



INCIDENCE AND ASSOCIATED RISK FACTORS OF AWARENESS WITH RECALL
UNDER GENERAL ANESTHESIA IN NON-CARDIAC AND NON-OBSTETRIC PATIENTS
IN TIKUR ANBESSA SPECIALIZED HOSPITAL, ADDIS ABABA, ETHIOPIA, 2021 G.C

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STATEMENT OF DECLARATION

I hereby declare and affirm that this research is my own original work as a partial fulfillment of the requirement for the speciality certificate training in Anesthesiology, Critical Care and Pain Medicine. I have followed all the ethical consideration in the preparation, data collection, data analysis and completion of this research. All the sources of the material used for this research and all people and institution who gave support for this work are fully acknowledged. I have cited and referenced all the sources used in this research document.

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TABLE OF CONTENTS

PAGE NO

Statement of declaration.....	i
Acknowledgement.....	ii
List of tables.....	v
List of figures.....	vi
Abbreviations.....	vii
Abstract.....	viii
1. Introduction.....	1
1.1. Background.....	1
1.2. statement of the problem.....	2
1.3. significant of the study.....	2
2. Literature review.....	3
3. Objectives.....	6
3.1. General objectives.....	6
3.2. Specific objectives.....	6
4. Research Methods and Materials.....	7
4.1. Study area and period.....	7
4.2. Study design.....	7
4.3 Population.....	7
4.3.1 Source population.....	7
4.3.2 Study Population.....	7
4.3.3 study unit.....	7
4.4 Eligibility criteria.....	7

4.4.1. Inclusion Criteria.....	7
4.4.2. Exclusion Criteria.....	7
4.5 Sample size determination.....	8
4.6 Sampling technique.....	8
4.7 Data collection.....	8
4.8. Study Variables.....	9
4.8.1 Dependent variables (outcome variable):.....	9
4.8.2. Independent variables:.....	9
4.9 Operational definition.....	9
4.10 Data quality assurance.....	10
4.11 Data entry and analysis.....	10
4.12 Ethical issue.....	10
4.13 Result dissemination.....	11
6. Discussion.....	18
7. Strength and Limitation of the study.....	20
8. Conclusion.....	21
9. Recommendation.....	21
Reference.....	22
Index.....	24

LIST OF TABLES

Table 1 : frequency and percentage of risk factors in the study participants in Tikur Anbessa specialized hospital, Addis Ababa, Ethiopia, 2021(N=341).....	13
Table 2 : Frequency and percentage of surgical procedures performed in Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia, 2021(N=341).....	14
Table 3 : FREQUENCY and percentage of the last thing patient remember and the first thing remember after waking up Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia, 2021(N=341).....	15
Table 4 : Frequency and percentage of intra-operative events reported among patients who had awareness with recall under general anesthesia in Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia, 2021(N=341).....	15
Table 5 : Bi-variant and Multi-variable logistic regression among patients who develop awareness with recall under general anesthesia in Tikur Anbessa Specialized Hospital Addis Ababa, Ethiopia, 2021 (N=341).....	16

LIST OF FIGURES

Figure 1 : Sex distribution of a study participant in Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia, 2021.....	12
Figure 2 : Age distribution of a study participant in Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia, 2021.....	12

ABBREVIATIONS

ASA.....American Society of Anesthesiologist

AWR..... Awareness with Recall

GA.....General Anesthesia

MAC..... Minimum Alveolar Concentration

OR.....Operation Room/ Odds Ratio

PACU..... Post Anesthesia Care Unit

PTSD.....Post Traumatic Stress Disorder

RSI.....Rapid Sequence Induction

SD.....Standard Deviation

TASH.....Tikur Anbess Specialized Hospital

TIVA.....Total Intravenous Anesthesia

ABSTRACT

Introduction: General anesthesia is the complex process of administering drugs to induce hypnosis, amnesia, and suppression of stress response to surgical stimuli and create a quiet surgical field.

Anesthesia awareness, unintended and unwanted peri-operative adverse event, is characterized by a patient's ability to recall events happening during anesthesia. Intra-operative awareness may also predispose patients for long-term psychological sequelae.

Objective: To assess the incidence and associated risk factors of awareness with recall under general anesthesia in non-cardiac and non-obstetric patients from April – October 2021 G.C in TASH, Addis Ababa, Ethiopia.

Methodology: single-centered institutional based prospective cross sectional study was conducted at Tikur Anbesa Specialized Hospital from April – October 2021 G.C. The modified Brice questionnaire and Aldrete score were used to assess intra-operative awareness with recall under general anesthesia and wakefulness respectively. Patients were selected by systematic random sampling technique and assessed at the PACU and ward. After the data was collected it was entered to SPSS version 25, cleaned and analyzed. Then the degree of association between variables was assessed using logistic regression. Finally, p-value less than 0.05 were considered statistical significant.

Results of the Study: The study population included 354 patients, who underwent surgery under general anesthesia during the study period from April – October 2021 G.C. Male 200 (58.7%) participants were greater than female 141 (41.3%). The minimum and maximum ages of the respondents were 18 and 89 with mean of 39.3+ 15.2 (SD).

The incidence of awareness with recall under general anesthesia was 11.7% and the incidence of dreaming found to be 9.1%. Awareness has been associated with the use of muscle relaxant (OR 2.793(1.872-1.948), p value 0.003) and having chronic pain (OR 2.929(1.592-1.821), p value 0.042)

Conclusions: The incidence of awareness in this study was 11.7%. Under the finding of this study, we conclude that the incidence of awareness with recall under general anesthesia is higher than most global studies. However, the risk factors and symptoms of awareness were comparable with most literatures. The use of muscle relaxant and having chronic pain were identified as risk factors in this study. When the incidence of dreaming was 9.3%, being female is a risk factor for dreaming.

Recommendation: The study has recommended the anesthesia provider to give much emphasis on intra-operative awareness, to be vigilant on dosage of relaxant, hypnotics and inhalational, prevention and pain management, follow the patient in the postoperative period, and check anesthesia equipment's and machine every day for every patient. We recommend the hospital to avail anesthetic gases monitor sensors, and anesthesia depth monitors.

Key words: Awareness, Dreaming, Recall, General anesthesia

1. INTRODUCTION

1.1. BACKGROUND

General anesthesia is the complex process of administering drugs to induce hypnosis, amnesia, and suppression of stress response to surgical stimuli and create a quiet surgical field. However, it is difficult to define the depth of anesthesia, especially in developing countries where invasive monitors are limited. (1) The main aim of anesthesia is to alleviate patients from stress/anxiety and pain, and maintain the physiologic state. However, depending on the intensity of surgical stimulation and different patient pathophysiology, there will be an imbalance between drug requirement and drug administration, which results in variable depth of anesthesia. When a patient has been given less than the desired dose of a drug, the patient will develop intraoperative awareness — the ability of memorizing or recalling events during a surgical procedure.(1)(2)

Awareness is one of the rare but potentially disastrous complications of anesthesia. It is characterized by explicit memorizing of events happening during anesthesia. Remembering of events of anesthesia and surgery are a common concern raised by most patients before undergoing anesthesia(3)(4)Awareness was recognized since the nineteenth century when the first general anesthesia with ether was started for tooth extractions after Gilbert Abbot remembered all events without postoperative pain.(5) Patient with awareness may experience different adverse events including nightmares, sleepiness, insomnia, anxiety and even post-traumatic stress disorders (PTSD). (6)(7)(8)

Causes and risk factors

The causes for awareness are not clearly identified and it is multi-factorial. However, patient requirement for light anesthesia, increased anesthetic requirement, and machine malfunction or misuse resulting in an inadequate delivery of anesthesia, are among the commonest causes incriminated. It can also be classified according to their source like patient related, surgery related and anesthesia related.(9)(10)(4)(11)

