KNOWLEDGE OF THE MANAGEMENT OF POSTPARTUM HAEMORRHAGE BY DOCTORS AND MIDWIVES WORKING IN FREE STATE DISTRICT HOSPITALS

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ABSTRACT

Postpartum haemorrhage is a major cause of maternal mortality with an estimated annual occurrence of 13.8 million globally. In South Africa, postpartum haemorrhage accounted for above 73% of the 688 maternal deaths from obstetric haemorrhage during 2008–2010, with the majority occurring in district hospitals. This study seeks to determine the knowledge of doctors and midwives, working in maternity units of Free State district hospitals in postpartum haemorrhage management. In this cross-sectional study, self-administered questionnaires were completed by doctors and midwives working in the maternity units of 14 district hospitals in 2012/2013. In total, 132 participants were included in the analysis. The majority (64.1%) of the participants with known occupation (n=131) were midwives. The highest percentage (24.4%) of doctors were medical officers. Most (94.1%) participants had working

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experience of over one year to five years, and 44.2% had completed Essential Steps in the Management of Obstetric Emergencies (ESMOE). Only 40 participants (30.3%) obtained scores over 80%, the acceptable mark for core knowledge. Doctors performed significantly better than midwives (p=0.0002). ESMOE training resulted in significantly better performance (p=0.0045). Issues identified were inadequate overall theoretical knowledge and an inability to practically demonstrate acquired theoretical knowledge. The self-assessment of doctors on obstetrics-related surgical skills revealed insufficient practice. The overall theoretical knowledge of doctors and midwives working in the maternity units of Free State district hospitals is limited. The article recommends that the roll-out of the ESMOE training should include all midwives and doctors in maternity units at district hospitals. Adequate skills training and exposure to obstetric emergencies through rotation should also be encouraged for district hospital medical staff.

Keywords: knowledge, management, postpartum haemorrhage, district hospital, ESMOE, maternal mortality, maternity unit

INTRODUCTION

The 2008–2010 triennial *Saving Mothers* report released by the National Committee for Confidential Enquiry into Maternal Deaths (NCCEMD) showed that obstetric haemorrhage is one of the top causes of maternal deaths in South Africa (Pattinson, 2012:34). The highest percentage (n=289; 42.0%) of deaths due to obstetric haemorrhage occurred at level 1 care, and over half (52.0%) of these cases could have been avoided if the health workers were able to competently manage this condition (Pattinson, 2012: 23-24, 34). According to the report, postpartum haemorrhage (PPH) accounted for more than 78% (n=540) of the 688 maternal deaths from obstetric haemorrhage (Pattison, 2012:23–24, 34).

In 2005, the World Health Organization (WHO) estimated an annual global occurrence of PPH of 13.8 million with at least 166 000 deaths due to PPH, accounting for 28% of maternal deaths. In sub-Saharan Africa, PPH is the leading cause of the high maternal mortality rate and morbidity. In South Africa, the Free State is one of the provinces with the highest number of PPH-related deaths reported (Fawcus, 2010a:77; Lombaard, 2009:326; Pattinson, 2012:10; World Health Organization, 2004).

Postpartum haemorrhage is classified into primary and secondary PPH. Primary PPH is indicated by blood loss of more than 500 ml during the first 24 hours after delivery. It is recognised that estimating blood loss is subjective and not easily measured accurately. On the other hand, secondary PPH refers to excessive blood loss after delivery and up to 6 weeks following delivery. Secondary PPH is less common and less frequent as a cause of maternal death than primary PPH (Fawcus, 2010a:77).

Postpartum haemorrhage is not always predictable, but several avoidable factors have been identified in preventing PPH deaths, and are classified according to patient-related factors, administrative factors, and healthcare worker-related factors (Pattinson, 2012: 23–24, 34). According to the 2008–2010 NCCEMD report, assessors identified a lack of appropriately trained doctors or nurses, especially at level 1 care, as a prominent administrative factor in deaths due to haemorrhage.

