



**JIMMA UNIVERSITY**

**INSTITUTE OF HEALTH**

**DEPARTMENT OF ANESTHESIOLOGY CRITICAL CARE AND PAIN MEDICINE**

**Utilization of safe obstetrics anesthesia protocol and associated factors among  
anesthesia providers during elective and emergency cesarean section in Jimma  
University Medical Center**

**By: Tsega Firdu (MD)**

*Thesis submitted to Department of Anesthesiology critical care and pain medicine, College of  
Health Science, Jimma University; in Partial Fulfillment for the Requirement for Specialty  
Certificate in Anesthesiology Critical care and Pain medicine*

January 2022

Jimma, Ethiopia

UTILIZATION OF SAFE OBSTETRICS ANESTHESIA PROTOCOL AND  
ASSOCIATED FACTORS AMONG ANESTHESIA PROVIDERS DURING  
ELECTIVE AND EMERGENCY CESAREAN SECTION IN JUMC

By: Tsega Firdu (MD)

Advisors: Hailu Merga (MPHE, Assistant Professor, PhD Fellow)

Yemane Ayele (MD, Associate professor)

January 2022  
Jimma, Ethiopia

## Abstract

**Background:** Anesthesia is one among the medical specialties which have sought to boost the standard of health care and patient safety by setting standards for safe practice in anesthesia that were adopted by the globe Federation of Societies of Anesthesiologists (WFSA). A fundamental assumption is that, to scale back maternal mortality, there should be rapid access to effective emergency obstetric and anesthesia care. The wants for safe practice of obstetric anesthesia are as follows: Skills within the variety of adequately trained staff and academic resources, appropriate anesthesia monitors, disposables and medicines, relevant management protocols for every level of care, with supervision and audit. Gaps in utilization can arise from unavailability of resources and from an inability to use available resources which can arise from lack of expertise.

**Objective:** The purpose of the study was to assess the level of utilization of the safe obstetrics anesthesia protocol among anesthesia providers during elective and emergency cesarean section in Jimma university medical center.

**Methods:** An institution based cross-sectional study of anesthesia providers during elective and emergency cesarean section in Jimma university medical center, using a structured interviewer administered questionnaire, by trained anesthesia assistants. All anesthesia providers working at Jimma University medical center and fulfill the inclusion criteria were included in the study. Data entry was done using Epi data manager (Version 4.6.0.2). SPSS version 26 was used for analysis. Descriptive analysis was used to summarize the relationship between the independent variables and dependent variable. Chi-square test was used to test for the presence or absence of association

**Results:** Among 70 anesthesia service providers in the hospital, 60 participated. The response rate was 100%. Forty eight (80%) were within the age range of 25-35 years. 48(78.3%) were male. Regarding duration of experience and professional training, 30(50%) had experience of 2-5years and was residents. Four parameters were used to assess the level of utilization of safe obstetrics anesthesia protocol. Accordingly, 51(85%), 43(71.7%), 43(78.3%) and 28(46.7%) had good utilization of safe obstetric anesthesia protocol in availability of medications and intravenous fluids, conduct of anesthesia and Availability of monitoring device respectively. In

this study, the level of good utilization of safe obstetric anesthesia protocol was 41 (68.3%), 95% CI [68.2, 68.4]. Chi square test was employed and it showed strong statistical associations between good utilization of safe obstetrics anesthesia protocol and availability of facility and equipment (Pearson's  $X^2=10.8$ , P-value=0.001), availability of medication and intravenous fluids (Pearson's  $X^2=5.99$ , P-value=0.014), availability of monitoring device (Pearson's  $X^2=4.66$ , P value=0.031) and conduct of anesthesia (Pearson's  $X^2=16.6$  P value=0.0001) respectively. However, there were no associations between utilization of good utilization of safe obstetrics anesthesia protocol and gender, age, level of experience or professional training.

**Conclusion:** The study revealed a higher good level of utilization of safe obstetric anesthesia protocol. The factors associated with good utilization of safe obstetric anesthesia protocol were; availability of medication and IV fluid, Conduct of anesthesia, availability of monitoring device, facility and equipment.

**Key words:** Safe obstetrics anesthesia protocol, World Federation Society of Anesthesiologists, Level of utilization

## Acknowledgement

I would like to thank all who have contributed to the development of this thesis. First, I would like to thank Jimma University for giving me the opportunity and exposure to thesis proposal development. I would also like to express my gratitude to my advisors Hailu Merga (MPHE, Assistant Professor, and PhD Fellow) and Yemane Ayele (MD, Associate professor) for their guidance and their unweathering efforts towards the completion of this thesis.

My deep appreciation and thanks is also extended to Jimma university medical center anesthetists, anesthesiology residents and consultant anesthesiologists and delivering mothers who participated in the data collection phase of my research.

Tsega Firdu (MD)

January 2022

## Contents

1. List of abbreviations.....	8
2. List of tables .....	9
3. List of figures .....	10
4. List of annexes .....	11
1. Introduction .....	12
1.1. Background .....	12
1.2. Statement of the problem .....	13
1.3. Significance of the study.....	15
2. Literature review .....	16
2.1. Availability of necessary equipment .....	16
2.2. Inadequate number of anesthesia providers .....	16
2.3. Availability of necessary medications .....	17
2.4. Knowledge gap among anesthesia providers .....	17
2.5. The WHO surgical safety check list .....	18
2.6. Preanesthetic evaluation and identification of high risk mothers.....	19
2.7. Conceptual frame work .....	20
3. Objective of the study.....	21
3.1. General objective .....	21
3.2. Specific objective.....	21
4. Materials and methods.....	22
4.1. Study setting .....	22
4.2. Study design.....	22
4.3. Population.....	22
Source population .....	22
Study population:.....	22
4.4. Inclusion and exclusion criteria.....	22
4.4.1. Inclusion criteria.....	22
4.4.2. Exclusion criteria .....	23
4.5. Sample size determination and sampling technique .....	23
4.5.1. Sample size calculation.....	23
4.6. Variables .....	23

4.7.	Data collection tool and procedure .....	24
4.9.	Data processing and analysis .....	25
4.10.	Operational definitions.....	25
4.11.	Ethical considerations .....	26
4.12.	Dissemination plan.....	26
5.	Results.....	27
5.1.	Socio-demographic and Educational characteristics of respondents .....	27
5.2.	Parameters to assess level of utilization of safe obstetrics anesthesia protocol .....	27
5.2.1.	Aggregate level of Utilization of safe obstetrics anesthesia protocol.....	28
5.3.	Associated factors .....	29
5.3.1.	Association between Utilization of safe obstetrics anesthesia protocol and professional aspects 29	
5.3.1.1.	<i>Gender and utilization of safe obstetrics anesthesia protocol.....</i>	29
5.3.1.2.	<i>Age and utilization of safe obstetrics anesthesia protocol.....</i>	29
5.3.1.3.	<i>Duration of experience and utilization of safe obstetrics anesthesia protocol.....</i>	30
5.3.1.4.	<i>Professional training and utilization of safe obstetric anesthesia protocol .....</i>	30
5.3.2.	Association between Utilization of Safe Obstetric Anesthesia Protocol and Individual Parameters.....	31
5.3.2.1.	<i>Availability of facility and equipment with Utilization of Safe obstetrics anesthesia protocol</i>	31
5.3.2.2.	<i>Availability of medications and intravenous fluids with utilization of safe obstetrics anesthesia protocol</i>	31
5.3.2.3.	<i>Availability of monitoring device with utilization of Safe obstetric anesthesia protocol .....</i>	31
5.3.2.4.	<i>Conduct of anesthesia with utilization of safe obstetrics anesthesia protocol.....</i>	32
6.	Discussion.....	33
6.1.	Strengths and Limitations.....	34
6.1.1.	Strengths.....	34
6.1.2.	Limitations .....	34
7.	Conclusion and recommendation.....	35
7.1.	Conclusion .....	35
7.2.	Recommendations .....	35
8.	References.....	36
9.	Annexes.....	38

Annex 1 Information sheet & consent form ..... 38  
Annex 2 Questionnaire ..... 41



## 1. List of abbreviations

CS -Cesarean section

JUMC –Jimma University Medical center

LB - Live birth

LMICs - low-and middle-income countries

MDG -Millennium Development Goals

MMR maternal mortality ratio

OBS -Obstetrics

OR -Operation Room

PAP- physician anesthesia provider

PI -Primary Investigator

WFSA -World Federation Society of Anesthesiology

WHO -World Health Organization

## 2. List of tables

Table 1: Variables

Table 2: Socio-demographic and Educational characteristics of respondents

Table 3 Gender and utilization of safe obstetrics anesthesia protocol

Table 4 Age and utilization of safe obstetrics anesthesia protocol

Table 5 Duration of experience and safe utilization of safe obstetrics anesthesia protocol

Table 6 Professional training and utilization of safe obstetrics anesthesia protocol

Table 7 Availability of facility and equipment with utilization of safe obstetrics anesthesia protocol

Table 8 Availability of medications and utilization of safe obstetrics anesthesia protocol

Table 9 Availability of monitoring device and utilization of safe obstetrics anesthesia protocol

Table 10 Conduct of anesthesia with utilization of safe obstetrics anesthesia protocol

### 3. List of figures

Figure 1: Conceptual framework

Figure 2. Level of Utilization of Safe obstetric Anesthesia Protocol using the four assessing parameters among anesthesia providers during elective and emergency cesarean section in Jimma University Medical center 2021.

