Undesirable Perioperative Anesthesia Outcomes at Two National Referral Hospitals, a cross sectional study in Eritrea

Yonatan Mehari Andemeskel (Yonimer2@gmail.com)

Department of Anesthesia & Critical care Nursing, School of Nursing, Asmara College of Health Sciences

https://orcid.org/0000-0003-1772-1042

Traudl Elsholz

Asmara College of Health Sciences

Ghidey Gebreyohannes

Asmara College of Health Sciences

Eyasu H. Tesfamariam

Asmara College of Health Sciences

Research article

Keywords: Leiden preoperative care patient satisfaction questionnaire (LPPSq), Perioperative care, Surgery, Undesirable anesthesia outcomes

Posted Date: December 18th, 2019

DOI: https://doi.org/10.21203/rs.2.19220/v1

Abstract

Background: Perioperative undesirable anesthesia outcomes are common among patients undergoing surgery. The aim of this study was to assess the prevalence of undesirable anaesthesia outcomes during the perioperative period.

Method: This cross sectional study was conducted on 470 patient who underwent different types of surgeries at two National Referral Hospitals with in a three month period. Patients were interviewed 24 hours after operation using the dimension “Discomfort and needs” of the Leiden preoperative care patient satisfaction questionnaire (LPPSq). Descriptive analysis was done using SPSS (version 22) to compute the percentage of occurrence of these undesirable outcomes. Odds ratio was computed using logistic regression to look for the association of the outcomes with the type of surgery and type of anesthesia. Statistical significance level was set at $p<0.05$.

Results: The prevalence of these outcomes was computed in two sequences; prevalence A and prevalence B. Of all the outcomes, post-operative pain was found to be the most prevalent outcome scoring 82.6% and 43.6% consecutively in both prevalence with a median score of 1. The rest of the post-operative side effects were less frequently reported with a median score of 0. In those who did general surgery, sore throat was observed 5.49 times more among those who took general anesthesia ($p <0.001$). The occurrence of nausea and vomiting was also higher among the same patients in which nausea occurred 1.74 times more ($p<0.05$) and vomiting 2.03 more ($p<0.05$). While back pain occurred 51% less among these patients ($p <0.05$). In those patients who had orthopedic surgeries significant differences was observed only in the occurrences of sore throat in which it was experienced 5.37 times more ($p<0.01$) by those patients who took general anaesthesia. While in those patients who did gyn/obs surgery, the occurrence of back pain was significant in which was 67% higher among those who took general anaesthesia

Conclusion: The experience of undesirable anesthesia outcomes is generally low except for postoperative pain. More emphasis is needed on the management of postoperative pain.

Keywords: Leiden preoperative care patient satisfaction questionnaire (LPPSq), Perioperative care, Surgery, Undesirable anesthesia outcomes.

Background

Undesirable post-anesthesia symptoms after surgery may affect all patient's body systems. Some of these adverse events are much more common and they don’t cause any harm to the patient. These undesirable events however, should be prevented because such events have been linked to subsequent, more serious intraoperative and postoperative problems. General anesthesia deprives the patient’s consciousness and causes abolition of sensation and reflexes. It is a safe way of ensuring patient safety and comfort during surgery, but still comes with complications that have to be recognized and dealt with. The side effects of local anesthetics occur as a result of suppression of the cellular conduction and these

effects occur within five to ten minutes right after the injection is given. In case they are administered intravenously, the reaction appears immediately. Patients may also experience postoperative pain and temperature disturbances. The pain may include needle insertion site pain, headache, back pain associated with needle insertion, postoperative surgical site pain, pain that radiates from the diseased or injured area, and even the pain may occur during medication administration (1–5).

Postoperative pain is a major concern for hospitalized patients and may interfere with postoperative recovery and it increases postoperative morbidity. The usual complaints of pain from post-operative patients is surgical site acute pain. Acute pain is commonly associated with recent surgery. Surveys on patients continue to indicate that acute pain is often inadequately relieved (6–9). Failure to control postoperative pain leads to increased nausea and vomiting a delay in discharge, and increased healthcare costs (6, 10, 11). The relief of the suffering associated with acute pain is first and foremost a humanitarian matter. Moreover, effective acute pain management is likely to improve the quality of clinical care by preventing some complications, reducing hospital stay, promoting patient recovery and reducing the development of chronic pain syndromes (7, 12). Since postoperative pain is both inevitable and unavoidable, routine measurement and treatment is important and to achieve adequate analgesia, the efficacy of the treatment regimen must be assessed (13). Other common complaints are cold feelings, persistent nausea and vomiting, sore throat, chills, breathing, swallowing, and/or talking difficulties (4, 5, 14). These symptoms occur more often in those who took general anesthesia. These symptoms are heightened if the patient is made to wake up before extubation (1). The anesthesia department is expected to provide adequate pre-operative assessment and preparation of patients, and care during and after anaesthesia (7, 14).

