

ORIGINAL ARTICLE**Clinical Performance of Emergency Surgical Officers in Southern Ethiopia****Abera A. Gobeze¹, Zelalem Kebede², Yifru Berhan³, Biku Ghosh⁴****ABSTRACT**

BACKGROUND: *Serious shortage of gynecologists and surgeons for several decades leading to a three-year masters level training was initiated in 2009. However, systematic analysis was not done to assess the graduates' performance. The purpose of this study was to assess improvement in access to emergency surgical and obstetrical care services.*

METHODS: *Both quantitative and qualitative methods were employed to assess the competence of emergency surgical officers (ESOs) in their decision making and surgical skills in eight hospitals between 2012 and 2014. Anesthesia time, post-operative hospital stay and change in hemoglobin level were, among others, used as proxy indicators of their surgical skills.*

RESULTS: *A total of 4075 obstetric and surgical operations was performed in the study hospitals. Of which, 93% were done on emergency base. Of the total emergency procedures, 3570(94%) were done by ESOs. Nearly two-thirds (63%) of all the emergency operations were cesarean sections, which were done by ESOs. Out of 239 uterine ruptures, hysterectomy was done for 58%. The proportion of cesarean and instrumental deliveries over the total deliveries were 13% and 0.7%, respectively. Explorative laparotomies and appendectomies were the majority of the non-obstetric emergency operations. Interviewed staff in the respective hospitals stated that ESOs' clinical decision making, surgical skill and commitment to discharge their responsibilities were in the best possible.*

CONCLUSIONS: *The study showed that deployment of ESOs made the emergency surgery services accessible to the majority, and their clinical decision making and surgical skills were remarkable.*

KEYWORDS: *decision making, emergency surgical officer, Ethiopia, surgical skill*

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INTRODUCTION

Ethiopia has been experiencing serious shortage of gynaecologists and surgeons for several decades (1). In 2011, the total number of all specialists working in the public health sector was 606 with a ratio of 1 specialist to about 54,000 population (2). The lack of these professionals for the majority has probably contributed significantly to the relatively high maternal and perinatal mortality and morbidity (3). Specifically, the most common obstetric causes of mortality (obstructed labor, obstetric hemorrhage and ectopic pregnancy),

causes of acute abdomen and trauma are rampant (4).

Due to the low access to emergency surgery, the number of surgical procedures in 2011 in the Southern Regional State varied from 56 to 421 operations per year per 100,000 catchment population; 36% were major surgical operations, and 58% were caesarean sections (5). All these procedures were performed by either gynecologist or surgeon. The national assessment in 2008 in 797 facilities also identified that the caesarean delivery rate was 0.6%, with regional variation from 0.2% to 9% (6). This was

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despite the World Health Organization (WHO) recommendation of 5% to 15% cesarean delivery for the general population (7).

Literature review of 30 years data from Ethiopia has shown that the leading cause of maternal mortality was obstructed labor with or without uterine rupture (29%-36%), which could have been prevented by performing timely cesarean section (8). Another analysis in the same period also demonstrated that obstructed labor with or without uterine rupture was the leading cause of perinatal mortality (27%) (9).

A narrative synthesis identified that shifting and sharing delivery of obstetric surgery, anesthesia and abortion care tasks to non-physicians may increase access to and availability of maternal and reproductive health services without compromising performance (10).

Taking all these into account, the Ministry of Health of Ethiopia, in collaboration with universities and development partners, has taken the initiative to train non-doctor health professionals in emergency obstetrics and general surgery in 2006. This innovative program has got the attention of several partners. However, since this program was the first of its kind in the world (training health officers with a Bachelor of Science Degree to Master's Degree level), several professionals (particularly surgeons) were questioning the graduates' capacity to handle emergency surgical problems in the rural setting, where surgeons and obstetricians are inaccessible. The back and forth discussion with stakeholders had delayed the initiation of the program by about three years.

Lastly, a three-year masters level training curriculum was launched in January 2009 in three universities by admitting health officers with a Bachelor of Science Degree and two or more years of work experience. So far, more than 700 students have been admitted in 12 universities across the country, and several African countries are benchmarking it for similar undertakings. The first batch graduated in early 2012 and has been in service for more than three years. During annual review meetings, regional health bureaus' representatives have been heard expressing their appreciation of the impact the assigned surgical officers are bringing about in their vicinity.