Figure 3 Aggregate Level of Utilization of Safe obstetric Anesthesia Protocol among anesthesia providers during elective and emergency cesarean section in Jimma University Medical center from 2021.

#### 4. List of annexes

Annex 1 Information sheet & consent form

Annex 2 Questionnaire

# 1. Introduction

## 1.1. Background

The international standards for a safe practice of Anesthesia were developed by the world federation societies of anesthesiologists (WFSA) and the world health organization (WHO). They include a set of suggested, recommended and highly recommended standards. The standards are regarding professional aspects, facilities and equipment, medications and intravenous fluids, monitoring and conduct of anesthesia. The highly recommended standards, the equivalent of mandatory standards, should be met in order to provide general or regional anesthesia for surgical procedures.[1]

Cesarean section is an emergency obstetric care that is designed to reduce maternal and newborn morbidity and mortality.[2] Problems that are no longer seen in developed countries still complicate the obstetric practice, including cesarean section in developing countries. It comes with special difficulties to the anesthesia providers in developing countries. Physiologic changes of pregnancy added to the emergency situations of patients along with obstetric complications call for trained anesthetists, which are few in number and unevenly distributed. Therefore it is more difficult to perform the surgery in developing countries.[3]

Obstetricians and obstetric anesthesia providers should work closely, especially in low resource settings to ensure the safety and wellbeing of mothers. The rapid access to effective emergency obstetric and anesthesia care is a must to decrease maternal mortality. The presence of adequately trained staff with access to educational resources, availability of necessary drugs and equipment and relevant management protocols with supervision and audit are the requirements for the safe practice of obstetric anesthesia.[4]

## 1.2. Statement of the problem

Approximately 295,000 women died during pregnancy and childbirth in 2017, making the maternal mortality unacceptably high. Majority of them (94%) occurred in low resource settings and could have been prevented. Sub-Saharan Africa and Southern Asia accounted for approximately 86% (254 000) of the estimated global maternal deaths in 2017. Sub-Saharan Africa alone accounted for roughly two-thirds (196 000) of maternal deaths, while Southern Asia accounted for nearly one-fifth (58 000). [5]

An operative delivery rate of 5 to 10% is recommended by the WHO. However these rates are below 1% for the population mostly located in sub Saharan Africa consisting of the poorest population in 20 countries. This is often to some extent due to a scarcity of anesthesia provision, particularly in rural areas. [6]

According to an article examining anesthesia related mortality in Michigan, USA over an 18 year period, anesthesia-related maternal mortality is a remarkable success story and illustrates how a problem can be targeted and significantly reduced through scientific study followed by recommendations that alter practice patterns. Deaths before 1984 were due to local anesthetics toxicity and they were reduced by using test doses and diluted local anesthetics. Although anesthesia-related maternal mortality was reduced, it was not eliminated. An examination of deaths after 1984 revealed that they now occurred primarily during operative delivery and were most often associated with general anesthesia. Reducing the incidence of aspiration or failed intubation by either avoiding general anesthesia or standardizing airway management became the focus of attention. The effect of these interventions remains to be seen. Currently maternal deaths occur during emergence and recovery related to either airway obstruction or hypoventilation. Risk factors were weight (obesity) and an African American race. Another is advancing maternal age (>35).[7]

A study on the association between mode of anaesthesia and severe maternal morbidity during admission for scheduled Caesarean delivery: a nationwide population-based study in Japan, 2010 to 2013 states recently, severe maternal morbidity has gained interest as an important quality indicator of obstetric care because maternal mortality remains extremely low in developed countries. In the present study, we adopted combined criteria (disease- specific and management-based) to identify severe maternal morbidity. Severe maternal morbidity was

defined as the occurrence of at least one life-threatening complication. The incidence of severe maternal morbidity was higher among those receiving general anaesthesia compared with those receiving neuraxial anaesthesia. General anaesthesia was mainly associated with hemorrhagic complications[8]

The existence of co-morbidities during pregnancy can pose various challenges to the attending anesthesiologists during operative deliveries or during the provision of labor analgesia services. The presence of cardiac diseases, endocrinological disorders, respiratory diseases, renal pathologies, hepatic dysfunction, anemia, neurological and musculoskeletal disorders, connective tissue diseases and many others not only influence the obstetric outcome, but can significantly impact the anesthetic technique[9]

The Confidential Enquiry into Maternal Deaths (CEMD) in South Africa, initiated in 1998, currently constitutes the best evidence for anesthesia-related mortality in a low-resource environment. It examined anesthesia related maternal deaths during three trienniums. From 1999 to 2001 there were 56 anesthesia related deaths (31, general anesthesia and 25, spinal anesthesia). From 2002 to 2004, there were 62 anesthesia related deaths and anesthesia was deemed the 7<sup>th</sup> most common direct explanation of maternal mortality. And finally from 2003 to 2007, there were 74 anesthesia related maternal deaths and anesthesia was the cause for 6% of all preventable maternal deaths.[10]

In 93% of perioperative deaths, there were avoidable factors according to a study in done in Togo, West Africa that attempts to determine the anesthetic death rate, the causes of death and the avoidable mortality rate. It should be possible to reduce the mortality by developing preventive measures, promoting the training of anaesthetists in developing countries and encouraging the use of regional anaesthesia, especially in obstetrics. It is also necessary to promote continuing education for nurse anaesthetists.[11]

According to UN estimates, Ethiopia has to this point reduced maternal mortality by 69% from the 1990s estimate with annual reduction rate of fifty or more. In step with the most recent UN estimate, the proportion of mothers dying per 100,000 live births has declined from 1400 in 1990 to 420 in 2013. However, EDHS 2005 and 2011 reported maternal mortality of 673 and 676 per 100,000 live births respectively, indicating no change between the 2 surveys. Another report from Lancet (2014) estimated that maternal mortality in Ethiopia was 497 in

2013. As part of the Health Sector Transformation Plan (HSTP), Ethiopia aspires to cut back Maternal Mortality Ratio (MMR) from 420 to 199 per 100,000 live births[12]

A hospital based cross sectional study, at Tikur anbesa specialized hospital in 2019, was done to assess the utilization of safe obstetrics anesthesia protocol according to the WFSA and WHO guidelines. It showed significant shortages of continuous education, equipment and medications needed to provider safe obstetric anesthesia care. The shortages have greatly impacted the safe anesthesia practice and compliance with international standards.[13]

### 1.3. Significance of the study

As stated above, anesthesia contributes to maternal morbidity and mortality. The safe utilization of anesthesia is therefore an important factor in the practice of obstetric anesthesia. This study, by exploring the current condition regarding the utilization of safe obstetrics anesthesia protocol in JUMC, aims to identify any gaps in the application of the protocol.

By identifying the gaps, the study provides answers on factors that need to be corrected to both the major departments involved and to the hospital administration. It also serves as a stepping stone for further research on improvement of the identified factors. The end result will be a better outcome for mothers who come for cesarean section to the hospital.