One aspect of quality of perioperative anesthesia care is the patient's experience with surgical and anesthesia care (15, 16). The quality of perioperative anesthetic care of a surgical patient and the appropriate management of the anesthetic procedure determines the therapeutic outcomes. Poor quality of anesthesia services may discourage patient from using available services (16, 17). Although the practice of anesthesia has been improved with the introduction of new methods and new anesthetic drugs, there is no ideal method of practice. Effective treatment is usually related to proper assessment of the patient and maintenance of appropriate pharmacotherapy. An appropriate pharmacotherapy considers possible complications interaction as well as the pharmacodynamics and pharmacokinetics of the agents used (1). Moreover, information provision about the perioperative concerns such as postoperative pain, nausea and vomiting is very important and is also associated with patient satisfaction. Assuring patients that they understand their own individual risks so that they can make an informed decision about whether to proceed to surgery is also important (18–24). Perioperative anxiety and complications are decreased in subjects who receive information regarding their anaesthetic and surgical procedures (23, 25–27).

The offer and rising standards of services increase patient expectation, and they become increasingly critical of the quality of service they experience (28–30). Moreover, meaningful evaluations of anesthetic services require patient outcomes to be measured. Research in to measuring anesthetic outcomes in a

reliable and valid manner will be an important tool for improving the standards of anesthesia practice and delivering of quality of anesthesia (14). Therefore the aim of this study is to determine the experience of perioperative anesthesia related undesirable outcomes among patients undergoing surgery.

Methods

Study design

This cross sectional study was conducted between January and March of 2018.

Sample

During the study period a total of 526 patients underwent surgeries under general and regional anaesthesia within the three month period. The eligibility to participate in the study was based on the respondent's willingness to take part in the study. Patients under the age of 18, those who were discharged before 24 hours of postoperative period, those who were seriously ill, and those who didn't give consent were excluded from the study. Finally, 470 were found to fulfil the inclusion criteria and thus were included in data analysis. (Figure 1).

Fig. 1 Number of patients eligible for the study, included in the study, and analyzed

Study setting

The study was conducted in the Eritrea, a country in the horn of Africa. Eritrea has two National Referral Hospitals which are located at the Capital city, Asmara. They are called Halibet and Orotta National Referral Hospitals and both of them provide health services at a tertiary level. They were selected because they are the only governmental medical surgical national referral hospitals in which all types of major and minor surgeries take place.

Data collection method and tool

The key elements of socio-demographic characteristics of the patients were obtained using a socio-demographic form. In order to measure the undesirable anesthesia outcomes, the dimension "discomfort and needs" from the validated English version Leiden Perioperative Patient Satisfaction questionnaire (LPPSq) was taken. This dimension investigates the adverse outcomes of the anesthesia. This questionnaire is a validated one and it is acceptable and suitable for research purposes (31). The

questionnaire was modified by Calijouw et al. (2008) and permission was asked and obtained from the responsible author. The selected dimension includes all the common perioperative undesirable anesthesia outcomes including post-operative pain, sore throat, back pain, nausea, vomiting, cold, hunger, thirst, and headache. Data was collected by four trained surveyors through face to face interview using a questionnaire.

Variable measurement

The items in the dimension were standardized and measured using a five point Likert scale. Patients had to state to which degree they experienced each of the attribute stated in each item after operation. The replies to the items were “Not at all” (0), “A little bit” (1) “Moderately” (2) “Quite a bit” (3), and “Extremely” (4). The prevalence of undesirable anesthesia outcomes was computed using two manners; prevalence of those with little bit to extremely outcome occurrence to see the total occurrence of these undesirable outcomes and prevalence of those with quite a bit to extremely outcome occurrences to see the severe occurrence of these outcomes. Moreover, odds ratio (95% CI) was computed to assess the association of undesirable anesthesia outcomes with the type of surgery and type of anesthesia using logistic regression. Tables and figures were used to present the results. *P*-values less than 0.05 were considered as significant throughout the analysis.

Results

Population Characteristics

A total of 526 patients did surgery and out of these, 470 subjects gave their consent and were eligible for data analysis. The mean age of the respondents was 45.9 ± 14.7, ranging from 18 to 85 years of age. Of all the patients, 55.1% were males and 44.9% were females. The majority (63.2%) of the patients were from Orotta Hospital. The patients underwent a wide range of surgical procedures, including general, orthopaedic, Gyn/obs, ENT and burn surgery. 267 (56.8%) patients had general anaesthesia, and 203 (43.2%) regional anaesthesia. Further baseline details are shown in Table 1.