1.2. STATEMENT OF THE PROBLEM

Sometimes, it is not uncommon for doctors and nurses to hear patients complaining about their experience to their close family and friends after surgery. The patient may feel pain, hear the sound of falling instruments, be unable to move extremities, and feel anxiety during anesthesia. Intraoperative awareness is one of the perioperative adverse events which are neglected by anesthesia provider and surgeon during operation particularly in low resource settings. Though the magnitude of intraoperative awareness is low in the westerns (12), the incidence in the developing countries were higher and ranging from 1.07-13.3% (13)(8)(14)(15). In addition, there were no study that deals on the impact of awareness, and the effects of anesthesia type on awareness, even on those high risk surgeries such as cesarean delivery and cardiac surgery. The effect of perioperative awareness following anesthesia is a concerning issue for the patient and it may resulted in the development of post-operative insomnia, anxiety, nightmare and post-traumatic stress disorder and other chronic psychological squealae. (6)(7)

There is only a single study in Ethiopia that studies the magnitude and associated risk factors of awareness with recall.(14) Intra-operative awareness of anesthesia is almost neglected in low-income countries, particularly in Africa. There was no similar study done in Addis Ababa so that the aim of this study was to answer the questions about the incidence of awareness with recall under general anesthesia (GA), and its associated risk factors.

1.3. SIGNIFICANT OF THE STUDY

Even though the incidence and impact of awareness is high in low-income countries, particularly in Africa, low attention has been given by both anesthesia providers and surgeons'. There were very few studies conducted so far. Therefore, the result of this study will fill the information gap on the magnitude of intra-operative awareness and associated risk factors. The result of this study will also help to improve patient care during perioperative period and possible guideline development. It will also serve as a base line reference for future studies in the study areas. Finally recommendations will be given for respective stakeholders to act accordingly.

2. LITERATURE REVIEW

Incidence of awareness

Awareness after general anesthesia is one of the rare complications occurring with different incidence across the globe. Multiple studies showed the incidence of awareness with recall ranging from 0.0068% to 13.3% in the general population.(3)(16)(13)(8)(14)(17)(18) The incidence is large and reported to be 1.1% -23%, 0.4%-1.3%, and 43% in cardiac, obstetrics, emergency surgery in polytrauma respectively. (10) Most studies report showed that the incidence of awareness in the developed world is lower than in the developing areas.

A multicenter united study conducted by Sebel et al. reported an overall incidence of 0.13% in 19,575 patients after he conducted a study in seven academic institutions. When cases of possible awareness were considered, the incidence of awareness increased to 0.36%. This paper showed the rate of awareness to be 1 to 2 cases per 1000 patients in the US. (12)Pollard et al., conducted a review of 3 Years data from 2002–2004 and the incidence of awareness found to be 0.0068%, or 1 in 14,560 cases.(18) A study conducted in 2020 by Deis et al., on 647,009 cases were analyzed retrospectively from the documented anesthesia data set, giving a calculated incidence of 1:92,429 (0.01%) of awareness with recall (AWR) under general anesthesia.(3)

A study conducted in China by L. Xu et al. in 25 academic institutions found the incidence of intraoperative awareness to be 0.41% from 11,101 patients, which is 3 times the western incidence. (19)

A prospective study conducted on 4001 patients by Errando et al. in England showed that the incidence of AWR found to be 1.0% and 0.8% among all patients and after emergency patients were excluded respectively.(20) According to the Royal College of Anesthetists and the Association of Anesthetists of Great Britain and Ireland under the 5th National Audit Project, the incidence of awareness under anesthesia was estimated to be 1:15,414 in the UK.(21)

A study from India which was conducted by Deepak et al., that includes 1068 adult patients had found the intraoperative awareness to be 0.33% in the general populations and 0.78% when high risk patients were added. (22) The incidence of intraoperative awareness reported from Helsinki after conducted by Ranta et al. in 2612 patients was 0.4-0.7 %. (23)

Literature from Brazil, a multi-center prospective study of 1259 cases conducted in 2014 by Silva et al., reveals the highest incidence of intraoperative awareness. In this study the estimated incidence of

awareness was 2.5% which is the highest from the previous literature's and even comparable and more from the high risk populations.(8)

Although multiple studies were conducted outside of Africa, there were a limited number of studies on our continent. One study conducted in Nigeria by Emannuela for the award of fellowship in anesthesia of the national postgraduate medical college of Nigeria (FMCA) in 2011 G.C showed the incidence of awareness to be 1.07% and that of “possible awareness” 4.6%. The author explained that the higher incidence of awareness in this study was related to low sample size, the anesthesia provider, patient or equipment factors even though this was difficult to prove.(13)

Another study from Africa conducted in Medani Teaching Hospital - Sudan in 2017 by Abdallah AbdalrazigBushirMohummed and Dr. Nawal Mukhtar Mohammed showed the incidence of intraoperative awareness and recall was 13.3%. The researchers set the following factors as the causes for high incidence of awareness in their study. Among the factors, the decreased number of anesthesiologists, lack of proper funding for the hospital and anesthesia department, absence of anesthetic gases monitor sensors in the used anesthesia machine, and absence of anesthesia depth monitors were included. (17)

A study from Debre Tabor showed that the incidence of awareness with recall was 8.2%. Compared to Europe, china, America and even from Nigeria, the incidence is higher but it is lower than a study in Sudan. However there is no explanation from the researcher regarding the reason for high incidence of awareness in Debre Tabor. (14) There is no study in our hospital regarding intraoperative awareness. Therefore this study will determine the incidence of AWR and its associated risk factors in the study area.

RISK FACTORS FOR AWARENESS

Though the occurrence of awareness in the general population without particular risk factor is low, there are different risk factors which predispose patients for high risk of awareness. The major risk for awareness includes overly light anesthesia accounted (87%), increased anesthetic requirements (7%), malfunction of the anesthesia delivery system (5%), and misuse of the anesthesia delivery system (4%). The risk factors can also be classified as patient-related, anesthetic drugs-related and/or surgery type-related. (10)(9)(11)

Patient related

Patient related risk factors promoting awareness include patients with comorbidity (ASA III and above), patients with reduced cardiovascular reserve, and those with chronic pain. A study from China showed

that patients with ASA 3 and above are more likely to experience intraoperative awareness.(9)(19)Because of difficulty in determining appropriate dose of drugs, and difficulty for intubation and longer duration of laparoscopy period, obese patients are prone for intra-operative awareness. Other incriminated factors for awareness include difficult intubation, alcoholics, gender and previous history of anesthesia. (9, 17) Previous history of awareness has a strong association with new development of intraoperative awareness(9)(20)

A. Surgery type related

Surgical procedures commonly predispose patients for awareness includes multiple traumas, cardiac surgery, cesarean section delivery, and emergence surgery. Much literature showed that cardiac surgery carries high risk of awareness. A study from Korea done by Hyun Sik Chung found the incidence of awareness in patients who undergo cardiopulmonary surgery ranges from 1.1- 23%. (10)(24) The incidence of awareness who undergo CABG surgery with opioid- BZN based anesthesia is higher when compared to balanced anesthesia. (9)

The incidence of awareness in obstetric patients was ranging from 0.4 to 1.3%. Rapid sequence induction, light anesthesia, premature lighting of anesthesia is among the risk factors associated with obstetric related awareness(9)(10)

Other high risk surgery for awareness is emergency surgery, poly trauma surgery and night time surgery with incidence of 43%. Hemodynamic instability and hypothermia are the incriminated reasons behind the high risk of awareness in trauma patients.(10)

B. Anesthesia technique related

An observational comparative study from China investigated by Yu and Wu showed that anesthesia with TIVA has greater risk of awareness when compared with balanced anesthesia(4)(12)(9)(10) Late start of infusions from inductions, inappropriate dose calculation, and infusion disconnections are some of the causes for high incidence of awareness in TIVA. (10)

3. OBJECTIVES

3.1. GENERAL OBJECTIVES

To assess incidence and associated risk factors of awareness with recall under general anesthesia in non-cardiac and non-obstetric patients from April – October 2021 G.C in Tikur Anbesa Specialized Hospital, Addis Ababa, Ethiopia.