## 2. Literature review

### 2.1. Availability of necessary equipment

A cross-sectional survey was done at 5 main referral hospitals in East Africa: Uganda, Kenya, Tanzania, Rwanda, and Burundi. Employing a questionnaire supported the World Federation of the Societies of Anesthesiologists (WFSA) international guidelines for safe anesthesia, anesthesiologists were interviewed in these hospitals. None of respondents had all the needed necessities available to produce safe obstetric anesthesia, and only 7% conveyed satisfactory anesthesia staffing. Availability of monitors was limited, and the ones that were available were often nonfunctional. The scarcity of local protocols, and absence of ICU services, also added significantly to poor maternal outcomes. [1]

In a similar cross-sectional survey lead at 64 government and private hospitals in Uganda, by means of pre-set questionnaires to the anesthesiologists and hospital directors. Access to the minimum requirements for safe obstetric anesthesia in step with WFSA guidelines were also checked employing a checklist for operating and recovery rooms. The response rate was 100% following personal interviews of anesthesiologists, and hospital directors. Only 3 of the 64 (5%) of the hospitals had all necessities available to fulfill the WFSA International guidelines for safe anesthesia. It was noted that several of the anesthesia machines present were obsolete models without functional safety alarms and/or mechanical ventilators. Continuous ECG was only available in 3/64 (5%) of hospitals. [6].

There have been deficiencies within the availability of essential equipment and basic intraoperative monitors, like end-tidal CO<sub>2</sub> detectors (17% availability across all hospitals). Postoperative care and access to resuscitative equipment, like defibrillators, were also lacking. [8]

### 2.2. Inadequate number of anesthesia providers

For the inhabitants of 142.9 million within the East African community, there have been only 237 anesthesiologists, with a staff density of 0.08 in Uganda, 0.39 in Kenya, 0.05 in Tanzania, 0.13 in Rwanda, and 0.02 anesthesiologists in Burundi per 100,000 populations in each country. [1]

In the cross sectional study from Uganda, in addition to lack of equipment, 54/64 (84%) didn't have a trained physician anesthetist and 5/64 (8%) had no trained providers for anesthesia in the slightest degree. [6]

In another cross-sectional survey of all Guatemalan public hospitals providing surgical care, with the World Federation of Societies of Anesthesiologists (WFSA) anesthesia facility assessment tool (AFAT) questionnaire, was done. Of the 46 public hospitals in Guatemala in 2018, 36 (78%) were found to supply surgical care, including 20 district, 14 regional, and a pair of national referral hospitals. The survey identified 573 full-time physician surgeons, anesthesiologists, and obstetricians (SAO) within the public sector, with an estimated SAO density of 3.3/100,000 population. There have been 300 full-time anesthesia providers employed at public hospitals. 47% of those providers consisted of Physician anesthesiologists, with an estimated physician anesthesiologist density of 0.8/100,000 population. Only 10% of district hospitals stated having an anesthesia provider constantly present intraoperatively throughout general or neuraxial anesthesia cases[14]

### 2.3. Availability of necessary medications

Frequent shortages of medication were reported for regional/neuraxial anesthesia, and other essential drugs were often lacking like antacids and antihypertensive [6]

No hospitals reported assessing pain within the immediate postoperative period. While the provision of some medications like benzodiazepines and local anesthetic was vigorous (100% availability across all hospitals), only some of the hospitals had essential medications like ketamine, epinephrine, or atropine. [14]

### 2.4. Knowledge gap among anesthesia providers

A task analysis study in Ethiopian anesthetists reported, among the whole study participants, over half rated 72.9% of the tasks as being highly critical to patient outcomes, and stated that they carried out 70.2% of all tasks at a high frequency, More than a quarter of respondents reported that they performed 15 of the tasks at a small frequency. Nine of the tasks rated as being highly critical weren't learned during pre-service education by over one-quarter of study participants, and over 10% of respondents reported that they were unable to perform five of the highly critical tasks [15]

A cross-sectional survey was conducted in Amhara region of Ethiopia from 15/12/2019 to 30/1/2020. All 81 hospitals of the region were stratified by their level as district, general, and referral hospital. Seventy eight (88.6%) anesthesia providers working in 62 hospitals responded to the survey. On aggregate, 36 (58%) hospitals from the total 62 hospitals have met the minimum expected safe anesthesia requirements. Anesthesia safety in Ethiopia appears challenged by substandard continuous medical education and continuous professional development practice, and limited availability of some essential equipment and medications.[16]

A questionnaire, first used in Uganda in 2006, to survey practicing anaesthetists regarding the current state of anaesthesia services across Ethiopia, was reproduced. The results indicate that a large proportion of centers remain unable to provide safe general, spinal, pediatric and obstetric anaesthesia, at all levels of hospital and across almost all of the country's regions. In addition to a lack of equipment and pharmaceuticals, anaesthetists report problems with professional recognition and a lack of access to continuing professional development as key barriers to service development.[17]

A cross-sectional survey of health facilities of the Health Antenna of Butembo in Democratic Republic of Congo was conducted from October to December 2018. Questionnaires were brought to anesthesia providers in the health facilities. The study included answers from the anesthesia practitioners who accepted to participate. The practices of standard monitoring in the health facilities were compared to WHO-WSFA guidelines. Forty out of 90 health facilities (44.4%) of 10 health zones responded on the questionnaire. All the health facilities were providing general anesthesia whereas spinal anesthesia was provided in 22 out of 40 centers (55%). Seventy percent (28/40) of the facilities were below standard according to WHO-WSFA guidelines. Only 40% (16/40) were using a pulse oximeter and 10% (4/40) declared that ECG was occasionally used.[18]

## 2.5. The WHO surgical safety check list

A cross-sectional survey was conducted at the main referral hospitals in Uganda, Kenya, Tanzania, Rwanda and Burundi. Using a pre-set questionnaire, anaesthetists were interviewed on their knowledge and attitudes towards use of the WHO surgical checklist. Of the 85 anaesthetists interviewed, only 25 % regularly used the WHO surgical checklist. None of the anaesthetists in

Uganda or Burundi used the checklist, mainly because it was not available, in contrast with Tanzania, Kenya, and Rwanda, where 65%, 19 % and 36 %, respectively, used the checklist[19]

A prospective observational study was conducted among 282 patients undergoing elective and emergency surgery in Gondar, Ethiopia. Compliance and completeness rate with implementation of Sign-in, Time-out, and Sign-out domains was computed with SPSS 20 package. The overall compliance and completeness rate were 39.7 and 63.4 % respectively. The main reasons cited for non-user were lack of previous training (45.1 %) and lack of cooperation among surgical team members. The completeness rate was satisfactory but the overall compliance rate was suboptimal. Supplementary training and attention to actual checklist use would be indicated to ensure that this valuable tool could be used more routinely and improve communication. [20]

## 2.6. Preanesthetic evaluation and identification of high risk mothers

Careful and early identification of these high risk patients can lead to timely investigations, referrals and medical management while anticipating and preventing worsening of the pre-existing condition and forming an appropriate delivery plan. Obstetric pre-assessment clinics with joint anesthetic input are a useful way to achieve early identification and appropriate management of the high-risk pregnant woman. Recognition and early referral for an anesthetic opinion can save lives in a variety of medical conditions. These include the appropriate recognition of the potentially difficult airway, optimization of treatment plan in patients with cardiorespiratory, thrombo-embolic and neurological disease.[21]