In the UK and US, respectively, teaching programmes specialising in obstetrics and neonatal emergency care include Managing Obstetric Emergencies and Trauma (MOET) and Advanced Life Support in Obstetrics (ALSO) (Frank, Lombaard & Pattinson, 2009:95; Walker, Fetherston & McMurray, 2013). The Royal College of Obstetricians and Gynaecologists (RCOG) International Office developed the Life Saving Skills programme aimed at improving emergency obstetric management in developing countries. The South African National Department of Health (NDoH) adapted version of this programme is the Essential Steps in the Management of Obstetrics Emergencies (ESMOE) training (Frank *et al*., 2009:95). In 2014, the completion of ESMOE training was made compulsory for all medical interns.

The assumption is made that doctors and midwives working in maternity units in the Free State district hospitals do have sufficient knowledge to recognise and manage PPH safely.

OBJECTIVES

The objective of this study was to determine the extent of knowledge on the management of PPH of doctors and midwives working in maternity units of Free State district hospitals during 2012–2013.

DEFINITIONS OF KEYWORDS

Knowledge is the theoretical or practical understanding of the subject matter.

Management is the process of dealing with the medical condition under question.

Postpartum haemorrhage is defined for this study as the loss of excessive amount of blood (500 ml) within the first 24 hours following childbirth.

A **district hospital** is a hospital that receives referrals from and provides generalist support to clinics and community health centres with health treatment administered by general health care practitioners or primary health care nurses.

Essential Steps in Management Obstetric Emergencies (ESMOE) is a training programme to improve the knowledge and skills of doctors and midwives in managing obstetric emergencies.

Maternal mortality is the death of a woman while pregnant or within 42 days of having given birth, irrespective of the duration of the pregnancy or the cause of death.

For the purpose of this article, **a maternity unit** is a 24-hour labour service rendered at district hospitals as part of the health service package.

METHODS

This was a cross-sectional study that included doctors and midwives working at the maternity units of 14 out of the 24 Free State district hospitals.

Sampling

All available doctors and midwives responsible for maternity cases at Free State district hospitals were targeted. In total, only 14 of the 24 district hospitals were included due to financial constraints and limited time. The sampling method used was purposeful as the authors arranged visits with the initial facilities that responded to the invitation. At the district hospitals, at least one doctor and one midwife were expected to be on site with access to another doctor and midwife to assist if needed. Therefore, the planned sample size was set at a minimum of 96 (two doctors and two midwives per hospital) (Driessen *et al*., 2011:23). This target was doubled (192) in order to accommodate for any extra participants that might be encountered.

Inclusion and exclusion criteria

Participants included were qualified medical doctors (interns, community service medical officers, medical officers/registrars) and midwives that were permanently employed at the time of data collection. Their involvement in the management of maternity patients was either ongoing or within the last six months prior to this study. Participants needed not to have actually managed PPH in the past.

Due to the nature of health professionals' work, including shifts and annual leave, doctors and nurses employed at the 14 district hospitals who were not present at the time of the visit were not interviewed.

Description of the instrument tool

A total of 200 questionnaires were distributed to the qualifying participants at 14 Free State district hospitals during March 2012 to June 2013. Most of the questionnaires were collected immediately after completion, while some were returned later by hand.

The self-administered questionnaires consisted of three sections, namely: Section A (participants' demographic information), Section B (participants'

theoretical knowledge of prevention, diagnosis and treatment of PPH) and Section C (participants' perceived practical/surgical capabilities through self-assessment).

The 24 questions in Section B are listed in Appendix A: (i) prevention (Questions 1, 2, 5, 6, 7, 8, 14, 19 and 24); (ii) diagnosis (Questions 3, 9, 10, 11, 12, 15 and 20), and (iii) treatment (Questions 4, 13, 16, 17, 18, 21, 22 and 23).