3.2. SPECIFIC OBJECTIVES

- To describe the incidence of awareness with recall under general anesthesia
- To assess the associated risk factors of awareness with recall under general anesthesia

4. RESEARCH METHODS AND MATERIALS

4.1. STUDY AREA AND PERIOD

The study was conducted at TASH in Addis Ababa, the capital city of Ethiopia. It is one of the biggest hospitals in the country and serves people coming from four corners of the country. Currently TASH gives surgical services in the following departments: Neurosurgery, Cardio-Thoracic surgery, Pediatric surgery, Urological surgery, ENT and orthopedic surgery, gastrointestinal tract surgery, Obstetrics and Gynecology surgery. Anesthesia services are provided by the department of Anesthesiology Critical care and Pain medicine, and anesthesia department. The study was conducted from April – October 2021 G.C. TASH is selected as a study area by its case flow, type and the number of surgeries performed.

4.2. STUDY DESIGN

Institutional based prospective cross sectional study has been used.

4.3 POPULATION

4.3.1 SOURCE POPULATION

All adult patients who have undergone surgical procedure under general anesthesia in TASH during the study period were included.

4.3.2 STUDY POPULATION

All selected adult patients who have undergone surgical procedure under general anesthesia in TASH during the study period were included.

4.3.3 STUDY UNIT

Each individual participated in the study

4.4 Eligibility criteria

4.4.1. INCLUSION CRITERIA

All adult patients above 18 years of age with normal mental status were included.

4.4.2. EXCLUSION CRITERIA

Patients not ex-intubated after surgery, patient undergoing conscious sedation and patients who refused to participate were excluded.

4.5 SAMPLE SIZE DETERMINATION

Sample size was determined by using a single population proportion formula.

The proportion of awareness with recall was 8.2 %. With a confidence interval of 95% and the margin of error of 3% (the marginal of error was decreased to 3% to increase the sample size)

$$\text{Sample size } n = \frac{[(Z \alpha/2)^2 * p (1-p)]}{d^2}$$

Where: - Z= Standard normal distribution value at 95% CI= (1.96)

p= proportion of awareness; P= 8.2 % (.082)

d= margin of error (0.03)

n= sample size

$$\text{Therefore, } n = \frac{1.96^2 * 0.082(1-0.082)}{(0.03)^2} = 322$$

Then, 10% of attrition rate is added and final sample size will be n= 354

4.6 SAMPLING TECHNIQUE

A systematic random sampling technique was used to collect data. The average numbers of cases done for the past six consecutive months were determined from OR registration book in each table, and then the average monthly and daily patients flow were determined. Based on this, the skip interval was calculated to select study participants and the first participant was selected by lottery methods in PACU. Data was collected at PACU and ward from a patient undergoing surgery under general anesthesia at the first 24hrs, 3rd, 5th and 7th day of surgery. The last response of the patient was taken as a final response.

4.7 DATA COLLECTION

By using structured questionnaires, data on demographic characteristics, patient-related variables, anesthesia-related variables, and surgery-related variables were collected by 2 PACU nurses and Anesthesiology residents after training has been given by principal investigators for one day. Brice Questionnaire was used after being translated to Amharic and medical record of all patients was reviewed. Though the Amharic questionnaire was not validated, it was used to other area. Data was retrieved at

PACU and in the ward after patients have been awoken from anesthesia, which was confirmed by using Aldrete score.

4.8. STUDY VARIABLES

4.8.1 DEPENDENT VARIABLES (OUTCOME VARIABLE):

Awareness with recall

4.8.2. INDEPENDENT VARIABLES:

- Patient related factors: sex, age, ASA physical status, alcohol history, medical comorbidity, previous history of awareness, chronic pain history, smoking history
- Surgery related factors: types of surgical procedure, urgency of surgery
- Anesthesia related factors: drugs given as a premedication, induction agents, neuromuscular blockers, use of opioids, use of inhalations

4.9 OPERATIONAL DEFINITION

Awareness: - defined as patient's postoperative ability to recall or remember events explicitly that occurred between the induction of anesthesia and the regaining of consciousness.

Explicit memory: - defined by the patient's ability to recall specific events that took place during general anesthesia

No awareness: -no reported explicit events or a vague description occurring between induction and extubation period

Recall: - is the patient's ability to retrieve stored memories

General anesthesia: -the process of administering medications to render a patient insensible to pain (analgesia); make the patient unaware of the procedure (amnesia); and muscle relaxation.

Dreaming: -Defined as any experience that was described by the patient as dreaming and was thought by the patient to have occurred between the induction of anesthesia and the first moment of consciousness after anesthesia.

Chronic pain: defined as patients having back pain, joint pain, myalgia, headache and other unspecified pain.

Difficulty intubation: defined as either an anticipated or unanticipated difficulty or failure is experienced with tracheal intubation.

4.10 DATA QUALITY ASSURANCE

Data quality were assured through carefully designed structured questionnaire and pre-test was performed on 5% of individuals before the actual data collection time in order to determine the validity of the instrument and to modify the questionnaire accordingly. Appropriate modification has been taken before the actual data collection. Also, the quality of data was ensured through training of data collectors, close supervision and prompt feedback, and reviewing each of the completed questionnaires daily.

4.11 DATA ENTRY AND ANALYSIS

After the data was collected and completeness confirmed, it was entered to the SPSS version 25. Data cleaning was performed to check for outliers, missed values and any inconsistencies before the data were analyzed using the software and dropped from the analysis. Bi-variant and multi-variant logistic regressions were used to determine the level of association between the dependent and independent variables. Descriptive statistics like frequency tables, charts and descriptive summaries were used to describe the independent variables. The association was considered significant when a p value is less than 5% at 95% confidence interval.

4.12 ETHICAL ISSUE

Ethical clearance and support letter have been obtained from department of Anesthesiology, Critical Care and Pain Medicine to conduct the study.

Verbal informed consent was taken from respondents after explanation is given on the objective, procedure, potential risks and benefits of participating in the study and the right to withdraw from the study at any time throughout their interview.

Study participants were assured about their response confidentiality by removing personal identifications instead of using codes and not sharing their information to anyone other than the study team. The interview was held with strict privacy and participants have been assured of confidentiality whenever necessary.

4.13 RESULT DISSEMINATION

The results of the study will be presented to Department of Department of Anesthesiology, Critical care and Pain Medicine. All possible effort will be made to publish in a relevant scientific journal and disseminated online

5. Result

5.1 Socio-demographic Characteristics

The study population included 354 patients, who underwent surgery under general anesthesia during the study period from April – October 2021 G.C. Among these 13 patients were excluded due to incomplete data. Male 200 (58.7%) participants were greater than female 141 (41.3%). The minimum and maximum ages of the respondents were 18 and 89 with mean of 39.3 ± 15.2 (SD).