## 2.7. Conceptual frame work

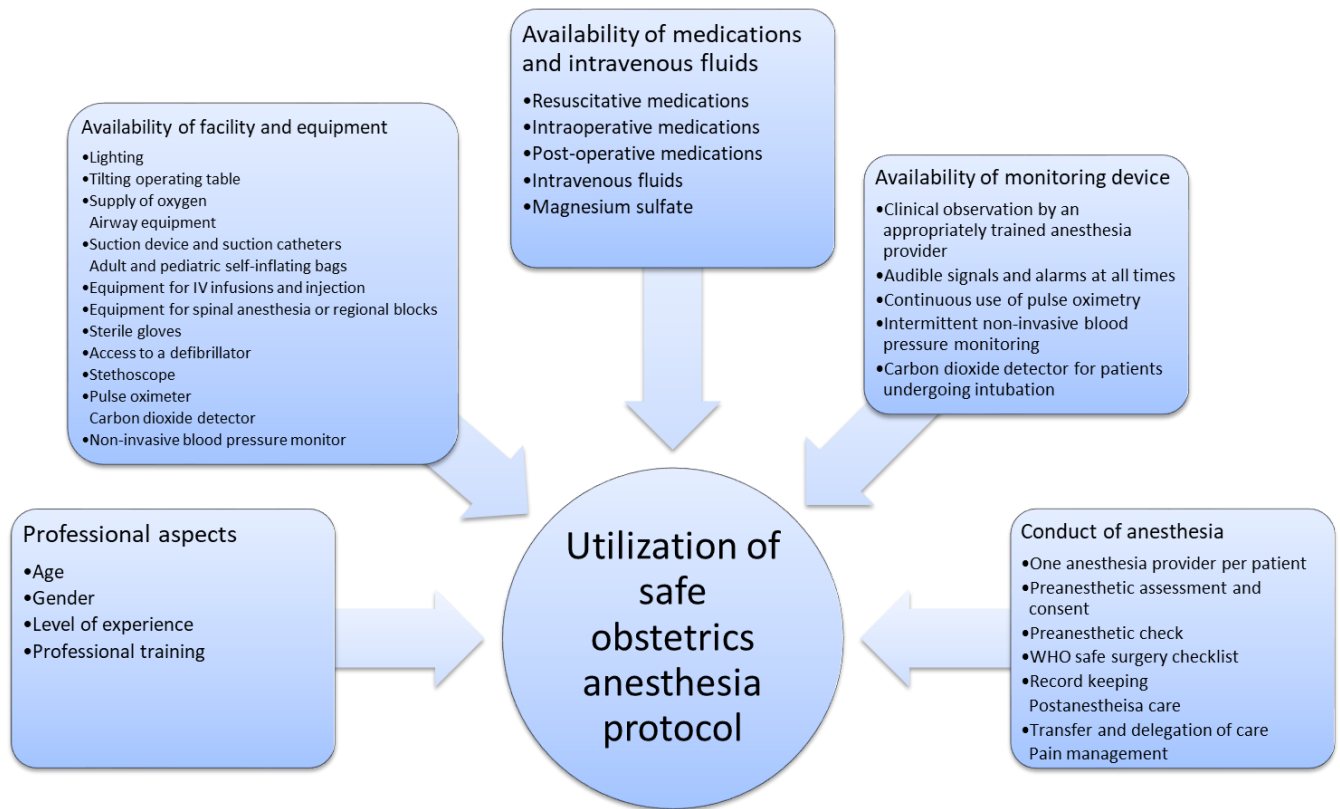


Figure 1 Sources: [1],[21],[19],[15]

### 3. Objective of the study

#### 3.1. General objective

3.1.1. To assess the level of utilization of the safe obstetrics anesthesia protocol among anesthesia providers during elective and emergency cesarean section in JUMC in terms of magnitude (high or low) and associated factors in order to identify any gaps in the utilization and to suggest corrective strategies, 2021

#### 3.2. Specific objective

3.2.1. To assess the level of utilization of safe obstetrics anesthesia protocol

3.2.2. To assess factors associated with utilization of safe obstetrics anesthesia protocol among anesthesia providers during elective and emergency cesarean section in Jimma University Medical center.

## 4. Materials and methods

### 4.1. Study setting

The study is going to be conducted in Ethiopia, Oromia regional state, Jimma town at Jimma university medical center located 352 km southwest of the capital Addis Ababa. It is inaugurated as a new Medical center on December 08, 2018 as the only teaching and referral hospital in the southwestern part of the country. It is delivering services for almost 15000 inpatient, 160,000 outpatient attendants, 11000 emergency cases and 4500 deliveries in a year coming to the hospital from the catchment population. Jimma zone has a total population of 2,486,155 according to the 2007 census of which 1,250,527 are male and 1,235,628 are females. It has 1600 staff members and 800 beds.

The hospital has two OR tables designated to emergency and elective obstetric cases. There are 5 consultant anesthesiologists, 30 anesthesiology residents, 35 MSC anesthetists, MSC anesthesia students and BSC anesthetists, a total of 70 anesthesia providers working on rotation at the obstetrics OR. There are also 10 trained anesthetic assistants.

### 4.2. Study design

An institution based cross sectional study

### 4.3. Population

#### **Source population:**

All anesthesia providers who fulfill the inclusion criteria

#### **Study population:**

All anesthesia providers giving anesthesia to mothers presenting for elective and emergency cesarean section in JUMC during the study period

### 4.4. Inclusion and exclusion criteria

#### 4.4.1. Inclusion criteria

- Anesthesia providers who have minimum 6 months working experience to ensure the provider had his/her rotation working at the obstetrics operation theatre.

#### 4.4.2. Exclusion criteria

- Anesthesia providers who don't fulfill the inclusion criteria or unavailable during the study period.

#### 4.5. Sample size determination and sampling technique

##### 4.5.1. Sample size calculation

- All anesthesia providers who fulfill the inclusion criteria were included in the study.

#### 4.6. Variables

**Table 1: Variables**

<b>Independent variable</b>	<b>Dependent variable</b>
<b>Professional aspects</b>	Level of utilization of safe obstetrics anesthesia protocol
Year of experience	
Professional background	
Age	
Sex	
Professional training	
<b>Availability of medications and IV fluids</b>	
Resuscitative medications	
Intraoperative medications	
Post-operative medications	
Intravenous fluids	
Magnesium sulfate	
<b>Availability of monitoring device</b>	
Intraoperative	
▪ Clinical observation by an appropriately trained anesthesia provider	
▪ Audible signals and alarms at all times	
▪ Continuous use of pulse oximetry	
▪ Intermittent non-invasive blood pressure monitoring	
▪ Carbon dioxide detector for patients undergoing intubation	
Postoperative	
▪ Clinical observation:	
▪ Continuous use of pulse oximetry	
▪ Intermittent non-invasive blood pressure monitoring	
▪ Assessment of pain score using age appropriate scale	



### **Availability of Facility and equipment**

Lighting

Tilting operating table

Supply of oxygen

Airway equipment

Suction device and suction catheters

Adult and pediatric self-inflating bags

Equipment for IV infusions and injection

Equipment for spinal anesthesia or regional blocks

Sterile gloves

Access to a defibrillator

Stethoscope

Pulse oximeter

Carbon dioxide detector

Non-invasive blood pressure monitor

### **Conduct of anesthesia**

One anesthesia provider per patient

Preanesthetic assessment and consent

Preanesthetic check

WHO safe surgery checklist

Record keeping

Postanesthesia care

Transfer and delegation of care

Pain management

---

## 4.7. Data collection tool and procedure

A structured interviewer administered questionnaire[1] was used. The questionnaire contains questions on facility and equipment, medication and intravenous fluids, monitoring and conduct of anesthesia. It was collected by anesthetic assistants after being trained by the primary investigator. English was used for data collection. The place for data collection was at the obstetrics operation room of JUMC. The primary investigator supervised the data collection.

## 4.8. Data quality control

To maintain the quality of data pretest was conducted using 5% of the sample size to know whether the questions are clearly understandable or not two weeks before moving to study. During data collection principal investigator gave onsite technical support and close supervision. The data was collected using English language primarily and using Amharic and Afaan Oromo

for clarification if needed. Data was checked daily for completeness, consistency and then errors were corrected accordingly before data processing and analysis.

#### 4.9. Data processing and analysis

After data collection and checking of the content was done, the data obtained was edited, coded, entered, and cleaned by Epi data software by the principal investigator. Then it was exported to Statistical Package for the Social Sciences (SPSS 26.0) for analysis. Descriptive analysis was used to summarize the relationship between each independent variable and its corresponding dependent/outcome variable. Chi-square test was used presence or absence of association.

#### 4.10. Operational definitions

- Anesthesia provider: Any healthcare worker who provides anesthesia care, irrespective of professional background or moderate or deep training
- Anesthesia :Refers to the administration of general or regional anesthesia or moderate or deep sedation independent of who provides the care
- Anesthesiologist: A graduate of a medical school who has completed a nationally recognized specialist anesthesia training program
- Nurse anesthetist: A graduate of a nursing school who has completed a nationally recognized nurse anesthetist training program
- Non-specialist physician anesthetist :A graduate of a medical school who has not completed a specialist training program in anesthesia but has undergone some anesthesia training
- Anesthesia Assistant (AA): is a specially trained, health professional who participates in the care of the stable surgical patient during general, regional, or conscious sedation anesthesia through medical directives under the supervision of the anesthesiologist.
- Highly recommended standards: the minimum expected standards. They are the functional equivalent of mandatory standards. If they are not met, provision of anesthesia for elective surgical procedures is unsafe and unacceptable
- Good utilization of safe obstetric anesthesia protocol: The variables were prepared in a table format using yes/no. Fulfilling 100% of the listed variables, as indicated by the yes answer, was

taken as good utilization of the protocol since these components are highly recommended for any level of health care facility.[1]

#### 4.11. Ethical considerations

Prior to the start of the research, the principal investigator obtained ethical approval from the institutional ethical review board of Institute of health, Jimma University. Then a formal letter was sent to the management of the hospital for cooperation. The purpose of the data collection, the nature of the study and all the necessary information about the study was explained and a formal written consent was obtained from the anesthesia providers who participated in the study. All data obtained in the course of the study was kept confidentially and used solely for the purpose of the research. The name of respondents or study participants was never used by any means throughout the research and participants were told they had the right to withdraw themselves from study anytime they want.