Points were allocated to each question, adding up to a maximum of 47 obtainable points, which represented 100%. An overall score of 80% and above was set as the acceptable 'pass mark' since PPH management is considered core knowledge. Three scoring methods were employed: (i) three-point questions (three answers required for a maximum score of 3 points per question); (ii) single correct answer or Yes/No type questions (only one option was correct; the correct and incorrect options were scored 1 and 0, respectively), and (iii) short sentence-type questions (participants had to answer the question in a short sentence that was graded as 'correct' (2 points), 'partially correct' (1 point) or 'wrong' (0 points)).

Content validity

The questionnaire was developed in accordance with the recognised standard guidelines for the management of PPH in South African district hospitals (Department of Health, 2008). Consultants from the Departments of Family Medicine and Obstetrics and Gynaecology at the University of the Free State assisted the first author with the development of the contents of the questionnaire and appropriate model answers in collaboration with the biostatistician.

Pilot study

A pilot of the questionnaire was carried out on five participants at National District Hospital, Bloemfontein, to verify the usability and practicality of the questionnaire. No changes were made, apart from small adjustments to the layout of the demographic items in Section A of the questionnaire, and as such, data from the five participants from the pilot study were included in the analysis, following discussion with the biostatistician.

Data analysis

The analysis was performed by the Department of Biostatistics, Faculty of Health Sciences, University of the Free State using SAS®/STAT® software, version 12.3 of the SAS® System for Windows®. The questionnaire items were scored to determine the percentage of correct responses. Differences in the test scores (Section B) between various groups were tested using either the Student's t-test or analysis of variance (ANOVA), and for both, p-values <0.05 were considered significant.

Ethical aspects

The study was approved by the Ethics Committee of the Faculty of Health Sciences, University of the Free State (ECUFS NR 27/2012). The Head of the Free State Department of Health gave permission to conduct the study. Each participant gave implicit consent by completing the questionnaire. The self-administered questionnaire was anonymous as no names of participants nor names of facilities were recorded on any of the documents.

RESULTS

Of the 200 questionnaires distributed, 140 (response rate: 70.0%) were returned. However, 132 questionnaires were included in the analyses as eight of the returned questionnaires were incomplete and could not be analysed. Table 1 summarises the socio-demographic data of the participants.

Table 1: Socio-demographic data of participants

	n	**%**
Gender (n=132)		
Male	30	22.7
Female	102	77.3
Age distribution in years (n=130)		
20–29	35	26.9
30–39	38	29.2
40–49	33	25.4
50–59	18	13.9
≥60	6	4.6
Occupation (n=131)		
Doctor	47	35.9
Midwives	84	64.1
Occupational rank (n=131)		
Registrar	7	5.3
Medical officer	32	24.4
Intern	8	6.1
Midwife	73	55.7
Advanced midwife	11	8.4

Highest academic qualification (n=132)		
Diploma	69	52.3
Bachelor's degree	13	9.9
MBChB	47	35.6
Masters	3	2.3
Years of experience in obstetrics care (n=118)		
<1–5	111	94.1
6–10	7	5.9
ESMOE course done (n=129)		
Yes	57	44.2
No	72	55.8
Other training in obstetric emergencies (n=132)		
Yes	22	16.7
No	110	83.3

ESMOE=Essential Steps in the Management of Obstetric Emergencies.

Most participants (77.3%; n=102) were female. The highest percentage of the participants was in the age group 30–39 years (29.2%; n=38) with an age range of 22 to 68 years (mean age 38.9 years). A minority (4.6%; n=6) of the participants were over 60 years. The majority (64.1%; n=84) of the participants were midwives. The highest percentage of the 47 participating doctors (24.4% of the total; n=32) were medical officers. Most (94.1%; n=111) participants had obstetrics-care working experience of less than 1 year to 5 years (mean 2.7 years), while 44.2% (n=57) of the participants had completed the ESMOE training. Only 22 (16.7%) reported other training in obstetric emergencies. Three participants reported training in fire drills and simulation of scenarios such as breech delivery, shoulder dystocia, cord prolapsed and PPH. The remaining 19 participants only reported involvement in obstetrics emergency training, the nature of which was not specified.