Nevertheless, some still express their concerns regarding the graduates' clinical decision

making capacity and surgical skill in the management of emergency surgical cases. Unpublished UNFPA survey report from ten hospitals in 2012 focusing only on emergency obstetric care. However, it has shown that the volume of obstetric and surgical emergency cases managed with surgical procedures have increased, and a significant reduction in maternal mortality has been observed. There was also a 49% reduction in obstetric referral from the studied hospitals. A study again focusing on comprehensive emergency obstetric care in Tigray reported that 63.3% of the obstetric procedures were performed by non-physician clinicians, and there was no significant difference in maternal deaths, fetal deaths and length of hospital stay between the physician and non-physician procedures (11).

Unlike the previous reports, the current study included both emergency obstetric/gynecologic and general emergency surgical procedures performed by IESOs in the studied hospitals, which is thought to enlighten the range of services IESOs providing. Therefore, the purpose of this study was to assess improvement in access to emergency surgical and obstetrical care services in health facilities of Southern Ethiopia, where IESOs are assigned.

METHODS

This study was conducted in the Southern Regional State of Ethiopia by including eight primary hospitals (Butajira, Halaba, Bona, Durame, Saula, Leku, Dubo and Adare). The selection of these hospitals as study sites was done purposely, based on the availability of IESOs in service at least for three years (2012 - 2014). The list of hospitals providing emergency surgical procedures by IESOs was obtained from the South Regional Health Bureau. Each hospital serves a catchment population ranging from 300,000 to 1.2 million.

Both quantitative (chart review) and qualitative data were collected from the selected hospitals between September and November 2014. A structured data collection form was used to retrieve quantitative data from recording books (delivery logbook and operation logbook). The data retrieved include the type of operation, the qualification of the operating surgeon and the patient outcomes. Data were collected by three

general practitioners after they were trained by the principal investigator. It was supervised by the principal investigator and incomplete questionnaires were communicated onsite to the data collectors to revisit registry and complete missing data.

The surgical skill of the ESOs was assessed by reviewing randomly selected patient charts from each hospital. To assess the ESOs's cesarean section skill, change in hematocrit level, anesthesia/operation time, postoperative hospital stay patient outcome (including baby) were reviewed. For their general surgery skill, anesthesia time, postoperative hospital stay and patient outcome were used as indicators. Their skill/decision making was also triangulated by interviewing staff in the operation theatre, obstetric and surgical ward. In all participating hospitals, in-depth interviews were conducted with surgeons, gynecologists, anesthetists, midwives, head nurses and medical directors focusing on three main thematic areas (performance of ESOs, relevance of the program, and challenges of the program). A guideline was used for the in-depth interview.

The quantitative data were entered into SPSS version 20 (IBM Corporation) and checked for completeness. The descriptive findings are presented in tables and graphs. Ethical approval for this research was obtained from Hawassa University Medical and College of Health Sciences, Research Ethics Review Committee. Support letters were dispatched from the Regional Health Bureau to each zone of the study hospital,

and permission for the study was obtained from medical director of each hospital. The data did not show identification and patients' name and analyses were done in aggregate.

RESULTS

Quantitative findings: During the study period, a total of 4075 emergency and elective obstetric and surgical operations was performed in the study hospitals. Of these, 3797(93.2%) were done on emergency base (Figure 1). Of the total emergency procedures, 3570(94%) were done by emergency surgical officers (ESO), and the rest by trained general practitioners and health officers. Nearly two-thirds (62.6%) of all the emergency operations were cesarean sections, and all were done by ESOs. Of the total uterine rupture cases (239) managed in the study hospitals, hysterectomy was done for 57.7%. The proportion of cesarean and instrumental deliveries over the total deliveries were 12.5%(2376/18950) and 0.7%(125/18950), respectively.