#### 4.12. Dissemination plan

The research was presented for partial fulfillment of specialty certificate in anesthesiology, critical care and pain medicine. The Soft copy and hard copy of finding of this research is disseminated to the department of anesthesiology and for selected department of the hospital. Finally the result of the study was disseminated to the scientific community through seminars, workshops, and conferences of health professionals association and publications in peer-reviewed scientific journal

## 5. Results

### 5.1. Socio-demographic and Educational characteristics of respondents

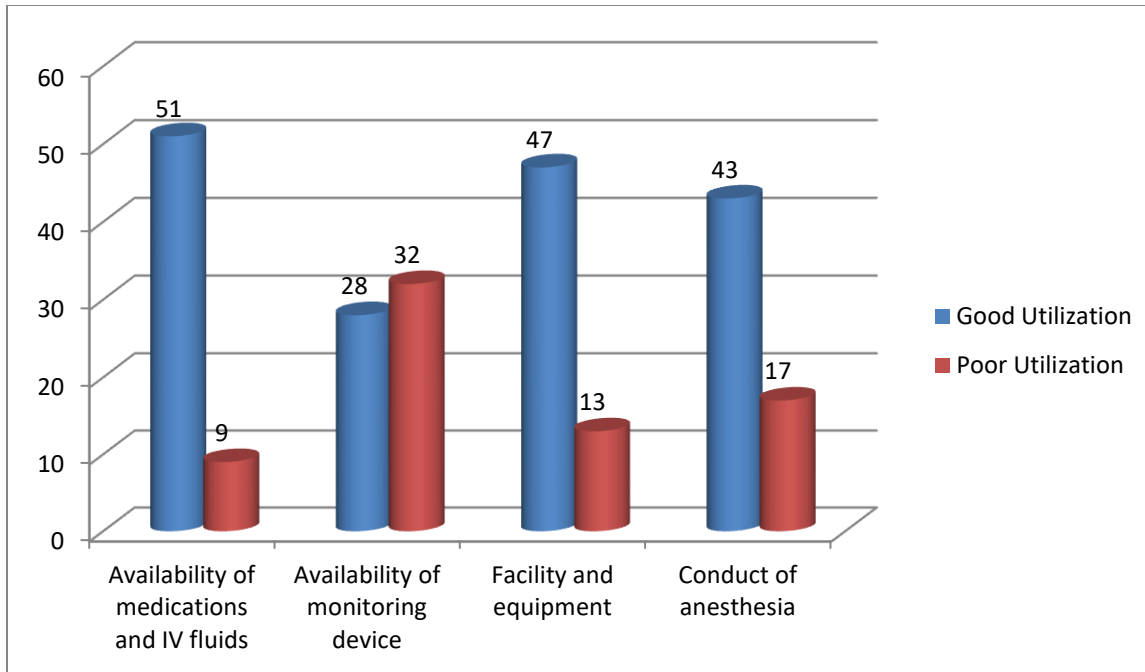
Among 70 anesthesia service providers in the hospital, 60 participated. The response rate was 100%. Forty eight (80%) were within the age range of 25-35 years. While, 48(78.3%) were male. Regarding duration of experience and professional training, 30(50%) had experience of 2-5years and were residents. (See Table 2 below)

**Table 2: Socio-demographic and Educational characteristics of respondents**

Characteristics	Category	Frequency	Percentage
Age	20-24	6	10%
	25-35	48	80%
	36-45	3	5%
	>46	3	5%
Gender	Male	47	78.3%
	Female	13	21.7%
Professional training	Resident	30	50.0%
	BSc anesthetist	18	30.0%
	MSc anesthetist	2	3.3%
	MSc student	6	10.0%
	Consultant Anesthesiologist	5	6.7%
Duration of experience	6 months to 2 years	27	45.0
	2 years to 5 years	30	50.0
	More than 5 years	3	5.0

### 5.2. Parameters to assess level of utilization of safe obstetrics anesthesia protocol

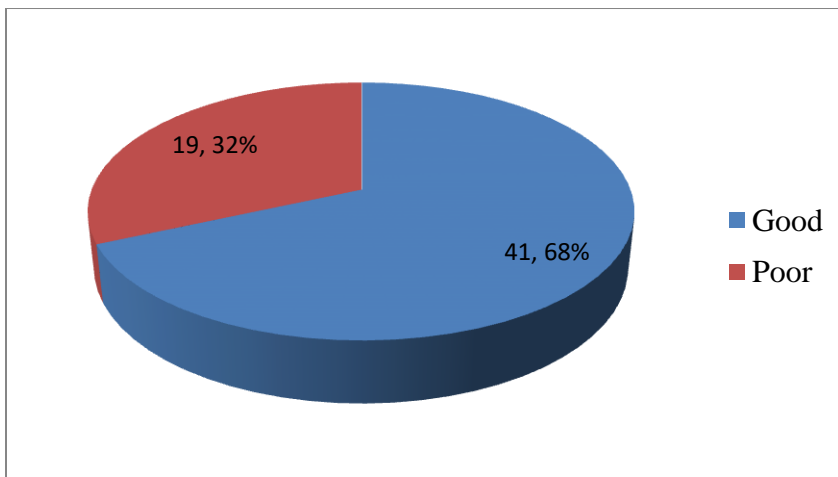
Four parameters, which are availability of medications and intravenous fluids, availability of monitoring device, facility and equipment and conduct of anesthesia were used to assess the level of utilization of safe obstetric anesthesia protocol. Accordingly 51(85%), 43(71.7%), 43(78.3%) and 28(46.7%) had good utilization of safe obstetric anesthesia protocol in availability of medications and intravenous fluids, conduct of anesthesia and Availability of monitoring device respectively. (See the figure given below).



**Figure 2. Level of Utilization of Safe obstetric Anesthesia Protocol using the four assessing parameters among anesthesia providers during elective and emergency cesarean section in Jimma University Medical center 2021.**

### 5.2.1. Aggregate level of Utilization of safe obstetrics anesthesia protocol

In this study, the level of good utilization of safe obstetric anesthesia protocol was 41 (68.3%), 95% CI [68.2, 68.4]. (See figure given below).



**Figure 3 Aggregate Level of Utilization of Safe obstetric Anesthesia Protocol among anesthesia providers during elective and emergency cesarean section in Jimma University Medical center from 2021.**

### 5.3. Associated factors

#### 5.3.1. Association between Utilization of safe obstetrics anesthesia protocol and professional aspects

##### 5.3.1.1. *Gender and utilization of safe obstetrics anesthesia protocol*

A chi square test was employed to assess the presence/absence of association between gender and good utilization and it revealed no association (P-value=0.347)

**Table 3 Gender and utilization of safe obstetrics anesthesia protocol**

	Aggregate safe anaesthesia category	
	Poor utilization of safe obstetric anaesthesia protocol	Good utilization of safe obstetric anaesthesia protocol
Gender:		
Male	16	31
Female	3	10

##### 5.3.1.2. *Age and utilization of safe obstetrics anesthesia protocol*

Fisher exact chi square test was employed and revealed no association between age and good Utilization of Safe Obstetric Anaesthesia Protocol (P-value=0.337)

**Table 4 Age and utilization of safe obstetrics anesthesia protocol**

Age	Aggregate safe anaesthesia	
	Poor utilization of safe obstetric anaesthesia protocol	Good utilization of safe obstetric anaesthesia protocol
25-35	16	32
36-45	0	3
>46	0	3
20-24	3	3

5.3.1.3. *Duration of experience and utilization of safe obstetrics anaesthesia protocol*

Likewise, Fisher exact chi square test was employed and revealed no association between duration of experience and good Utilization of Safe Obstetric Anaesthesia Protocol (P-value=0.53)

**Table 5 Duration of experience and safe utilization of safe obstetrics anaesthesia protocol**

Duration of experience	Aggregate safe anaesthesia		Total
	Poor utilization of safe obstetric anaesthesia protocol	Good utilization of safe obstetric anaesthesia protocol	
6 months to 2 years	10	17	27
2 years to 5 years	9	21	30
More than 5 years	0	3	3

5.3.1.4. *Professional training and utilization of safe obstetric anaesthesia protocol*

There was no association between professional training and good utilization of safe obstetric anaesthesia protocol (P-value=0.247).

