood transfusion	100%	96.3%	100%	98.6%	97.7%

Table 8. Reasons for the impracticality of EmONC functions.

Reasons for non-practice of EmONC fx	IV-IM antibiotics	IV-IM anticonvulsants	Manual placenta extraction	Evacuation of uterine debris	Forceps-suction assisted	Basic NN resuscitation	Cesarean section	Blood transfusion	Average% of the population having advanced the reason
Never heard of it	12.5	6.7	9.4	4.5	2.1	-	-	-	4.4
No training	**33.3**	**60**	**59.4**	**36.4**	**28.8**	**77.3**	**35.2**	15.4	**43.2**
Training but technique not mastered	4.2	-	18.8	18.2	13.6	18.2	**40.8**	**38.5**	19.04
Training but materials not available	-	-	3.1	13.6	**24.7**	4.5	4.2	7.7	7.2
Other reasons	**50**	**33.3**	9.4	**27.3**	**30.9**	-	19.7	**38.5**	26.1

4. Discussion

EmONC are a hot topic and one of the main strategies in the tackling maternal and child mortality. The majority of maternal deaths are preventable because the prevention and care solutions recommended by the WHO are well known, namely, access to antenatal care during pregnancy; skilled delivery assistance; postpartum care and support. Let's remember that maternal and newborn health is closely linked.

To achieve the objectives set in reducing maternal and infant mortality, WHO relies on the training of providers in the various control strategies and recommends the effective implementation of these strategies wherever needed.

Our study is in line with these recommendations, it assessed the knowledge of providers, all categories combined, on the EmONC in the 6 health districts and most frequented medical institutions.

According to the report by the Sanofi foundation in February 2015 [7], 40% of women do not receive prenatal care and almost half of childbirth takes place at home without qualified assistance; despite the fact that WHO recommends a midwife trained to care for 500 mothers around the world, to date we have about 350,000 midwives around the world.

These statistics highlight the importance of training in reducing maternal mortality. Unfortunately, we have a low rate of providers trained in EmONC, one of the recommended control strategies these days. The majority of work on the EmONC relates to the assessment of the needs in EmONC and not on the knowledge of the EmONC and their practice by the providers supposed to administer this care.

We were able to find some work showing the provider's impact in reducing maternal mortality. This is the case with the study by Storeng *et al.* [8] in 2012, which showed that undiagnosed obstetric complications were often associated with poor follow-up, which led to deaths. Dogba *et al.* [9] in 2011, found a posi-

tive relationship between the presence of a doctor in a health center and the survival of parturients with obstetric emergencies. They found that the proportions of women who survived differed from center to center depending on the teams of providers.

For example, a team of 3 healthcare providers without doctors had a patient survival rate of around 67.8%; a health center without a doctor but having more than 3 providers had a 76% survival rate; whereas a center where only one doctor worked, the survival rate was 73.7%. It emerges from these data that the level of qualification of healthcare providers has a real influence on the quality of patient care.

In our study, the level of knowledge of the EmONC in the surveyed health facilities was 56.4%. The acceptability threshold being fixed at 50%, this knowledge rate was deemed satisfactory for the whole population. But considering the qualification of providers, this level of knowledge is considered mediocre for general practitioners (46.9%) compared to the other categories (Gynecologists, Midwives and midwives) respectively 63.6%, 75.6% and 59.4%.

This could be explained by the fact that most of the training in EmONC, organized in favor of primary level structures (health center and referral health center) mostly involve paramedical staff (birth attendant and midwives) but also, there is a lack of interest from general practitioners when they are required for these kind of training.

Add to this, the fact that training campaigns on EmONC are mainly aimed at the staff of delivery rooms which, in most maternity wards, consists mainly of birth attendant or midwives. We also noted that the level of knowledge of the EmONC was poor in most of the health structures belonging to the districts of Kalamu (Bumbu MCC, Camp Kabila HC, Saint Gabriel and Saint Joseph Hospital) and Lukunga (Kokolo CMH and Kitokimosi RHC). This could be explained by the high participation of these two districts in our series. We have not found, within the limits of the literature we had consulted to carry out this work, studies devoted exclusively to global knowledge in EmONC.

Only studies on the different functions considered separately and, especially on the needs in EmONC were found. This is the study by Boni-Cisse *et al.* [10] carried out in 2006, on the evaluation of knowledge and practical attitudes in nosocomial infections, which found a knowledge rate of 79.8%; Ekouya-Boyasa *et al.* [11], in a study on the knowledge and practice of neonatal resuscitation, conducted in 2013, autors found that the rate of knowledge of the theoretical stages of neonatal resuscitation was 64.6%; Ndandu, in a study on the evaluation of knowledge on Active Management of the 3rd Period of childbirth, in 2013, found that 83.7% of providers had a good knowledge of GATPA [6]. Our rate of 56.4% is much lower than those reported by these different authors. We think that they cannot be compared because our study evaluated the EmONC globally while the others have the EmONC functions individually.