Among the general surgical procedures, explorative laparotomies and appendectomies were the majority of the emergency operations ESOs performed. They did surgical repair for twenty eight cases of perforated peptic ulcer diseases. Generally, although all started at the same time with almost similar set up and population density, the largest and the least emergency operations were done in Butajira (34.8%) and in Halaba (2.6%) hospitals.

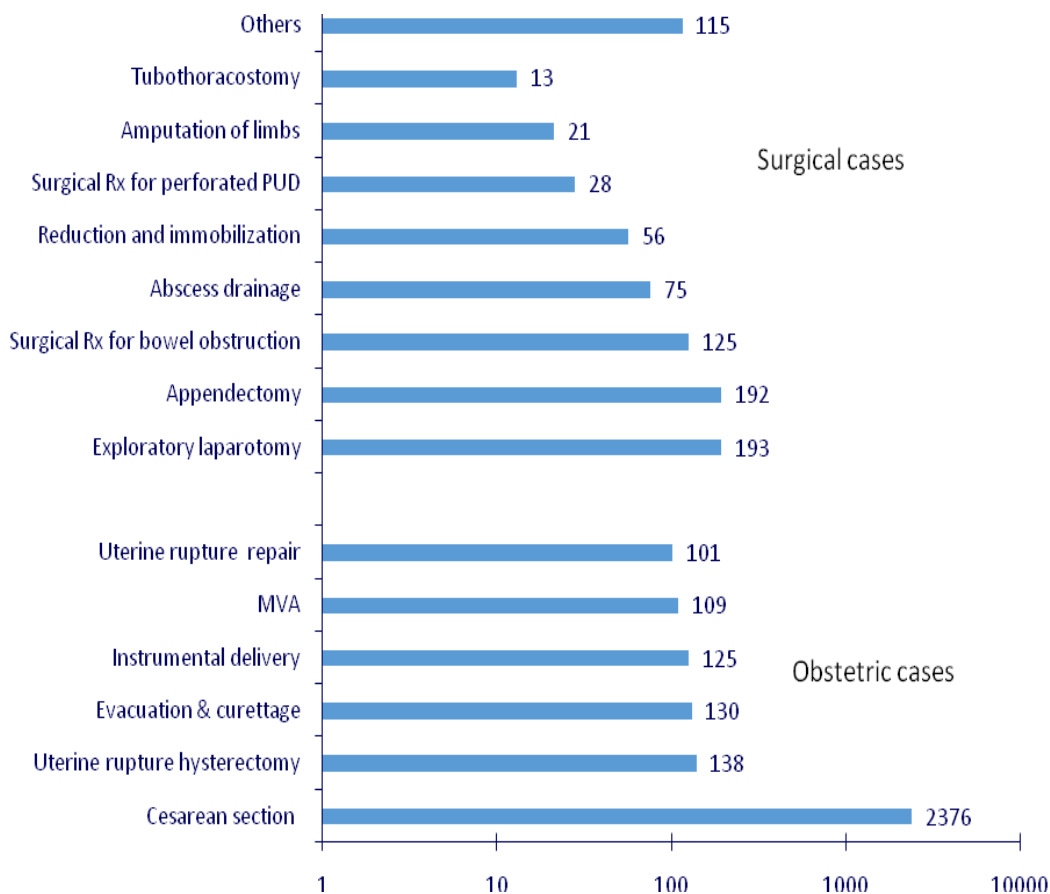


Figure 1: Emergency obstetric and general surgery procedures performed by emergency surgical officers (ESO), South Ethiopia, 2014

The indications for cesarean sections are summarized in Figure 2. The top four indications for cesarean sections were labor abnormality, fetal distress, obstructed labor and malpresentations (excluding breech presentations). Labor abnormalities (cephalopelvic disproportions, arrest and protracted disorders, prolonged latent first stage and prolonged second stage of labor) accounted for more than four and half of the total cesarean sections (21.8%). About 17% of the cesarean sections were performed for obstructed labor.