**Table 6 Professional training and utilization of safe obstetrics anaesthesia protocol**

Professional training	Aggregate safe anaesthesia		Total
	Poor utilization of safe obstetric anaesthesia protocol	Good utilization of safe obstetric anaesthesia protocol	
Resident	13	17	30
BSc anaesthetist	5	13	18
MSc anaesthetist	0	2	2
MSc student	0	6	6
Consultant	1	3	4

### 5.3.2. Association between Utilization of Safe Obstetric Anesthesia Protocol and Individual Parameters

#### 5.3.2.1. Availability of facility and equipment with Utilization of Safe obstetrics anesthesia protocol

A chi square test was employed so as to assess the presence and/absence of association between facility and equipment with good utilization of safe obstetric anesthesia protocol. Accordingly, the test revealed, strong statistical association (Pearson’s  $X^2=10.8$ , P-value=0.001)

**Table 7 Availability of facility and equipment with utilization of safe obstetrics anesthesia protocol**

Facility and equipment	Aggregate safe anaesthesia category	
	Poor utilization of safe obstetric anaesthesia protocol	Good utilization of safe obstetric anaesthesia protocol
Poor	9	4
Good utilization of facility and equipment	10	37

#### 5.3.2.2. Availability of medications and intravenous fluids with utilization of safe obstetrics anesthesia protocol

A chi square test was employed so as to assess the presence and/absence of association between availability of medication and intravenous fluid with good utilization of safe obstetric anesthesia protocol. Accordingly, the test revealed, strong statistical association (Pearson’s  $X^2=5.99$ , P-value=0.014).

**Table 8 Availability of medications and utilization of safe obstetrics anesthesia protocol**

Availability of Medications and IV fluids	Aggregate safe anaesthesia category	
	Poor utilization of safe obstetric anaesthesia protocol	Good utilization of safe obstetric anaesthesia protocol
Poor availability of medications and IV fluids	6	3
Good availability of medications and IV fluids	13	38

#### 5.3.2.3. Availability of monitoring device with utilization of Safe obstetric anesthesia protocol



A chi square test was employed so as to assess the presence and/absence of association between availability of monitoring device with good utilization of safe obstetric anesthesia protocol. Accordingly, the test revealed, association between (Pearson's  $X^2=4.66$ , P value=0.031).

**Table 9 Availability of monitoring device and utilization of safe obstetrics anesthesia protocol**

Availability of Monitoring Device	Aggregate safe anaesthesia category	
	Poor utilization of safe obstetric anaesthesia protocol	Good utilization of safe obstetric anaesthesia protocol
Poor monitoring	14	18
Good monitoring	5	23

*5.3.2.4. Conduct of anesthesia with utilization of safe obstetrics anesthesia protocol*

A chi square test was employed so as to assess the presence and/absence of association between availability of monitoring device good utilization of safe obstetric anesthesia protocol. Accordingly, the test revealed, strong statistical association between (Pearson's  $X^2=16.6$  P value=0.0001).

**Table 10 Conduct of anesthesia with utilization of safe obstetrics anesthesia protocol**

Conduct of anaesthesia	Aggregate safe anaesthesia category	
	Poor utilization of safe obstetric anaesthesia protocol	Good utilization of safe obstetric anaesthesia protocol
Poor conduct of anaesthesia	12	5
Good conduct of anaesthesia	7	36

## 6. Discussion

The aim of the study was to assess the utilization of the safe obstetrics anesthesia protocol and associated factors among anesthesia providers in Jimma university medical center.

In this study the level utilization of good safe obstetric anesthesia protocol was 41(68%). While, the factors associated with good utilization of safe obstetric anesthesia protocol were; availability of medication and IV fluid, Conduct of anesthesia, availability of monitoring device, facility and equipment.

The level utilization of safe obstetric anesthesia protocol in the present study was higher as compared to similar cross sectional studies conducted in Tanzania, Kenya, and Rwanda, where 65%, 19 % and 36 %, respectively, used the checklist [20]. The possible justification for the discrepancy might be due to differences in sample size; where a small number of sample size used in the current study while a bit higher sample size used in the prior studies. Hence, as sample size is small it might overestimate the level of utilization. Also, differences in experiences, training and professional level might explain the difference. Likewise, the study is higher compared to a survey conducted in Ethiopia, where large proportion of centers remain unable to provide safe general, spinal, pediatric and obstetric anesthesia, at all levels of hospital and across almost all of the country's regions on aggregate, 36 (58%) hospitals from the total 62 hospitals have met the minimum expected safe anesthesia requirements [17].

The factors associated with good utilization of safe obstetric anesthesia protocol were; availability of medication and IV fluid, Conduct of anesthesia, availability of monitoring device, facility and equipment. This finding was agreeable with two cross sectional studies which revealed availability of medications and IV fluids, Availability of facility and equipment and conduct of anesthesia were predictors of a higher level of utilization of safe obstetric anesthesia protocol [6, 14]. The reason for the concordance might emanate from as the four basic parameters are readily available and accessible, the safe the obstetric anesthesia protocol execution will be easily.

## 6.1. Strengths and Limitations

### 6.1.1. Strengths

The study has identified strong associations between the good utilization of the safe obstetrics anesthesia protocol and four of the major parameters. This gives a direction on how to further improve the utilization by working on these important items.

### 6.1.2. Limitations

A small sample size is a limitation of this study that could be addressed in future research. First the study was based in one hospital and small sample size of anesthesia providers was used, it may result in over estimation of results. Second, this also affects the generalizability of the study.

## 7. Conclusion and recommendation

### 7.1. Conclusion

The study revealed a higher good level of utilization of safe obstetric anesthesia protocol. The factors associated with good utilization of safe obstetric anesthesia protocol were; availability of medication and IV fluid, Conduct of anesthesia, availability of monitoring device, facility and equipment.

### 7.2. Recommendations

Given the tremendous importance of safe obstetric anesthesia protocol;

- ✦ The department is highly recommended to further encourage the utilization of safe obstetric anesthesia protocol.

Moreover, since the parameters to assess safe obstetric anesthesia protocol are associated with good safe obstetric anesthesia protocol; a due emphasis has to be given to

- ✦ Availability of medication and IV fluid,
- ✦ Bettering the Conduct of anesthesia,
- ✦ Availability of monitoring device,
- ✦ Availability of facility and equipment