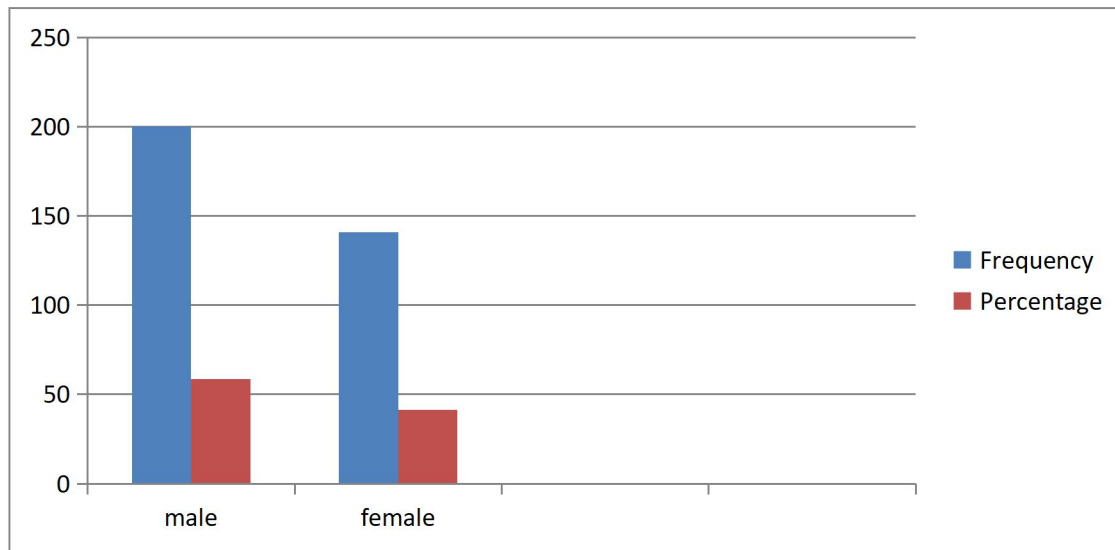


FIGURE 1: SEX DISTRIBUTION OF A STUDY PARTICIPANT IN TIKUR ANBESSA SPECIALIZED HOSPITAL, ADDIS ABABA, ETHIOPIA, 2021

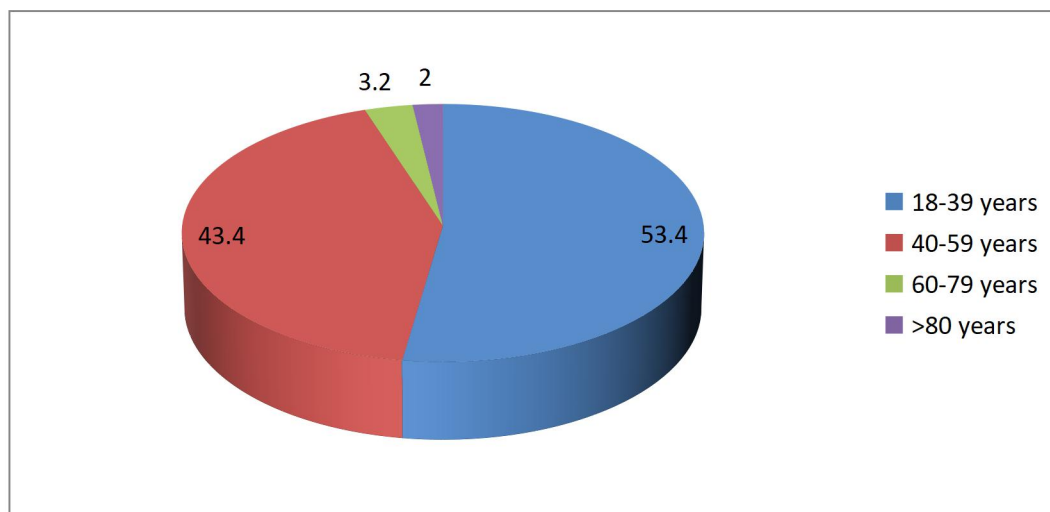


FIGURE 2: Age distribution of a study participant in Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia, 2021

5.2 Risk factors

In this study majority of patients were ASA I 176 (51.6%), and the rest were ASA II 137 (40.2%), ASA III 20 (5.9%) and ASA IV 8 (2.3%). Among the respondents, 99 (29) were found to have chronic illness, 57 (16.7%) were taking alcohol, 16 (4.7) of patients were smoker, 19 (5.6%) had history of chronic pain and three patients had history of awareness in previous surgeries.

TABLE 1: FREQUENCY AND PERCENTAGE OF RISK FACTORS IN THE STUDY PARTICIPANTS IN TIKUR ANBESSA SPECIALIZED HOSPITAL, ADDIS ABABA, ETHIOPIA, 2021(N=341)

Variables		Frequency	Percent
ASA status	ASA I	176	51.6
	ASA II	137	40.2
	ASA III	20	5.9
	ASA IV	8	2.3
Alcohol	Yes	57	16.7
	No	284	83.3
Smoking	Yes	16	4.7
	No	325	95.3
Chronic pain	Yes	19	5.6
	No	322	94.4
Medical illness	Yes	99	29
	No	242	71
Previous history of awareness	Yes	3	0.9
	No	339	99.1

5.3 Anesthesia related factors and surgical procedures

Both normal (218, 63.9%) and modified rapid sequence induction (RSI) (123, 36.1%) were used during intubation. Thiopental 176 (51.6%), propofol 143 (41.9%), ketamine 9 (2.6%) and ketofol 8 (2.3%) were used as induction of anesthesia. Volatile anesthetics (halothane 87.7%), and isoflurane 12.3%) were used as a maintenance of anesthesia and supplemented with opioids (morphine 71.8%, fentanyl 15.8%, and pethidine 10.9%). Of the patients, 16.1% were received premedication, usually dexamethasone (3.2%), followed by diazepam (2.6%), metoclopramide (2.1%), and lidocaine (1.8). Muscle relaxants (78.3%) were used for both induction and maintenance in 276 (78.3%) of patients. Different adjuvant drugs, like lidocaine 25 (7.3%), dexamethasone 17 (5.0%), Mgso4 14 (4.1%), fentanyl 7 (2.1%), diazepam 5 (1.5%), and

paracetamol 5 (1.5%), were used. Most of the respondents were elective 231 (67.7%) while the rest 110 (32.3%) were emergency.

TABLE 2: FREQUENCY AND PERCENTAGE OF SURGICAL PROCEDURES PERFORMED IN TIKUR ANBESSA SPECIALIZED HOSPITAL, ADDIS ABABA, ETHIOPIA, 2021(N=341)

Procedures	Elective		Emergency		Total
	Frequency	Percent	Frequency	Percent	
Neurosurgery	34	14.4	12	11.4	46
Thoracic surgery	33	14.0	4	3.8	37
ENT surgery	25	10.6			25
Endocrine surgery	10	4.2			10
Abdominal surgery	50	21.3	34	32.4	84
Gynecologic surgery	18	7.6	11	10.5	29
Urology surgery	29	12.3	4	3.8	33
Orthopedics surgery	23	9.7	17	16.2	40
Vascular surgery	14	5.9	16	15.2	30
Trauma surgery			7	6.7	7
Total	236	100	105	100	341

5.4 Prevalence of awareness

Among 341 respondents, 278 (81.5%) were assuming that the surgery was done under complete sleeping conditions, whereas 63 (18.5%) were not.