Knowledge of PPH management

The scores for the participants' knowledge of the management of PPH (Section B of the questionnaire) ranged from 18 to 44 (38.3% to 93.6%), with a mean score of 73.5%. The highest percentage of participants (37.9%; n=50) obtained a score between 70% and 79%, while 30.3% (n=40) participants scored equal to or above 80%. Only two participants (1.5%) scored less than 50%. The remaining participants (30.3%, n=40) scored between 51% and 69%. Doctors had a minimum and maximum

score of 57.4% and 93.6%, and midwives 38.3% and 89.3%, respectively. The mean scores for the doctors and nurses were 77.8% and 71.4%, respectively.

Table 2: Summary of the mean PPH management knowledge score for levels of ESMOE training, occupation and rank

	n	%	Mean score (% with 95% CI)	t-tests		
				DF	T	*P*-value
ESMOE (n=129)						
Yes	57	44.2	76.3 (73.6–78.9)	127	2.90	0.0045
No	72	55.8	71.3 (69.1–73.5)			
Occupation (n=131)						
Doctor	47	36.2	77.8 (75-5–80.1)	128	3.87	0.0002
Nurse	84	64.1	71.4 (69.1–73.4)			
				ANOVA		
				DF	F	*P*-value
Occupational Rank (n=131)						
Registrar	7	5.3	78.4 (70.6–86.2)	4	5.5	0.0004
Medical officer	32	24.4	78.2* (75.2–81.2)			
Intern	8	6.1	75.8 (70.2–81.4)			
Midwife	73	55.7	70.3* (68.0–72.7)			
Advanced midwife	11	8.4	77.6 (73.1–82.0)			

ANOVA=analysis of variance; CI=confidence interval; DF=degree of freedom (assuming unequal variances); ESMOE=Essential Steps in the Management of Obstetric Emergencies; F=ANOVA F-statistic; T=Student's t-value.

**Post-hoc Scheffé test showed significant differences only between medical officers and midwives.*

Doctors showed significantly better knowledge compared with the nurses (p=0.0002), while medical officers showed significantly better knowledge than the midwives (p=0.0004) (Table 2). Participants who had completed the ESMOE training showed significantly better knowledge compared with participants who had not completed the training (p=0.0045).