## 8. References

- [1] A. W. Gelb *et al.*, "World Health Organization-World Federation of Societies of Anaesthesiologists (WHO-WFSA) International Standards for a Safe Practice of Anesthesia," *Can. J. Anesth.*, vol. 65, no. 6, pp. 698–708, 2018, doi: 10.1007/s12630-018-1111-5.
- [2] A. Olani, K. Woldemichael, M. Tessema, and E. Bayana, "Cesarean section and associated factors among women who gave birth at Jimma university specialized hospital, Jimma, South West Ethiopia 2016," *Ital. J. Gynaecol. Obstet.*, vol. 31, no. 4, pp. 47–52, 2019, doi: 10.14660/2385-0868-137.
- [3] E. Y. Kwawukume, "Caesarean section in developing countries," *Best Pract. Res. Clin. Obstet. Gynaecol.*, vol. 15, no. 1, pp. 165–178, 2001, doi: 10.1053/beog.2000.0155.
- [4] R. A. Dyer, A. R. Reed, and M. F. James, "Obstetric anaesthesia in low-resource settings," *Best Pract. Res. Clin. Obstet. Gynaecol.*, vol. 24, no. 3, pp. 401–412, 2010, doi: 10.1016/j.bpobgyn.2009.11.005.
- [5] S. D. Goals, "Maternal mortality Evidence brief," no. 1, pp. 1–4, 2017.
- [6] P. Clyburn, S. Morris, and J. Hall, "Anaesthesia and safe motherhood," *Anaesthesia*, vol. 62, no. SUPPL. 1, pp. 21–25, 2007, doi: 10.1111/j.1365-2044.2007.05293.x.
- [7] E. Views, "Gene Therapy for Pain Advancing Perioperative Prediction of Cardiac Risk," *Anesthesiology*, no. 6, pp. 1079–1087, 2007.
- [8] H. Abe *et al.*, "Association between mode of anaesthesia and severe maternal morbidity during admission for scheduled Caesarean delivery: a nationwide population-based study in Japan, 2010–2013," *Br. J. Anaesth.*, vol. 120, no. 4, pp. 779–789, 2018, doi: 10.1016/j.bja.2017.11.101.
- [9] S. J. Bajwa, S. Bajwa, and G. Ghuman, "Pregnancy with co-morbidities: Anesthetic aspects during operative intervention," *Anesth. Essays Res.*, vol. 7, no. 3, p. 294, 2013, doi: 10.4103/0259-1162.123207.
- [10] J. Moodley, S. Fawcus, and N. Moran, "The confidential enquiry into maternal deaths in South Africa : a case study," pp. 53–60, 2014, doi: 10.1111/1471-0528.12869.
- [11] O.-B. Maman, "Deaths associated with anaesthesia inTogo , West Africa Deaths associated with anaesthesia inTogo ," vol. 37, no. October 2005, pp. 220–222, 2015.
- [12] Federal Democratic Republic of Ethiopia Ministry of Health, "Ethiopian Health Sector Transformation Plan.2015/16 - 2019/20," *Fed. Democr. Repub. Ethiop. Minist. Heal.*, vol. 20, no. May, p. 50, 2015.
- [13] S. T. (MD), "Challenges of Providing Safe Obstetric Anesthesia in Black Lion Specialized Hospital: Cross-Sectional Survey," *Online*, no. November, 2019.
- [14] Y. Zha *et al.*, "Assessment of Anesthesia Capacity in Public Surgical Hospitals in Guatemala," *Anesth. Analg.*, vol. 132, no. 2, pp. 536–544, 2021, doi: 10.1213/ANE.0000000000005297.
- [15] S. Kibwana *et al.*, "Education, Practice, and Competency Gaps of Anesthetists in Ethiopia: Task

- Analysis," *J. Perianesthesia Nurs.*, vol. 33, no. 4, pp. 426–435, 2018, doi: 10.1016/j.jopan.2017.02.001.
- [16] F. Mihretu, "The current state of anesthesia safety in a third world country : a cross-sectional survey among anesthesia providers in," pp. 1–8, 2021.
- [17] T. Bashford, "Anaesthesia in Ethiopia: Providers' perspectives on the current state of the service," *Trop. Doct.*, vol. 44, no. 1, pp. 6–13, 2014, doi: 10.1177/0049475513512642.
- [18] F. N. Blaise Pascal *et al.*, "Practice of standard monitoring during anaesthesia in hospitals of North Kivu: A survey of health facilities of the health antenna of Butembo," *BMC Health Serv. Res.*, vol. 20, no. 1, pp. 1–8, 2020, doi: 10.1186/s12913-020-05076-x.
- [19] I. Epiu *et al.*, "Working towards safer surgery in Africa; A survey of utilization of the WHO safe surgical checklist at the main referral hospitals in East Africa," *BMC Anesthesiol.*, vol. 16, no. 1, pp. 1–7, 2016, doi: 10.1186/s12871-016-0228-8.
- [20] T. B. Melekie and G. M. Getahun, "Compliance with Surgical Safety Checklist completion in the operating room of University of Gondar Hospital , Northwest," *BMC Res. Notes*, pp. 1–7, 2015, doi: 10.1186/s13104-015-1338-y.
- [21] A. Hinova and R. Fernando, "The preoperative assessment of obstetric patients," *Best Pract. Res. Clin. Obstet. Gynaecol.*, vol. 24, no. 3, pp. 261–276, 2010, doi: 10.1016/j.bpobgyn.2009.12.003.

## 9. Annexes

### Annex 1 Information sheet & consent form

Jimma University, Jimma town, Ethiopia

**Introduction:** Good day! I am \_\_\_\_\_ from JUMC and working with investigator **Tsega Firdu (MD)** who is doing her Thesis for partial fulfillment of the requirement for a specialty certificate in anesthesiology. I kindly request you to lend me your attention to explain about the issue raised here below.

**Purpose:** The study will be, helpful to assess utilization of safe obstetrics anesthesia protocol among anesthesia providers during cesarean section from August to October, 2021 at JUMC. The Information collected during this study could be used by the MOH, JUMC, organizations supporting the services, and researchers, for planning health service improvement or for conducting further studies on quality health services. Furthermore, the main aim of this study is to write a thesis as a partial requirement for the fulfillment of specialty certificate in anesthesiology.

**Procedure, risk and duration:** First of all the providers were selected to take part in this study because of convenience. The data will be collected after the mother presents to the OR for cesarean section and the anesthesia provider gives the anesthesia to the mother. The risks of being participated in this study are very minimal, only taking few minutes from your day. Other than this, the study will not cause any physical harm on anybody or the organization.

**Confidentiality:** The information provided will be confidential .There will be no evidence that will identify you. The findings of the study will be general for the study population and will not reflect anything particular of individual person. The questioner will be coded to exclude showing names; no references will be made on reports that could link participants to the research.

**Risks and discomforts:** No subject is obliged to take part in this study and you may withdraw from the study any time you want.

Would you be willing to participate in the study?

1. Agree \_\_\_\_\_

2. Disagree \_\_\_\_\_

**Signature of the data collector:** \_\_\_\_\_

የመጠይቅ ፈቃድ

ጂማ ዩኒቨርሲቲ ጤና ሳይንስ ኮሌጅ ፣ህክምና ትምህርት ቤት፣የአንስቴዥሎጂ ትምህርት ክፍል

የመጠይቅ ፈቃደኛነት ቅጽ

ስሜ \_\_\_\_\_ ይባላል። እኔ በጂማዩኒቨርሲቲ በአንስቴዥሎጂ ትምህርት ክፍል የምርምር ቡድን ዉስጥ አንድ አባል ነኝ። የዚህ መጠይቅ አላማ.

የ በማዋለጃ ቀዶ ህክምና ክፍል የሚድረገውን የወላዶች ክትትል እና ተያያዥ ነገሮችን ለማዋቅ የሚደረግ ምርምር/ጥናት /መረጃ መሰብሰብ ነው።

እርስዎ አንድ የጥናቱ ክፍል አድርጌ ስመርጥ አስፈላጊ የሆኑ መረጃዎችን እንደሚሰጡኝ በማሰብ ነው።

በጥናቱ ለመሳተፍ ፈቃደኛ ከሆኑ ከእርስዎ የሚገኘው ማንኛውም መረጃ በሚስጥር ይጠበቃል። ለዚህም ሲባል የእርስዎ ሥም እና አድራሻ አይገለጽም። እንዲሁም ከጥናቱ በኋላም በማዋለጃ ቀዶ ህክምና ክፍል የሚድረገውን የወላዶች ክትትል እና ተያያዥ ነገሮችን ለማዋቅ ይረዳል።

የቃል ሥምምነት

የዚህ ጥናት ዓላማው ገብቶኝ በጥናቱ ለመሳተፍ

ሀ. ፈቃደኛ ሆኛለሁ ለ. ፈቃደኛ አይደለሁም

በጥናቱ ለመሳተፍ ፈቃደኛ ከሆኑ ቃለመጠይቁን መቀጠል ይቻላል።

ፈቃደኛ ከሆኑ የመጠይቁ መለያ ቁጥር \_\_\_\_\_ መጠይቁ የተካሄደበት ቀን \_\_\_\_\_

የጠያቂው ስምና ፈርማ \_\_\_\_\_

የሱፐርቪይዘር ስምና ፈርማ \_\_\_\_\_ ጥናቱን በተመለከተ ማንኛውም አይነት ጥያቄ ካላችሁ

የሚከተለውን አድራሻ ተጠቀሙ። tsegafirdu.tf@gmail.com



## Informed consent form Afaan Oromo version

Walii galitee

Ani Obboo/addee/Dr \_\_\_\_\_ , miseensa garee qorannoo irra.

Qorannoon kun kan inni irratti xiyyeefate, waa'ee yaalamtota kutaa da'umsaati irratti.

Kanaafuu qorannoo kana irratti wanta isin irraa eegamu akka nuuf gootan kabajaan isin gaafanna. Kunis ammoo fayyaa yaalamtota kutaa da'umsaa irratti fayidaa fi jijjiirama guddaa ni fida.