If the level of knowledge of the EmONC was judged satisfactory on the whole, it is less than the level of knowledge of the EmONC functions taken separately.

In fact, only 44.7% and 36.6% of the providers evaluated respectively knew what EmONC B and EmONC C meant. These low knowledge rates lead us to note the non-benefit drawn by providers from the training received. This is further confirmed by the low rates of around 27.3% and 25.5% of the correct definition of EmONC B and EmONC C.

The midwives were the providers who succeeded better in giving the correct definition of the EmONC B and EmONC C. We believe that this performance is due to the fact that the EmONC B are applied in the basic structures, essentially held by the paramedics whose midwives and that the latter are often involved in training in this area. But also, the EmONC module is currently included in the training course for this category of service providers.

We found that the overall knowledge of EmONC and that of its B and C components was poor, while the overall level of knowledge of the various EmONC functions was satisfactory in all categories of providers (54.5% of Gynecologist Doctors, 50% of birth attendant and 59.4% of midwives) except in the category of General Practitioners where this level of knowledge was considered mediocre (45.6%). But when we considered the knowledge of each EmONC function according to the qualification of the providers, we realized that gynecologists had a satisfactory level of knowledge on all the functions, in particular 54.5% for parenteral administration (IV/IM) antibiotics, 63.6% for vacuum assisted delivery and forceps and 72.7% for each of the other functions. We believe that this performance is probably linked to the training of a high level in the curriculum of this category of providers (specialists)

The level of knowledge on all EmONC functions was judged to be poor in the category of General Practitioners testifying, as we noted above, of their likely disinterestedness as they are less involved when they are asked for training punctual organized for primary level structures, unlike birth attendant and midwives.

But when we assessed the level of knowledge of each function in the two categories targeted by training in EmONC, we realized that the birth attendant had satisfactory knowledge on only one of the 9 EmONC functions, especially parenteral administration of antibiotics with 50% while midwives had satisfactory knowledge in two functions: parenteral administration of antibiotics (59.4%) and basic neonatal resuscitation (52.2%). It is therefore necessary to ask questions about the effectiveness of training campaigns in EmONC by reflecting on the quality of the providers to be trained and the implementation methodology in order to make these training courses more efficient.

Of the 385 providers who have heard of EmONC, 261 said they regularly practice the various EmONC functions. Which gives us a practice rate of 67.8%. Analysis of the results shows that all categories of providers, according to their qualification, regularly perform these EmONC functions with rates between 60% for general practitioners and 81% for gynecologists and midwives. This high rate of practice, which contrasts with the level of knowledge on the different EmONC functions, noted across different categories of providers, could be explained by

the fact that the EmONC functions are acts taught and practiced for a long time by providers in the daily exercise of their profession. But many providers do not recognize them as part of a structured whole that are the EmONC.

It emerged from this study that vacuum assisted or forceps delivery was the least performed function. This is justified in our opinion by the fact that some maternities in our environment prohibit the use of these instruments in the practice of childbirth because of the complications they can yield but also following a lack of practical experience of the majority providers in our community on their use. This raises the concern of theoretical and above all practical teaching of instrumental delivery. We believe that an objective evaluation of the practice of EmONC functions in our maternity wards is necessary to ensure the effectiveness and efficiency of their practice according to standards.

In our study, of the 385 providers who had heard of the EmONC, only 124 or 32.2% did not practice the different functions. The majority of which 86 (69.4%) was made up of general practitioners with 40%. In the other three categories, there were only 18.2% to 25.6% of providers who did not practice the different EmONC functions. This is another proof of the lesser involvement of General Practitioners in training in EmONC. Moreover, the fact that doctors are in a minority in delivery rooms, the selection for training aimed more at nurses and midwives. We also noted that the administration of uterotonics was the only function performed by all providers. To explain the non-practice of the EmONC functions, 43.2% of the providers cited as a reason the lack of training, 7.2% the lack of equipment, 1.05% the lack of mastery and 26.1% various other reasons.

The limit of this study was that the assessment of EmONC practice was theoretical. But nevertheless, it is the first study which analyzes the overall knowledge in EmONC in all professional categories; it insists on training and evaluation in the fight against maternal and perinatal mortality; and it provides valuable information for the EmONC training schedule.

5. Conclusion

The EmONC, as a strategic package in the tackling maternal and perinatal mortality, is very less known to providers. Its functions are better known in the context of current practice and training rather than in the structured framework of EmONCs. Structured training only concerned 24% of respondents and 43.6% had no training in EmONC. Parenteral antibiotic administration was the best known function, unlike assisted delivery, which was the least known and practiced.

Author Contributions

All authors contributed to data analysis, drafting and revising the paper and they agreed to be accountable for all aspects of the work.

Conflicts of Interest

The authors report no conflict of interest in this work.

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