TABLE 3: FREQUENCY AND PERCENTAGE OF THE LAST THING PATIENT REMEMBER AND THE FIRST THING REMEMBER AFTER WAKING UP TIKUR ANBESSA SPECIALIZED HOSPITAL, ADDIS ABABA, ETHIOPIA, 2021(N=341)

Variables	Frequency	Percent (%)
The last thing patient remember		
Feeling mask on face	84	24.6
Being with family	74	21.7
Being in the pre-op area	57	16.7
Seeing the operating room	54	15.8
Burning or stinging in the IV line	27	7.9
Hearing voices	25	7.3
Smell of gas	16	4.7
The first thing you remember after waking up		
Hearing of voice	143	41.9
Nothing	47	13.8
Feeling breathing tube	42	12.3
Feeling mask on the face	32	9.4
Feeling pain	30	8.8
Being in the recovery room	19	5.6
Seeing the operating room	14	4.1
Being with family	14	4.1
Total	341	100

Forty cases (11.7%) were identified with awareness and 33 (9.7%) patients were reporting dreaming. Among 40 cases who had awareness, 70% had auditory perception, 10% were experienced anxiety/stress, 10 % was felt pain, 5% sensing surgical events and the remaining experienced unable to move or breath and sensation of breathing tube. Most patients claimed pain 141 (41.3%) and anxiety 122 (35.8%) as their worst experience during operations.

Among patients with dreaming, 8 patients experienced horrifying sounds and events while other reported being with family, going to the toilet, bitten by ants, collecting crops from the farm area, surrounded by old people and 4 patients with unspecified dreams.

TABLE 4: Frequency and percentage of intra-operative events reported among patients who had awareness with recall under general anesthesia in Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia, 2021(N=341)

Events		Frequency	Percentage
Nothing		301	88.3
Hearing voices		28	8.2
Sensing surgical events		2	0.6
Unable to move or breath		1	0.3
Anxiety or stress		4	1.2
Feeling pain		4	1.2
Sensation of breathing tube		1	0.3
Dreaming	Yes	33	9.7
	No	308	90.3
Worst thing about the operation	Anxiety	122	35.8
	Pain	141	41.3
	Recovery process	21	6.15
	Unable to carry out usual activities	12	3.52
	Others	45	13.23

5.4 Factors associated with awareness

Binary logistic regression was performed to assess the association of each independent variable with dependent variable and the factors that showed a p-value of 0.25 and less were added to multivariate regression model to detect the statistically significance variable. On binary logistic regression, factors such as ASA status, history of chronic pain, use of premedication, use of muscle relaxant, smoking history, and orthopedics surgery were entered to multivariate analysis. On multi-variant logistic regression only uses of muscle relaxant and history of chronic pain were significantly associated. Other variables like age, sex, history of previous awareness, alcohol intake, smoking, premedication use, type of surgery, type of operation, use of inhalations and opioids were not having statistically significant association on this study. Awareness was associated with use of muscle relaxant (OR2.793 (1.872-1.948), p value 0.003) and having chronic pain (OR 2.929(1.592-1.821), p value 0.042). Patient with muscle relaxant were 2.8 times higher chance of developing awareness when compared to none-relaxed patients. Dreaming had associated with a female gender (OR 2.375, CI 1.038-5.433, and P value 0.036) in this study

TABLE 5: Bi-variant and Multi-variable logistic regression among patients who develop awareness with recall under general anesthesia in Tikur Anbessa Specialized Hospital Addis Ababa, Ethiopia, 2021 (N=341)

Variables	Frequency (%)	Bi-variant	Multivariate			
Age		Crude OR	P value	Adjusted OR	Pvalue	
18-39	177(51.9)	0.510 (0.051-5,142)	0.568	1.447(0.177-11.83)	0.731	
40-59	148 (43.4)	0.939 (0.095-9.332)	0.957	1.212(0.145-10.09)	0.859	
60-79	14(3.2)	1	1	1	1	
>80	2					
Sex						
Male	200 (58.7)	0.974(0.442-2.149)	0.948	0.948(0.486-1.848)	0.875	
Female	141(41.3)	1	1	1	1	
ASA status						
ASA I	176(51.6)	5.421(0.62447.617)	0.125	0.3(0.056-1.611)	0.160	
ASA II	137(40.2)	2.391(0.327-	0.390	0.454(0.085-2.423)	0.333	
ASA III	20(5.9)	17.485)	0.957	0.750(0.108-5.216)	0.771	
ASA IV	8(2.3)	0.941(0.107-8.272)	1	1	1	
Alcohol						
Yes	57(16.7)	0.710(0.275-1.833)	0.479	1.286(0.559-2.957)	0.554	
No	284(83.3)	1	1	1	1	
Smoking						
Yes	16(4.7)	0.481(0.133-1.745)	0.265	2.676(0.819-8.738)	0.103	
No	325(95.3)	1	1	1	1	
chronic pain						
Yes	19(5.6)	0.349(0.098-1.248)	0.105	2.929(1.592-1.821)	0.042	
No	322(94.4)	1	1	1	1	
Premedication						
Yes	55(16.1)	0.673(0.260-1.743)	0.415	1.351(0.586-3.114)	0.480	
No	286(83.9)	1	1	1	1	
Difficult intubation						
Yes	2(0.6)	0.317(0.071-1.407)	0.131	2.359(0.621-8.964)	0.207	
No	339(99.4)	1	1	1	1	
Muscle relaxant						
Yes	267(78.3)	3.447(1.517-7.831)	0.003	2.793(1.872-1.948)	0.003	
No	74(21.7)	1	1	1	1	
Urgency of surgery						
Emergency	105(30.8)	1.680(0.645-4.375)	0.288	0.835(0.400-1.743)	0.835	
Elective	236(69.2)	1	1	1	1	
Type of operations						
Neurosurgery	46(13.5)	0.356(0.037-3.469)	0.374	5.026(0.585-43.179)	0.141	
Thoracic	37(10.9)	0.438(0.043-4.430)	0.485	4.375(0.482-39.727)	0.190	
ENT	25(7.3)	0.818(0.059-11.59)	0.882	2.435(0.207-28.584)	0.479	
Endocrine	10(2.9)	0.433(0.021-8.892)	0.587	3.111(.176-54.967)	0.439	
Abdomen	84(24.6)	0.533(0.059-4.816)	0.576	3.027(0.362-25.316)	0.307	
Gynecology	29(8.5)	0.587(0.045-7.677)	0.685	2.074(0.178-24.228)	0.561	
Urology	33(9.4)	0.391(0.017-9.169)	0.560	4.667(0.255-85.551)	0.299	
Orthopedics	40(11.7)	0.208(0.022-1.936)	0.168	6.222(0.734-52.712)	0.094	
Vascular	30(9.1)	0.234(0.023-2.384)	0.220	5.185(0.568-47.321)	0.145	
Trauma	7(2.1)					
Crude odds ratio		P value <0.05		Adjusted odds ratio		

6. DISCUSSION

Awareness during operation is one of the rare and potentially devastating events occurring during the perioperative period. This study provides the incidence of awareness and its associated risk factors based on institutional based cross sectional study. In the current study, we defined awareness with recall under general anesthesia if a patient recalls any of the following events: hearing voices, anxiety/stress. Feeling of pain, sensation of breathing tubes and unable to move or breath.

Based on this study, the incidence of awareness with recall under general anesthesia was 11.7%. Comparing with other studies, the incidence of awareness was higher than most studies in the westerns which is ranging from 0.0068%-1%.(18)(20) And also, the finding of this study was higher than the studies done in Nigeria (4.6%) (13), Brazil (2.5%) (14), England (1.0%) (20), Indian (0.78%) (22) and Ethiopia (8.2% done at Debre tabor) (5). However, it was lower than a study done in Sudan which showed the incidence of awareness with recall under GA was 13.3%.(15) The difference would be attributed to the absence of anesthesia depth monitoring, absence of anesthetic gases monitor sensors in the used anesthesia machine, technique of anesthesia used, and inappropriate dosage of drugs.