Waliigaltee fi eeyyama kessaniin malee iccitii keessan nama biraaf yookin ammoo waajjira tokkoofuu akka dabarsinee hin kenninee waadaa isiniif galla.

Yoo qorannoo kana irratti hirmachuu kessan waliigallee, gaaffii waliigalaa irraa isiniif jalqabna. Deebii keessan kan dhugaa irratti hundahee yoo kennitan, faayidaa jijjiirama fayyaatiif nu gargaara.

Qorannoon kun karaa univarsiitii Jimma irraa fudhatama argatee jira. Kanafuu qorannoo kanarratti hirmaachuuf fedhii qabduu?

1. nanqaba ..... Deebiin nanqaba yoo jette gaaffii itti anutti fufi.

2. Hinqabu ..... deebiin hinqabu yoo jette , galatoomaa jedhiiti gaaffii addaan kuti.

Fedhii qorannoo adeemsiisuuf yaada namarraa kan fuudhu.

Maqaa \_\_\_\_\_

guyyaa gaaffii itti gaafatame ...../...../..... mallattoo.....

Hordofaa isaatiin mirkanaa'uu kan muli'isu

Maqaa.....guyyaa...../...../.....mallattoo.....

## Annex 2 Questionnaire

Study number \_\_\_\_\_

### I. Professional aspects

1. Age
2. Sex
  - a. Male
  - b. Female
3. Duration of experience
  - a. 6months - 2 years
  - b. 2 - 5 years
  - c. >5 years
4. Professional training
  - a. Physician anesthesia provider
    - i. Consultant
    - ii. Resident
  - b. Non physician anesthesia provider
    - i. BSc
    - ii. MSc
    - iii. MSc student

### II. Facility and equipment

#### Operating room

1. Lighting  
Yes  No
2. Tilting operating table  
Yes  No
3. Supply of oxygen  
Yes  No
4. Oropharyngeal airways  
Yes  No
5. Facemasks  
Yes  No
6. Laryngoscope and appropriate sized laryngoscope blades for both adult and pediatric patients

- Yes  No
7. Appropriate sized endotracheal tubes for adult and pediatric patients
- Yes  No
8. Intubation aids (e.g., Magill forceps, bougie, stylet)
- Yes  No
9. Functional suction device and suction catheters
- Yes  No
10. Adult and pediatric self-inflating bags
- Yes  No
11. Equipment for IV infusions
- Yes  No
12. Equipment for spinal anesthesia
- Yes  No
13. Sterile gloves
- Yes  No
14. Access to a defibrillator
- Yes  No
15. Stethoscope
- Yes  No
16. Pulse oximeter
- Yes  No
17. Carbon dioxide detector
- Yes  No
18. Non-invasive blood pressure monitor with appropriate sized cuffs for adult and pediatric patients
- Yes  No

**Post anesthesia recovery area**

19. Lighting
- Yes  No
20. Supply of oxygen
- Yes  No
21. Functional suction device and suction catheters
- Yes  No
22. Facemasks and ambu bag

- Yes  No
23. Electrocardiogram
- Yes  No
24. Access to a defibrillator
- Yes  No
25. Pulse oximeter
- Yes  No
26. Non-invasive blood pressure monitor with appropriate sized cuffs for adult and pediatric patients
- Yes  No

**III. Medications and intravenous fluids**

27. Ketamine
- Yes  No
28. Diazepam
- Yes  No
29. Morphine
- Yes  No
30. Local anesthetic (e.g., lidocaine or bupivacaine)
- Yes  No
31. Dextrose
- Yes  No
32. Normal saline or Ringer's lactate
- Yes  No
33. Adrenalin
- Yes  No
34. Atropine
- Yes  No
35. Paracetamol
- Yes  No
36. Non-steroidal anti-inflammatory medicine
- Yes  No
37. Magnesium
- Yes  No

#### IV. Monitoring

##### Intraoperative

38. Pulse rate and quality

Yes  No

39. Tissue oxygenation and perfusion

Yes  No

40. Respiratory rate and quality

Yes  No

41. Breathing system bag movement

Yes  No

42. Breath sounds

Yes  No

43. Heart sound

Yes  No

44. Audible signals and alarms at all times

Yes  No

45. Continuous use of pulse oximetry

Yes  No

46. Intermittent noninvasive blood pressure monitoring

Yes  No

47. Carbon dioxide detector for patients undergoing intubation

Yes  No

##### Postoperative

48. Tissue oxygenation and perfusion

Yes  No

49. Respiratory rate and quality

Yes  No

50. Pulse rate and quality

Yes  No

51. Continuous use of pulse oximetry

Yes  No

52. Intermittent noninvasive blood pressure monitoring

Yes  No

53. Assessment of pain score using appropriate scale

Yes  No

**V. Conduct of anesthesia**

54. Anesthesia provider present throughout the procedure

Yes  No

55. Trained anesthetic assistant throughout the procedure

Yes  No

56. Preanesthetic assessment

Yes  No

57. Was the anesthesia work station checked before starting the case?

Yes  No

58. Was WHO safe surgery checklist completed?

Yes  No

59. Anesthesia chart filled

Yes  No

60. Was there appropriate transfer of care to PACU?

Yes  No

61. Post op pain management plan by anesthesia provider

Yes  No

62. Do you know about the International Guidelines for Safe Anaesthesia care for Obstetric Patients?

Yes  No

If no, reason \_\_\_\_\_

63. Do you perform pre-anesthetic evaluation in all obstetric cases

Yes  No

If you answered no, reason \_\_\_\_\_

64. Do you always check patient's preoperative informed consent?

Yes  No

If you answered NO, reason \_\_\_\_\_

65. Do you always check patient's identification and type of surgery?

Yes  No

If no, reason \_\_\_\_\_

66. Do you think there are adequate anesthesia personnel in your department?

Yes  No

If no, reason \_\_\_\_\_

67. Do you always have a trained anesthesia assistant?

Yes  No

If no, reason \_\_\_\_\_

68. Do you have training in use and safety of equipment?

Yes No

69. Is Anesthesia provided, lead or over seen by an anesthesiologist?

Yes No

70. Do you have access to continuous education activity in your department?

Yes  No

If no, reason \_\_\_\_\_

71. You usually monitor your patients' ventilation during (GA)

	Always used	Sometimes used	Never used
Stethoscope			
Reservoir bag movement			
Capnograph			

## Equipment

72. Do you always formally perform pre-anesthetic checking of anesthetic machine and circuit?

Yes  No

If no, reason \_\_\_\_\_

73. Do you monitor patient with electrocardiography (EKG) in every case?

Yes  No

If no, reason \_\_\_\_\_

74. Do you monitor patient with pulse oximeter in every case?

Yes  No

If no, reason\_\_\_\_\_

75. Do you always have a functional suction available for each case?

Yes  No

If no, reason\_\_\_\_\_

76. You have all monitors on during spinal anesthesia

	Present	Functioning	Absent
Pulse oximeter			
Automated blood pressure monitor			
Manual Blood Pressure monitor			
ECG			
Thermometer			
Capnograph and end tidal measurement			
Stethoscope			
Defibrillator			

77. Do you have IV infusers available for use?

Yes  No

78. Do you have a difficult airway cart, available for emergency difficult airways

Yes  No

**Post anesthesia care unit**

79. Are your patients monitored and followed for at least half an hour during postoperative period?

Yes  No

If No, reason\_\_\_\_\_

80. Are all of your patients are taken care of in the recovery room?

Yes  No

If no, reason\_\_\_\_\_



81. Do your patients have post op pain relief?

Yes  No

If No, reason \_\_\_\_\_

82. Do you have basic ICU services available, dedicated for monitoring any obstetric post op patient?

Yes  No

**Assurance of principal investigator**

The undersigned agrees to accept responsibility for the scientific ethical and technical conduct of the research project and for provision of required progress reports as per terms and conditions of the Institute of health faculty of medical science in effect at the time of grant is forwarded as the result of this application.

Name of the student: \_\_\_\_\_ Signature \_\_\_\_\_

Date: \_\_\_\_\_

**Approval of the first advisor**

Name of First Advisor: \_\_\_\_\_ Signature \_\_\_\_\_

Date: \_\_\_\_\_

Name of Second advisor: \_\_\_\_\_

Date: \_\_\_\_\_