Out of 160 randomly selected patients' charts, complete documentation was found only in 126 (78.8%). Postoperative hematocrit (HCT) was

the commonly missed investigation. As shown in Table 1, the mean (95% CI) preoperative and postoperative HCT levels were 37% (35.7% - 39.9%) and 31% (29.6% - 33%), respectively, showing a statistically significant difference in Paired Samples T-test ($P < 0.001$). The mean anesthesia time for emergency general surgery was almost two-fold higher than the mean anesthesia time for cesarean section. Long hours of anesthesia time were reported in patients with gangrenous bowel obstruction and abdominal trauma surgeries. With the exception of two fetal deaths, all the revised charts showed that the postoperative conditions of patients were stable.

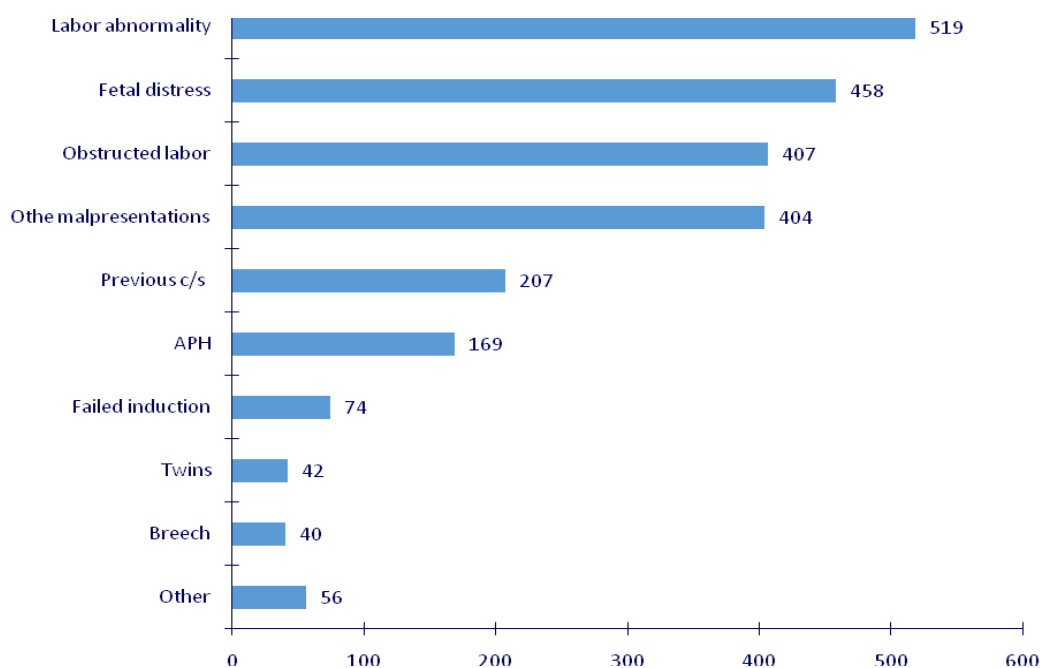


Figure 2: Common indications for cesarean sections among cases operated by emergency surgical officers (ESO), South Ethiopia, 2014

Table 1: Quantitative proxy indicators of emergency surgical officers (ESO) operation skill, South Ethiopia, 2014

Cesarean section	Mean (95%CI)	General surgery	Mean (95%CI)
Pre-operative HCT(%)*	37(35.7-39.9)	Anesthesia time (min)	79(68.4-90.2)
Post-operative HCT(%)*	31(29.6 -33)	Post-op hosp stay (days)	7(6.6-7.7)
Anesthesia time (min)	38(35.4-42.4)		
Post-op hospital stay (days)	5(4.6-5.5)		

Range for preop hematocrit (HCT) (26%-53%), postop HCT (22%-46%), anesthesia time for c/s (20-50 min) and for general surgery (30-200 min), hospital stay after c/s (3-8 days) and after general surgery (3-14 days). *Paired Samples T-test ($P < 0.001$)

Qualitative findings: In all participating hospitals, in-depth interviews were conducted with medial directors and managers in three main thematic areas. This was intended to understand their attitude towards the performance of ESO, challenges and their views on the program.

Performance of ESOs: The in-depth interviews showed that ESOs' clinical decision making, surgical skill, overall competence and commitment to discharge their professional responsibilities were optimal. Among others, their patient selection for surgery and management of surgical complications were appropriate; the surgical outcomes of their patients were very

satisfactory. Specifically, they stressed that maternal and child health improved very significantly after the ESOs were assigned. They also added that there were no major complications seen since ESOs were assigned in the respective study hospitals, primarily due to their availability at all time for consultations, good surgical skill and excellent relation with the staff.