The incidence of awareness was determined by using Modified Brice questionnaires (memories of voices, sensations, feeling of pain and stress/anxiety). Based on this, 28 (70%) respondents were reporting hearing voice, 4 (10%) were experiencing anxiety/stress, 4 (10%) were having pain, 2 (5%) hearing events of surgery and the remaining two patients were reporting unable to move or breath and sensation of the breathing tubes each. The finding of this study was supported by a study done in the US; a multi-center study showed that 48% with auditory perceptions, 36% with anxiety, and 28% with pain.(12) The study from China also goes in line with this study (auditory experiences (n=24), felt pain, fear or other uncomfortable feelings (n=20), talk (n=23), and three patients had visual sensations. (19) Another study from Brazil also showed that auditory memories (48%), feeling of not be breathing (48%) and pain (28%) were among the most commonly reported events.(8) The study from Debre Tabor revealed almost similar results with hearing of voice 52 (4.9%), feeling pain 28 (2.6%), and anxiety and stress accounts 19 (1.8%) (14). Most studies showed that there is insignificant difference regarding sign and symptoms of awareness.

A multivariate logistic regression analysis was showed that the use of muscle relaxant was significantly associated with awareness (OR 2.793 (1.872-1.948), p value 0.003). A meta-analysis conducted by Nunes et al. to determine the risk factors of awareness showed that 0.18% of patients receiving muscle relaxant were developed awareness. This study concludes that the use of neuromuscular blocking agents

were associated with a higher intra-operative awareness incidence, as well as with implicit memory.(10)Based on the closed claims analysis from the database of the American Society of Anesthesiologists, of the 79 aware patients, 18 patients were due to awake paralysis that resulted from labeling errors and drug administration.(25) Silva D, Squeff F. demonstrated that awareness was associated with the use of GA with muscle relaxant after conducting a study on 1259 patients.(8) Hypnosis was achieved with volatile anesthetics' well as with intravenous anesthesia. This would be a result of the use of low MAC, not supplement with intravenous anesthesia, infrequent machine maintenance and expired and unchanged co2 absorbent.

Multivariate logistic regression analysis for chronic pain showed that patients with chronic pain had an association with intraoperative awareness (OR 2.929(1.592-1.821), p value 0.042). Silva D, Squeff F. also demonstrated that use of different drugs like amphetamines, opioids and drug addictions were associated with intraoperative awareness due to increased anesthesia requirement.(8)(10) Another study from India showed that patients with chronic pain and those who use analgesics, particularly opiates, had greater associations with awareness.(22) A study conducted on awareness under general anesthesia in German also showed that patient with chronic pain conditions particularly those taking analgesics had association with awareness. (4) These could result from the use of different analgesia and other medications, and psychological factors which increase the requirement for anesthetics.

ASA physical status was considered an independent risk factor in most studies. However, this study showed no associations with awareness. This could be due to a small number of patients having higher ASA status, a small sample of this study when comparing with the above studies. In contrast to this study, different literature showed that ASA status was among the risk factors of intraoperative awareness. A study from China showed a positive correlation of awareness and being ASA III and IV. (12)(19)ⁱ

Type of surgery, difficult intubation, and previous history of awareness use were not associated with awareness. This may be due to a small sample size compared to the other studies.

Bi-variants and multivariate analysis showed that dreaming was significantly associated with female sex (OR 2.375, CI 1.038-5.433, p value 0.036) A multi-center study of awareness with anesthesia from the US showed the incidence of dreaming to be 6 %.(12) Another study showed that the incidence of dreaming was three times lower than the study (3.3%). (26) The finding of this study was slightly higher than these two studies. On the other hand, the incidence of this study was two times lower than the incidence of a study from the US which had an incidence of 22%.(20)

7. STRENGTH AND LIMITATION OF THE STUDY

Having a comparable finding of this study with most studies across the globe was one of the strengths of this study. Patients were interviewed a minimum of two times and the response rate also good. It will also serve as a baseline for further studies in the future. The limitation of this study includes being done in single center, absence of anesthesia depth monitors, and lack of gas analyzer.

8. CONCLUSION

According to this study, the incidence of intraoperative awareness with recall under general anesthesia was 11.7%. Under the finding of this study, we conclude that the incidence of awareness with recall under general anesthesia is higher than most global studies. However, the risk factors and symptoms of awareness were comparable with most literature's. The use of muscle relaxant and having chronic pain were identified as risk factors in this study. When the incidence of dreaming was 9.3%, being female is a risk factor for dreaming.

9. RECOMMENDATION

Awareness has a great impact on the patient's life and peri-operative satisfactions. So that the study has recommended the anesthesia provider to give much emphasis on intra-operative awareness, to be vigilant on dosage of relaxant, hypnotics and inhalational, prevention and pain management, follow the patient in the postoperative period, and check anesthesia equipment's and machine every day for every patient. We also recommend to have anesthesia depth monitors and gases sensors to monitor inhalational anesthetics in the gases supply. Finally, the area also needs further multi-center studies to draw conclusion to the national level.

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INDEX

1. Consent

Addis Ababa University
College of Health Sciences
Department of Anesthesiology, Critical Care and Pain Medicine

INCIDENCE AND ASSOCIATED RISK FACTORS OF AWARENESS WITH RECALL UNDER
GENERAL ANESTHESIA IN NON-CARDIAC AND NON-OBSTETRIC PATIENTS IN TASH,
ETHIOPIA

General Information

My name is _____; I'm here on behalf of Addis Ababa University. The aim of this questionnaire is to assess the incidence and associated risk factors of awareness under general anesthesia among surgical patients in Tikur Anbessa specialized hospitals. This study will help to fill the information gap on the incidence and associated risk factors of awareness under general anesthesia which can contribute to the improvement of perioperative anesthesia management and increase patient satisfaction with anesthesia service.

You are randomly selected to participate in this study and provide appropriate response to questions. Your participation is voluntary. Only anonymous data will be analyzed, and the secret of the participant will be strictly kept confidential. Participating or not participating in this study will not bring any harm or benefit to you.

We strongly value your honest response to the questions. If you feel or face any problem regarding your participation, you can contact the principal investigators by 0923244930. Do you agree to participate?

1. If agree go to the next page 2. If not agree got to the next participant

Name of the data collector: _____ Date: _____ Sig. _____

Name of the supervisor: _____ Date: _____ Sig. _____

2. Questionnaire

Part I: Identification			
s.no	Questionnaire	Response	Remark
1	Card no		
2	Age		
3	Sex	I. Male II. Female	
4	ASA status	1. I 2. II 3. III. 4. IV 5. V	
Part II: Modified Brice Questionnaire, 2014			
1	Were you expecting to be completely asleep for this operation?	1. Yes 2. No	
2	What is the last thing you remember before going to sleep?	1. Being in the pre-op area 2. Seeing the operating room 3. Being with family 4. Hearing voices 5. Feeling mask on face 6. Smell of gas 7. Burning or stinging in the IV line 8. Other / /	
3	What is the first thing you remember after waking up?	1. Hearing voices 2. Feeling breathing tube 3. Feeling mask on face 4. Feeling pain 5. Seeing the operating room 6. Being in the recovery room 7. Being with family 8. Nothing 9. Other / /	
4	What do you remember between going to sleep and waking up?	1. Nothing 2. Hearing voices 3. Hearing events of the surgery	

