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CLINICAL ARTICLE

Obstetric competence among referral healthcare providers in Mali

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ABSTRACT

Objective: To determine the factors associated with obstetric competency and clinical practice among obstetric care providers in referral health centers in Mali. *Methods:* The present cross-sectional study was conducted between March and May 2012 among 140 obstetric care providers (obstetric nurses, midwives, and physicians) working in referral health centers in Mali. Emergency obstetric care knowledge and skills were evaluated with clinical vignettes developed using national Malian guidelines. The vignettes covered 5 areas of emergency obstetric care, and the results were used to generate a competency score. A backward stepwise random-effects model using a maximum likelihood estimator was applied to evaluate variables independently associated with competency score. *Results:* Out of 100, the mean ± SD score was 57.8 ± 11.2 for obstetric nurses, 66.4 ± 14.7 for midwifes, and 78.6 ± 13.4 for physicians ($P < 0.001$). Three variables were significantly associated with a higher competency score: professional qualification, working in an urban setting, and working in a health center with a smaller number of obstetric care providers. *Conclusion:* Increasing the in-service training of both rural staff and lower-level healthcare workers working in larger health centers via facility-based maternal death reviews might help to improve clinical practice and maternal health outcomes.

1. Introduction

High rates of maternal mortality and morbidity persist in Sub-Saharan Africa, and progress in this area has been poor. Reducing these rates is the aim of the fifth Millennium Development Goal, which—as is now clear—will not be attained in this region of the world [1]. Although reducing maternal mortality and morbidity is feasible, it remains a major challenge in Sub-Saharan Africa, where healthcare systems are weak, and the availability and quality of care are heterogeneous and often inadequate [2–4]. The human resource crisis faced by many health systems in low-resource countries is characterized both by an insufficient number of staff and by a shortage of skills among existing healthcare workers. Furthermore, the competency of so-called "skilled birth attendants" has seldom been studied [5].

In Mali, the obstetric competence of healthcare providers at the community level can be deficient [6], increasing the risk of obstetric complications and delaying the timely referral of women to referral health centers, where comprehensive emergency obstetric and neonatal care (EmONC) can be provided. Referral health centers have more advanced technologic platforms compared with community health centers (CHCs), and obstetric care therein is provided by personnel with specialized obstetric training including physicians with surgical skills (e.g. for cesarean delivery), midwives, obstetric nurses, and nurse anesthetists [7]. Obstetric nurses undergo 3 years of specialized training after primary school, midwives undergo 3 years of (different) specialized training after the Malian baccalaureate diploma, and physicians undergo 7 years of medical training after the baccalaureate diploma.

Although the degree of specialization of healthcare providers can explain some of the variation in competency and clinical practice, assessment by title alone can result in gross mischaracterization [8]. Contextual factors such as the availability of equipment and supplies, the skills of surrounding coworkers, workload, access to clinical guidelines, feedback, and leadership might also influence a worker's level of knowledge and skills. Knowing the influence of such institutional factors on competency and clinical practice might have the potential to improve maternal and neonatal outcomes by enhancing practice settings.

The aim of the present study was to determine the factors associated with competency and clinical practice among obstetric care providers in referral health centers in 2 regions in Mali. In a separate study [6], the competency of primary healthcare workers has been assessed in CHCs in the same districts of Mali.

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2. Materials and methods

The present cross-sectional survey was conducted among obstetric care workers in 9 referral health centers in 2 regions in Mali, the Kayes region and the capital Bamako, between March 1 and May 31, 2012. The study was approved by the ethics committees of the Research Centre of the University of Montreal Hospital, Montreal, Canada, and the Faculty of Medicine, Pharmacy and Odonto-Stomatology of the University of Bamako, Bamako, Mali. Informed consent was obtained from all participants.

For the study, referral health centers were selected in districts corresponding to those of a previous survey at the CHC level [6]. Respondents were thus recruited in the Kayes regional hospital, in 7 "Centres de Santé de Référence" in the Kayes region, and in 1 "Centre de Santé de Référence" in the capital Bamako. In each center, all staff involved in maternal healthcare who had performed at least 1 delivery in the previous month were recruited.

EmONC competency was evaluated via a test consisting of clinical vignettes (Supplementary Material S1), which were developed by Malian and French gynecologists and were based on the Malian national guidelines on obstetric care services [9]. The vignettes evaluated 5 areas of EmONC: acute complications during labor leading to hemorrhage and uterine rupture; hypertensive disorders (knowledge of pre-eclampsia and eclampsia); ability to supervise labor (dystocia); postpartum infection management; and neonatal care (Apgar score). Vignettes are known to be a valid and comprehensive method for measuring quality of clinical practice [10].

Some of the vignettes used in the present study were the same as those used in the Malian study in CHCs [6], but different answers were expected because healthcare workers in referral health centers must provide comprehensive EmONC as opposed to the basic EmONC provided in CHCs. Some vignettes described a more advanced stage of an obstetric complication included in the CHC study, reflecting the condition of women who come late to referral health centers. The same 3 basic knowledge questions used in the survey in CHCs were also included in the test: that is, naming the 5 criteria of the Apgar score, naming 3 signs of pre-eclampsia, and naming anticonvulsants in the case of eclampsia.