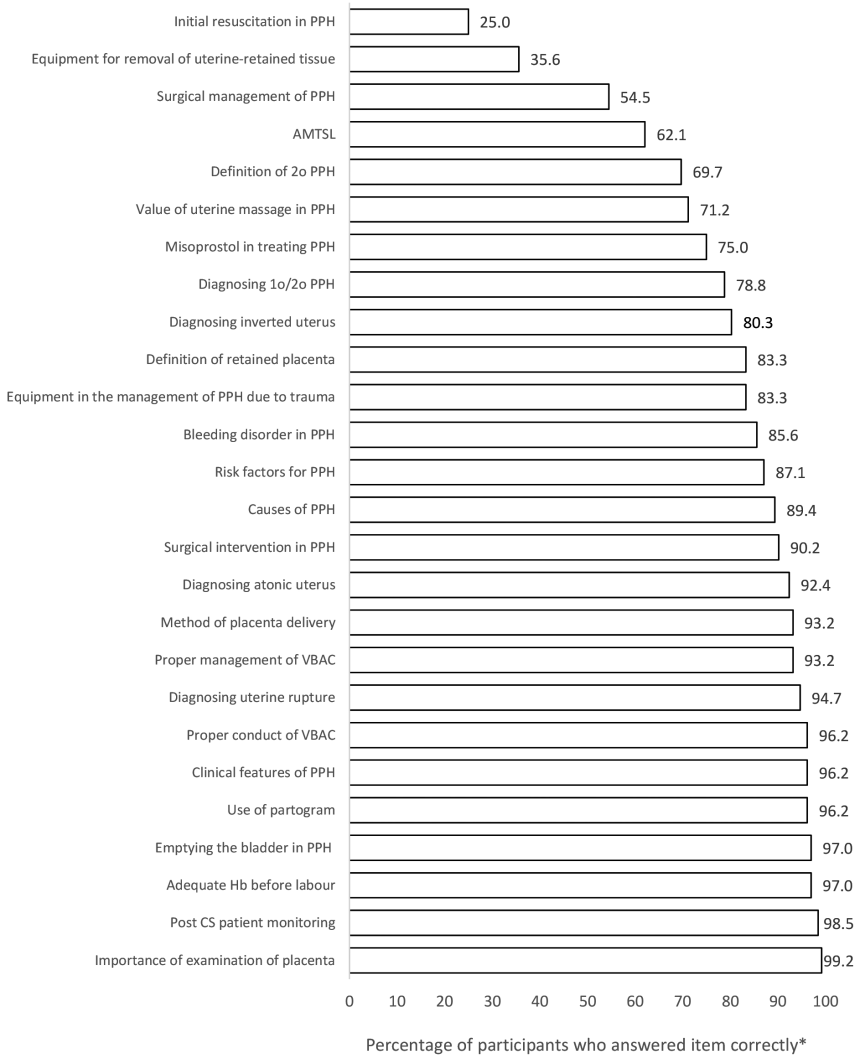
Figure 1 summarises the performance of the participants in each question of section B.

The five areas of knowledge that scored poorly were 'definition of secondary PPH' (69.7%); 'active management of the third stage of labour' (62.1%); 'surgical

management of PPH' (54.5%); 'equipment for removal of uterine-retained tissue' (35.6%); 'initial resuscitation of PPH' (25.0%).

Section C of the questionnaire was a self-assessment of the participants on their ability to perform essential procedures required in the management of PPH (Table

Figure 1: Performance of participants per knowledge area (N=132)



AMTSL=active management of the third stage of labour; CS=caesarean section; Hb=haemoglobin; PPH=postpartum haemorrhage; VBAC=vaginal birth after caesarean; 1^0=primary; 2^0=secondary.

**Satisfactory score: 80% or above correct responses per item.*

3). More than half (56.4% of the total; n=66) of the participants with experience in PPH management reported involvement in less than 10 cases.

Table 3: Self-assessment of skills capability for doctors and nurses, and only doctors

Procedure	***n***	**%**
Doctors and nurse		
Involvement in PPH management (n=130)		
Yes	117	90.0
<10 cases	66	56.4
10-20 cases	29	24.8
>20 cases	22	18.8
No	13	10.0
Ability to manually remove retained placenta (n=130)		
Confident	55	42.3
I cannot	14	10.8
Not sure	61	46.9
Ability to suture lacerated cervix (n=130)		
Confident	20	15.4
I cannot	56	43.1
Not sure	54	41.5
Conduction of bimanual uterine compression (n=128)		
Confident	50	39.1
I cannot	24	18.8
Not sure	54	42.2
Perform (cut and repair) episiotomy (n=129)		
Confident	116	89.9
I cannot	2	1.6
Not sure	11	8.5
Only doctors		
Caesarean section (n=47)		
Confident	35	74.5
I cannot	4	8.5

Not sure	8	17.0
B-lynch (n=47)		
Confident	12	25.5
I cannot	15	31.9
Not sure	20	42.6
Sub-total hysterectomy (n=47)		
Confident	3	6.4
I cannot	35	74.5
Not sure	9	19.2
Uterine artery ligation (n=47)		
Confident	7	14.9
I cannot	23	48.9
Not sure	17	36.2

The only procedure which the majority (74.5%; n=35) of the doctors were confident to perform was a caesarean section.