		4. Unable to move or breathe 5. Anxiety/stress 6. Feeling pain 7. Sensation of breathing tube 8. Feeling surgery without pain 9. Other / _____ /	
5	Did You dream during your procedure?	1. Yes 2. no	
6	If yes, what was your dream?	_____ _____ /	
7	Were your dreams disturbing to you?	1. Yes 2. no	
8	What was the worst thing about your operation?	1. Anxiety 2. Pain 3. Recovery process 4. Unable to carry out usual activities 5. Other / _____ /	
Part III: Assessment of Risk Factors			
1	Do you drink alcohol?	1. Yes 2. No	
2	If your answer for Q1 is yes, how often do you drink?	1. Rarely 2. Sometimes 3. Usually 4. Always	
3	Do you have history of chronic pain?	1. Yes 2. No	
4	If your answer for Q3 is yes, are you taking medication for your pain?	1. Yes 2. No	
5	Do you have history of medical illness?	1 yes 2. no	
6	If the answer for Q8 is Yes, what are the medical illnesses?	1. Hypertension 2. Diabetes 3. Cardiac disease 4. Renal disease	

		5. Asthma 6. Others.....	
7	Do you have previous history of awareness with recall under anesthesia?	1. Yes 2. No	
8	Do you have any history of smoking?	1. Yes 2. No	
To be filled from the anesthetic record			
1	Was the patient intubated?	1. Yes 2. No	
2	What were the inductions drugs?	1. Propofol 2. Thiopental 3. ketamine 4.all	
3	Was the intubation RSI (rapid sequence induction)?	Yes 2. No	
4	Was the patient premedicated?	Yes 2. No	
5	If the answer for Q4 is Yes, what were the medications used?	/----- -----/	
6	Was the intubation difficult?	Yes 2. No	
7	Was inhalational drug(s) used?	1. Yes 2. No	
8	If yes, what is the name of the inhalational drug used?	/ _____ /	
9	Had the patient given muscle relaxant for intubation?	1. Yes 2. No	
10	Had the patient given muscle relaxant for maintenance/during the procedure?	1. Yes 2. No	
11	Had the patient given opioids (s)?	1. Yes 2. No	
12	Name of opioids?		
13	Adjuvants	Name.....	
14	Type of surgery	1. Emergency 2. Elective	
15	What was the category of surgical procedure done?	1. Neurosurgery 2. Thoracic surgery 3. ENT surgery 4. Endocrine surgery 5. Abdominal surgery 6. Gynecology surgery 7. Trauma surgery 8. Orthopedic surgery 9. Urology surgery 10. Vascular surgery	

3. MODIFIED ALDRETE SCORE CRITERIA FOR DISCHARGE FROM PACU

Criteria	Characteristics	Points
Activity	Able to move 4 extremities	2
	Able to move 2 extremities	1
	Unable to move extremities	0
Respiration	Able to breathe deeply and cough freely	2
	Dyspnea or limited breathing	1
	Apneic	0
Circulation	BP +/- 20% of pre-anesthetic level	2
	BP +/- 20-49% of pre-anesthetic level	1
	BP +/- 50% of pre-anesthetic level	0
Consciousness	Fully awake	2
	Arousable on calling	1
	Not responding	0
Oxygen saturation	Able to maintain O2 saturation >92% on room air	2
	Needs oxygen to maintain O2 saturation >90%	1
	SO2 <90% even with supplemental oxygen	0

መጠይቅ

እኔ ዶ/ርእባላለሁ፡ ፡ በአድስ አበባ ዩኒቨርሲቲ ህክምና እና ጤና ሳይንስ ኮሌጅ ሪዚደንት ስሆን ጥናቱን የማከናወን ዉ በአድስ አበባ ዩኒቨርሲቲ ነዉ ፡፡ የዚህ ጥናት ዓላማ ጥቁር አንባቢ ስፒሻል ዘድ ሆስፒታል የልብ ህመም የሌለባቸዉን እና ነፍሰ ጡር ያልሆኑ የቀዶ ህክምና የሚደረግላቸዉ ታካሚዎች አጠቃላይ የማደንዘዣ/የስመመን መድሐኒት ወስደዉ ከነቁ በኋላ የነበሩበትን የማስታዎስ ሁኔታና ተጓዳኝ መንሰዔዎችን ለይቶ ለማወቅ ነዉ ፡፡ በመሆኑ የዚህ ጥናት ዓላማ አጠቃላይ የማደንዘዣ/የስመመን መድሐኒት የወሰዱ ታካሚዎች የሚያልፏቸዉን የማስታዎስ ሁኔታዎችና ተጓዳኝ መንሰዔዎችን በተመለከተ መረጃ በመሰብሰብ ቅድመ ቀዶ ህክምና ለታካሚዎች የሚሰጡ የማደንዘዣ/የስመመን መድሐኒት አሰጣጥን ለማሻሻልና የታካሚዎችን ፍላጎት ለማርካት ነዉ፡ ፡

በዚህ ጥናት ላይ እንድሳተፉ የተመረጡት በአሁኑ ጊዜ በሆስፒታሉ የህክምና ክትትል እያደረጉ ስለሆነ ነዉ፡፡ በጥናቱ ላይ ተሳታፊ የሚሆኑት ፍቃደኛ ከሆኑ ብቻ ነዉ፡፡ ለዚህ ጥናት ዓላማ ከእርስዎ የሚሰበሰቡ ምላሾችና መረጃዎች እንድሁም ስምዎት እና ሌሎች ግላዊ መረጃዎች በሚስጥራዊነት የሚጠበቁ ይሆናል፡፡ በዚህ ጥናት በመሳተፎዎ በተየ የሚያገኙት ጥቅም ወይም የሚደርስብዎት ጉዳት የለም፡

ለሚቀርብሎት ጥያቄ እዚኑ ተሻናትክክለኛ ምላሽ እንድሰጡ በአክብሮት እጠይቃለሁ። በዚህ ጥናት ለመሳተፍ ፍቃደኛሆነ ውይይት ሂደት ከተጀመረ በኋላ በማንኛውም ሰዓት እና ምክንያት ተሳትፎዎን ማቋረት የሚችሉ ሲሆን በጥናቱ ላይ ያሉትን ተሳትፎ በማቋረጥዎ የሚደረስበዎት አንዳችም ችግር አይኖርም፡፡

በጥናቱ ላይ ለመሳተፍ ፍቃደኛ ነዎት

አዎ

አይደለሁም

አዎን ከሆነ

ፊርማ

የመረጃ ሰብሳቢዉ ስም ቀን ፊርማ

መረጃዉ የተሰበሰበበት ቀን

ክፍል 1፡ ግላዊ መረጃዎች

ተ. ቁ.	መጠይቅ	መልስ	አስተያየት
1	የካርድ ቁጥር		
2	ዕድሜ		
3	ጾታ	1. ወንድ 2. ሴት	

4	የአሜሪካ ሶሳይቲ ኦፍ አንስቶሎጂ ሁኔታ	1. I 2. II 3. IIII 4. IV 5. V	
ክፍል II: ተሻሻሎ የቀረበ የብሪስ መጠይቅ 2014 እ.ኤ.አ			
1	ይህ ቀዶ ህክምና በተደረገ ለዎት ግዜ መሉ የህክምና ሂደቱን ሰመመን ውስጥ ሆነ ው እንደሚሰራ ሳልፉ ጠብቀው ነበር	1. አዎን 2. የለም	
2	የሰመመን መድሐኒት ወስደው እራስዎን ከመሳትዎ በፊት የሚያስታወሱት የመጨረሻ ነገር ምንድነው	1. የቅድመ ቀዶ ህክምና ክፍል ሆኜ 2. የቀዶ ህክምና ክፍል ገብኜ 3. ከቤተሰቤ ጋር ሆኜ 4. የሰዎች/ህክምና ባለሙያዎች ድምጽ 5. ፊት ለይ ማስክሲያ ያደርጉልኝ 6. በአፍንጫዊ ሚሽን ጋዝ 7. የማቃጠል ስሜት/በደም ስር የሚሰጥ መርፌሲ ወጉኝ 8. ሌሎች	