A score was calculated on the basis of staff answers to the test. Between 1 and 5 items were expected for each answer, but a total of 1 point was given per question. The total score was converted into a percentage. The test was administrated orally by a Malian physician (A.C.) in French or Bambara.

Institutional variables were collected via a questionnaire developed in a previous study in Senegal and Mali [11]. Data were collected on human resources, the size of the referral health center in terms of number of beds and number of staff, the availability of equipment, drugs, and supplies needed for EmONC, access to a medical library or the internet, and the availability of different comprehensive EmONC services. Data on the number of assisted deliveries performed per year in each referral health center were obtained from records held by the regional department of health.

Statistical analyses were performed with Stata version 12.0 (StataCorp, College Station, TX, USA). After ensuring that no multicollinearity was present, bivariate analysis between the mean score and individual and institutional characteristics was explored via analysis of variance. All 12 individual and institutional independent variables were tested simultaneously in a random-effects model using a maximum likelihood estimator to evaluate variables associated with competency score, taking into account a potential cluster effect per health center. The final model was built in a backward stepwise fashion and included variables with a P value of less than 0.05. Interactions between variables were analyzed. Continuous variables were dichotomized on their median value for presentation in the univariate analysis, but were included as continuous variables in the random-effects model.

3. Results

All eligible healthcare workers agreed to participate, and 140 respondents from 9 referral health centers were recruited. The numbers of respondents in each health center ranged from 9 to 51. The distribution of respondents per referral health center and the individual years of experience of respondents are shown in Table 1.

The mean total score for each area of assessment was plotted by type of healthcare worker (Fig. 1). The mean ± SD score was 66.3 ± 15.2 out of 100, and physicians scored highest (78.6 ± 13.4), followed by midwives (66.4 ± 14.7) and obstetric nurses (57.8 ± 11.2) ($P < 0.001$). This ranking was observed in each area of assessment except for questions related to neonatal care, where obstetric nurses and midwives scored slightly higher than physicians. All cadres combined, the healthcare workers scored highest on vignettes related to hypertensive complications (mean, 84.8), followed by Apgar score (mean, 79.1), hemorrhage and uterine ruptures (mean, 76.1), and dystocic labor (54.5), and scored lowest on vignettes related to postpartum infections (mean, 35.2). Univariate associations among all 12 independent variables and the competency score are presented in Table 2.

The results of the final random-effects model of individual and institutional factors associated with competency score are shown in Table 3. In the final model, 3 variables remained significantly associated with a higher obstetric competency score: type of obstetric care provider, urban location, and total number of obstetric care providers at the health center (all $P < 0.001$). The latter variable was negatively associated with competency score, indicating that staff had a tendency to be more competent when working in a smaller referral health center.

No interactions were significant and the cluster effect was negligible (likelihood-ratio test that the variance between centers = 0.00; $P > 0.99$). The predicted competency score, adjusted for other covariates in the model, was plotted by type of healthcare worker and location of the health center (Fig. 2).

4. Discussion

The present study, based on an evaluation by clinical vignettes, found a need to improve the ability of healthcare workers to handle obstetric emergencies across referral health centers in Mali.

A strength of the study is the use of clinical vignettes. Clinical vignettes are known to be valid and reliable tools for measuring clinical practice [10]. The present clinical vignettes were produced by using local guidelines for emergency obstetric care that seem more suitable for evaluating local practice, which differs from the context of high-income countries. Thus, the use of clinical vignettes derived from

Table 1
Characteristics of respondents.[a]

Characteristic	Obstetric nurses (n = 43)	Midwives (n = 68)	Physicians (n = 29)	Total (n = 140)
Total individual experience, y				
Mean ± SD	9.4 ± 7.7	12.0 ± 9.9	7.5 ± 3.6	10.3 ± 8.4
Median (range)	7 (1–33)	8 (1–35)	7 (1–15)	7 (1–35)
Health centers				
Rural	14 (32.6)	17 (25.0)	17 (58.6)	48 (34.3)
Diéma	5 (11.6)	3 (4.4)	4 (13.8)	12 (8.6)
Bafoulabé	2 (4.7)	4 (5.9)	4 (13.8)	10 (7.1)
Kéniéba	3 (7.0)	3 (4.4)	4 (13.8)	10 (7.1)
Nioro	1 (2.3)	5 (7.4)	2 (6.9)	8 (5.7)
Yélimané	3 (7.0)	2 (2.9)	3 (10.3)	8 (5.7)
Urban	29 (67.4)	51 (75.0)	12 (41.4)	92 (65.7)
Commune V, Bamako	15 (34.9)	32 (47.1)	4 (13.8)	51 (36.4)
Kita	8 (18.6)	6 (8.8)	4 (13.8)	18 (12.9)
Kayes-CSREF	5 (11.6)	6 (8.8)	2 (6.9)	13 (9.3)
Kayes hospital	1 (2.3)	7 (10.3)	2 (6.9)	10 (7.1)

[a] Values are given as number (percentage) unless stated otherwise.

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