DISCUSSION

Over 80% of the participants were distributed almost evenly among the age groups 20–29, 30–39 and 40–49 years, yet, the number of years in obstetrics care was five years or less in 94% of the participants. This implies that a number of these health professionals either qualified late, or had been working for a number of years in other departments before rotating in obstetrics/maternity departments.

Only 22 participants acknowledged involvement in other training they felt was relevant to obstetric emergencies. These reported trainings are not formally recognised. El Hamamy and B-Lynch (2012) described different modalities of training for obstetric emergencies, one of which is simulation. They commented that haemorrhage drills and simulations could assist healthcare workers in dealing with PPH.

Across the various ranks, the medical officers performed significantly better than the midwives. The results also showed that completion of the ESMOE training resulted in significantly better performance. This finding is in keeping with a study by Frank *et al*. (2009: 98–99) done among interns in seven South African teaching hospitals: there were improved knowledge and skills among interns who completed the ESMOE training compared with their counterparts who had not. Considering this fact and the positive effect of ESMOE training stated above, it is clear that

relevant, continuous learning may help to achieve sustained, better knowledge on the management of PPH.

The majority (87.1%) of the participants would be able to identify the risk factors for PPH in patients presenting for antenatal care. Early identification of risk factors in pregnant women, such as multi-parity, multiple pregnancy and advanced maternal age, coupled with early arrangement for their deliveries has been shown to play a significant role in decreasing maternal mortality (Fawcus, 2010b).

Almost 90% of the participants were aware of the causes of PPH. Studies by Driessen *et al*. (2011:21) and Oyelese and Ananth (2010:154) have shown uterine atony to be the leading cause of PPH; it is re-assuring that 92.4% of the participants were able to identify the clinical features of uterine atony. However, only 62.1% of the participants were familiar with the components of active management of the third stage of labour (AMTSL), which is considered an important step in the prevention of PPH (Fawcus, 2010b:82). Despite the ability to recognise the clinical features of uterine atony, a large percentage of the participants might not adequately prevent it through AMTSL.

Previous caesarean section(s) have been shown to be the primary cause of uterine rupture, and it is not uncommon among women opting for vaginal birth after caesarean (VBAC) (Al-Zirgi *et al*. 2010:809). This study showed that 93.2% of the participants would be able to identify problems during a VBAC and make appropriate decisions. Over 96% of the participants were aware of the use of the partogram. Proper monitoring of labour progress using a partogram has been advocated to prevent prolonged labour that could result in PPH (Fawcus, 2010b:82).

The poor self-assessed capability ('low' or 'no self-confidence') of all doctors and midwives in managing the causes of PPH is of concern. Only 42.3% of the participants reported confidence in removing retained placenta manually and 39.1% in conducting bimanual uterine compression. A mere 15.4% were confident in suturing a lacerated cervix. It should be noted that this is a subjective self-assessed measure and will be dependent on the participants' current confidence at the time of the interviews. In comparison, a 2011 study in Latin America found that the current self-reported competence reported by 37 midwives and obstetricians showed that 57% (n=21) were confident in performing the manual removal of the placenta, while 73% (n=27) were confident in performing a bimanual uterine compression (Thompson, Land, Camacho-Hubner & Fullerton, 2015:347).

Apart from caesarean section, the confidence of doctors in performing essential surgical procedures required in the management of PPH is unsatisfactory. Only a quarter (25.5%) of the doctors reported confidence in doing the B-lynch procedure. This is much lower than the 41.7% of respondents in a survey among obstetric trainees who were confident to apply a B-lynch suture (El Hamamy & B-Lynch, 2012:516). In our study, even fewer participants were confident in doing a sub-total hysterectomy (6.4%) and uterine artery ligation (14.9%). It is of interest that 90% of

the participants reported having been involved in the PPH management of a patient, however, most were involved in less than 10 cases during their work experience in maternity.