3	ከሰመመን ከነቁ በላያስ ታወሱት የመጀመሪያ ነገር ምንድነው	1. የሰዎች ድምጽ 2. መተንፈሻ አካሌ የገባው አርቴፊሻል መተንፈሻ 3. ፊቴ ላይ የተደረገ ልኝ ማስክ 4. የህመም ስሜት 5. የቀዶ ህክምና ክፍል 6. የድህረ ቀዶ ህክምና / ማገገሚያ ክፍል 7. ከቤተሰብ ጋር ሆኜ 8. ምንም ትዝ አይለኝም 9. ሌሎች	
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4	የሰመመን መድሃኒት ወስደው እራስዎን ከሰቁ ጊዜ ጀምሮ እስኪነቁ ድረስ በነበረው ጊዜ ዉስጥ ምን የሚያስታውሱት ነገር አለ?	1. ምንም ትዝ አይለኝም 2. የሰዎች ድምፅ 3. በቀዶ ህክምና ክፍል ውስጥ የነበረ 4. መንቀሳቀስ ሆነ መተንፈስ አልተቻለም 5. ጭንቀት 6. የህመም ስሜት 7. በመተንፈሻ አካሌ ላይ የተገጠመ 8. የቀዶ ህክምና ውሲደረግ ልኝ ምን 9. ሌሎች	
5	በሰመመን መድሃኒት እራስዎን በሰቁበት ጊዜ ህልም ያዩ ነበር?	1. የለም 2. አዎን	

6	መልስዎ አዎን ከሆነ ምን አይነት ህልም አዩ?	
7	ያዩት ህልም የሚያስጨንቅ ወይም የሚረብሽ ነበር?	1.የለም 2.አዎን
8	በቀዶ ህክምና ወቅት ያጋጠምዎት የጌላ ወይም የከፋ ሁኔታ ምን ድን ነበር?	1.ጭንቀት 2.የህመም ስሜት 3.ቶሎ ያለማገገም ሁኔታዎች 4.ቀድሞ በቀላሉ የማከናወናቸዉን 5.በቀላሉ የሰመምን ስሜት ውስጥ አ 6.ሌሎች //
ክፍል IIIተጓዳኝ መንሳኤዎች		
1	የአልኮል መጠጥ ይወስዳሉ?	1.አዎን 2.የለም
2	ለጥያቄ ቁጥር 1 መልስዎ አዎ ከሆነ በየስንት ጊዜ ይወስዳሉ?	1.ከስንት አንዴ 2.አልፎ አልፎ 3.አብዛኛዉን ጊዜ 4.ሁል ጊዜ
3	ስር የሰደደ ህመም ታሪክ አለዎት?	1.አዎን 2.የለም
4	ለጥያቄ ቁጥር 3 መልስዎ አዎ ከሆነ ለህመሙ መድሃኒት እየወሰዱ ነው?	1.አዎን 2.የለም

5	የታወቀ የዉስጥ ደዌ ህመም አለበት?	1. አዎን 2. የለም
6	ለተራ ቁጥር 5 መልስዎ አዎ ከሆነ ህመሞ ምን ድነው?	1. የደም ግፊት 2. የስኳር ህመም 3. የልብ ህመም 4. የኩላሊት ህመም 5. አስም 6. ሌሎች
7	ከአሁን ቀደም የሰመመን መድሃኒት ወስደው ንቁ የሆኑበት/እራስዎን ሳይስቱ የቀሩበት አጋጣሚ አለ?	1. አዎን 2. የለም
8	ትምባሆ (ሲጋራ) ያጫሉ?	1. አዎን 2. የለም
ከስመመን መድሃኒት ሪከርድ ላይ የሚሞላ		
1	ለታካሚው አርቴፊሻል መተንፈሻ ቱቦ ተገጥሞለትነበር?	1. አዎን 2. የለም
2	ለታካሚው አርቴፊሻል መተንፈሻ ቱቦ ሲገጠምለት የወሰደው የሰመመን መድሃኒት ምን ድነው?	1. ፕሮፖፎል 2. ትሮፔንታል 3. ኪታሚን 4. ሁሉንም

3	አርቴፊሻል የመተንፈሻ ቱቦ የማድረግ ሂደቱ አራኤሳይ (rapid sequence induction) ነበር?	1. አዎን 2. የለም
4	ታካሚው ሰመምን መድሃኒት ከመውሰዳቸው አስቀድሞ ሌላ ተጓዳኝ መድሃኒት ተሰጥቷቸዋል ነበር?	1. አዎን 2. የለም
5	ለጥያቄ 4 መልስዎ አዎ ከሆነ የተሰጣቸው መድሃኒት ምን ነበር? መጠኑስ ምን ያህል ነበር?	/...../
6	ለታካሚው አርቴፊሻል መተንፈሻ ቱቦ የማስገባት ሁኔታ አስቸጋሪ ነበር?	1. አዎን 2. የለም
7	ለታካሚው በአፍንጫ የሚሸተት የሰመምን መድሃኒት ተሰጥቶት ነበር?	1. አዎን 2. የለም
8	መልስዎ አዎ ከሆነ ለታካሚው የተሰጠው በአፍንጫ የሚሸተት የሰመምን መድሃኒት የትኛው ነበር?	/...../
9	ለታካሚው አርቴፊሻል መተንፈሻ ቱቦ በተገጠመላቸው ወቅት የተሰጣቸው የሰውነት ጡንቻ ማፍታቻ መድሃኒት ነበር?	1. አዎን 2. የለም
10	ለታካሚው የቀዶ ህክምና ሂደት በሚከናወንበት ወቅት የተሰጣቸው ተጨማሪ	1. አዎን 2. የለም

	የሰውነት ጡንቻ ማፍታቻ መድሃኒት ነበር?	
11	ለታካሚው አፒዎድስ/አፔንተሰጥቷቸውን በር?	1.አዎን 2.የለም
12	አፒዎድስም	1.ሞርፊን 2. ፌንታሊን 3.ፒትድን 4.
13	ለታካሚው የተሰጡ ሌሎች የሰመመን/የማደንዘዣ መድሃኒቶች አይነት እና መጠን ይገለጽ (ከሰመመን መድሃኒት መዝገብ ላይ የሚወሰድ)	1. ተጓዳኝ የማደንዘዣ መድሃኒት 2. የህመምማስታገሻ መድሃኒት 3. የሰውነት ጡንቻ ማፍታቻ መድሃኒት 4. ለቀዶህክ ምናሂደት አጋዥ የሆነ መድሃኒት
14	የቀዶህክ ምና አይነት	1.ድንገተኛ 2.በምርጫ
15	ለታካሚው የተደረገ ለቸውምን አይነት ቀዶህክ ምና ነበር?	1.የነርቭ ቀዶህክ ምና 2.የልብና የደረት ቀዶህክ ምና 3.ከአንገት በላይ ቀዶህክ ምና 4.የአንገት/የምራቅ እጢ/የእንቅር 5.የሆድ ቀዶህክ ምና 6.የማህፀን ቀዶህክ ምና 7.ጉዳት የደረሰበት የሰውነት አካል 8.የአጥንት ቀዶህክ ምና 9.የኩላሊትና ሽንት ቱቦ ቀዶህክ ምና 10. የደም ስር ቀዶህክ ምና