A head nurse in the labor ward expressed her full confidence on the ESO's competence: "If I have an illness which require surgery, I will not go anywhere. I have full confidence in him (ESO working there) to give my body for surgery". One anesthetist also said: "If my wife becomes pregnant and requires an operation (cesarean

delivery), I do not hesitate to let her be operated by ESO, who is currently working with us”.

Relevance of the program: In this regard, the majority of the respondents said that the integrated emergency surgery program brought about a significant change in the provision of health services. All participants agreed that patients' costs were reduced due to low referral practice. They stressed the importance of the program mainly to improve the maternal and their child health.

A medical director in one of the study hospitals said: “Obstetric services are significantly optimized; referral for cesarean delivery has been reduced”. He also added: “I believe in that the program has improved service coverage and patient outcome in the remote areas like ours”. Another medical director said: “As we do not have obstetricians in this hospital, all obstetric emergency surgeries are performed by ESO”. The majority of the study participants also noted that the public demand to utilize the hospital services increased because of the quality service ESOs are providing. In one of the study hospitals, the head nurse in Durame reported that one of the ESOs (the one who served for three years) was a public prize winner for the extraordinary service he had rendered to the people of the town. They recommended that the ESO training need to be scaled up to address the public health demand in remote areas.

Challenges of the program: Most participants raised that occasionally important elements for undertaking surgery are missing in their hospitals, particularly anesthesia drugs, suction machines and antibiotics. Incomplete teams for the surgery, commonly due to lack of anesthetists, are the main challenges for the ESOs to perform emergency surgery. A medical director who expressed his experience as a challenge expressed: “Occasionally, there are conflicts of interest between general practitioners and ESOs, surgeons/gynecologists and ESOs in terms of hierarchy in decision making and accepting orders of command”.

DISCUSSION

It was observed that a large number of emergency surgical operations in the rural hospitals were done by ESOs. The staff in the respective hospitals also noted a dramatic increase in the patient load and the number of operations, and a significant reduction in maternal mortality and referral to other hospitals. Previous analysis also showed that shifting and sharing emergency surgery tasks increased access to and availability of maternal and reproductive health services without compromising performance or patient outcomes (12).

Although it was not directly assessed, the findings of this study may show the public's acceptance and recognition in their vicinity to the quality of services ESOs have been providing. That is why most study participants claimed that the program is so important to reach patients who require emergency surgery in the remote areas, and those who cannot afford to go to a hospital where gynecologists and surgeons are available. The cost effectiveness of task shifting and sharing of non-physicians was also well noted in previous studies (12-14).

Apart from other activities, the high number of cesarean sections performed by ESOs also comply with the World Health Organization recommendation(15). The rapid assessment done by the Ethiopian Ministry of Health in 2011 has also shown that ESOs competence is optimal to achieve the expected level of performance of doing lifesaving procedures like cesarean section and appendectomy (16).

The short postoperative hospital stay in both obstetric and general emergency surgical patients may be taken as a proxy indicator for the good ESOs's surgical skill. Previous studies which assessed the surgical performance and patients' outcome of non-physicians and physicians did not showed statistically significant difference between the two groups (17-19). The mean anesthesia time, particularly for c-sectioned women, was also in the acceptable range.

However, this study has several limitations. The ESOs decision making and surgical skills were assessed from document review and interview with their colleagues, which is liable to subjectivity and recall bias. Had they been directly observed while they were evaluating and

managing patients, the assessment would have been somehow more objective. Since the study was limited to ESOs performance in eight hospitals and the majority of the assessment focused on the first graduate, the findings may not be representative to other ESOs in other hospitals. In conclusion, the deployment of ESOs in the respective hospitals made the emergency surgery procedures accessible to the people around. Their decision and surgical skill were reported as remarkable. Nevertheless, a country wide evaluation has to be made to see the impact of the emergency surgery program, and the quality of the service should be systematically assessed.

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