Considering the present maternal mortality ratio of about 300 per 100 000 live births in South Africa (Bradshaw & Dorrington, 2012:41) with the fact that PPH is a significant cause for this unacceptably high mortality rate, the low overall theoretical knowledge of the participants on the management of PPH is of concern. Although 68% of the participants had scores above 70%, only 30% obtained scores above 80%; the 'cut-off' point considered an acceptable pass mark. It is concerning that, while the EMSOE-trained participants did score significantly higher than those who did not have this training, the mean even for the ESMOE-trained group was below 80%. However, the participants' theoretical knowledge in certain tasks, such as risk factors for PPH, post-caesarean section patient monitoring and causes of PPH, was satisfactory. Challenges identified among the participants regarding the management of PPH were: (i) inadequate overall theoretical knowledge, and (ii) inability to practically demonstrate acquired theoretical knowledge.

CONCLUSIONS

Among the participating doctors and midwives in this study, the overall theoretical knowledge on the management of PPH was below the pass mark set at above 80%. Even though an appreciable level of theoretical knowledge was shown in certain tasks, it seems that this knowledge is not always put into practice with confidence.

The self-assessed surgical capability of doctors with regard to the management of PPH was surprisingly low. It needs to be understood that confidence in a skill is built as a result of continuous practice. It seems that for certain skills, doctors at district hospitals are exposed to insufficient practice of these skills. This might explain the reason for setting the validity of life-support courses at two years after which the courses have to be repeated to confirm competency. The ESMOE training has resulted in better theoretical knowledge in PPH management, but more needs to be done: the practical aspect of this course should be emphasised and repeated frequently among health professionals rendering services in the maternity units, especially in district hospitals.

Most doctors and midwives working in the district hospitals are expected to render services in the maternity room whenever the need arises. It is therefore pertinent for these health professionals to be well equipped in both theoretical knowledge and practical/surgical capabilities of PPH management, knowing that PPH contributes significantly to the unacceptably high maternal mortality rate in South Africa.

RECOMMENDATIONS

There is a need to build on theoretical pre-graduate training through refresher courses or other forms of regular on-going training/teachings. The ESMOE training seems to be the leading formal training relevant to the management of PPH and other obstetric emergencies. Efforts should be made to ensure that doctors and midwives working in the maternity units are ESMOE-trained. Fire drills and simulation of PPH and other obstetric emergencies should be held frequently, as specified by the ESMOE training.

Training of ESMOE trainers should be expedited to ensure quicker local training of doctors and nurses. It is suggested that these training roles be delegated to an experienced medical officer or family physician in every Free State district hospital.

The use of appropriate mannequins will allow for the demonstration and practice of relevant skills, such as suturing of a lacerated cervix, uterine artery ligation and B-lynch technique. Increasing the duration and frequency of rotation in maternity units might be necessary to develop confidence in performing the necessary skills in PPH management.

LIMITATIONS OF THE STUDY

Participants comprised doctors and midwives from 14 out of the 24 district hospitals in the Free State; due to time constraints, the district hospitals in Fezile Dabi and Xhariep district municipalities were not visited and doctors and midwives from these hospitals are not represented in this study.

Not all possible doctors and midwives were sampled at all district hospitals, but only those who were on duty at the time of the researchers' visit to the facility.

The statistical data available from the Provincial Human Resource Department did not stratify the professional nurses from the midwives. This may have influenced the ability to select potential nursing staff participants working in maternity.

The practical knowledge on the management of PPH was assessed based on the information volunteered by the participants. Direct assessment of the practical knowledge of individual participants would have been more appropriate but for time and financial constraints.

The poor performance of the participants relating to initial resuscitation in PPH might have been the result of possible ambiguity with respect to the interpretation of the applicable question.

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