Table 1. Demographic and clinical Characteristics of the participants

Variables		Frequency	Percentage
Gender			
	Male	259	55.1
	Female	211	44.9
Residence			
	Urban	274	58.3
	Rural	196	41.7
Occupation			
	Employed	235	50
	Unemployed	235	50
Hospital Setting			
	Halibet	173	36.8
	Orotta	297	63.2
Health coverage			
	Paying	358	76.2
	Free	112	23.8
Type of Anesthesia			
	General	267	56.8
	Regional	203	43.2
Type of Surgery			
	General	261	55.5
	Orthopedic	99	21.1
	Gyn/Obs	89	18.9
	ENT	7	1.5
	Burn	14	3.0
Admission type			
	Emergency	109	23.2
	Elective	361	76.8
Age	**Mean**	**SD**	

45.87 18.53

Undesirable Anaesthesia Outcomes

The dimension “discomfort and needs” involves items that are considered as undesirable or adverse anaesthesia outcomes. The prevalence of these outcomes was computed in two sequences; those who experienced little bit to extremely were calculated first (prevalence A) and those who experienced quite a bit to extremely outcomes were calculated next (prevalence B). Of all the outcomes, post-operative pain was found to be the most prevalent outcome scoring 82.6% and 43.6% consecutively in both prevalence with a median score of 1. The rest of the post-operative side effects (sore throat, back pain, headache, nausea, cold and hunger) were less frequently reported with a median score of 0 (Table 1).

Table 1. Prevalence of undesirable anaesthesia outcomes (n = 470)

Discomfort & needs	Prevalence A (little bit/to extremely n (%)	Prevalence B (Quite a bit/to extremely n (%)	Severity Median (Range)
Post-op pain	388 (82.6)	205 (43.6)	1 (0-4)
Sore throat	87 (18.5)	10 (2.1)	0 (0-4)
Back pain	125 (26.6)	20 (4.3)	0 (0-4)
Nausea	191 (40.6)	44 (9.4)	0 (0-4)
Vomiting	177 (37.7)	47 (10)	0 (0-4)
Cold	194 (41.3)	80 (17)	0 (0-4)
Hunger	86 (18.3)	21 (4.5)	0 (0-4)
Thirst	130 (27.7)	47 (10)	0 (0-4)
Headache	118 (25.1)	25 (5.3)	0 (0-4)

Notes: Severity was graded as: 0= not at all; 1 = a little bit;2 = moderately; 3= quite a bit; 4=extremely.

Association of outcomes with type of surgery and type of anaesthesia

As indicated in table 3, analysis was also done to assess if there is any association between the type of surgery the patients underwent and the type of anaesthesia those patients took on the undesirable anaesthesia outcomes.

In those patients who did general surgery, significant difference was observed in the occurrence of sore throat in which those who took general anaesthesia experienced 5.49 times more than those who took regional anaesthesia (OR=5.49; 95%CI=2.24, 13.46). The occurrence of nausea and vomiting was also higher among the same patients in which nausea occurred 1.74 times more (OR=1.74; 95%CI=1.04, 2.90) and vomiting 2.03 more (OR=2.03; 95%CI=1.19, 3.47). While back pain occurred 51% less among these patients (OR=0.49; 95%CI=0.27, 0.88).

In those patients who had orthopedic surgeries significant differences was observed only in the occurrences of sore throat. In which it was experienced 5.37 times more (OR=5.37; 95%CI=1.54, 18.67) by those patients who took general anaesthesia. While in those patients who did gyn/obs surgery, the occurrence of back pain was significant in which was 67% higher (OR=0.33; 95%CI=0.14, 0.80) among those who took general anaesthesia (Table 3).

Table 3. Occurrence of undesirable anaesthesia outcomes (Type of surgery versus type of anaesthesia)

	General Surgery			Orthopedic Surgery			Gyn/obs Surgery		
	GA	RA	OR (95% CI)	GA	RA	OR (95% CI)	GA	RA	OR (95% CI)
Post-op pain	84.66	77.55	1.60 (0.85, 3.02)	75.68	77.42	0.91 (0.35, 2.37)	92	89.74	1.31 (0.31, 5.63)
Sore throat	26.38	6.12	5.49 (2.24, 13.46)***	27.03	6.45	5.37 (1.54, 18.67)**	24	10.27	2.76 (0.82, 9.37)
Back pain	17.79	30.61	0.49 (0.27, 0.88)*	24.32	24.19	1.01 (0.39, 2.60)	30	56.41	0.33 (0.14, 0.80) *
Nausea	49.08	35.71	1.74 (1.04, 2.90)*	10.81	19.35	0.51 (0.15, 1.70)	60	64.1	0.84(0.35, 2.00)
Vomiting	44.79	28.57	2.03 (1.19, 3.47)*	16.22	16.13	1.01 (0.33, 3.04)	66	64.1	1.09 (0.45, 2.62)
Cold	44.17	40.82	1.15 (0.70, 1.91)	27.03	32.26	0.79 (0.32, 1.91)	44	58.97	0.55 (0.23, 1.28)
Hunger	20.25	20.41	0.99 (0.53, 1.85)	2.7	14.52	0.16 (0.02, 1.35)	24	17.95	1.44 (0.51, 4.10)
Thirst	33.13	30.61	1.12 (0.66, 1.93)	8.11	12.9	0.60 (0.15, 2.40)	36	33.33	1.13 (0.47, 2.72)
Headache	18.4	28.57	0.56 (0.31, 1.02)	27	27.42	0.98 (0.39, 2.45)	20	38.46	0.40 (0.16, 1.03)

RA(Regional Anesthesia)-Reference category

**p<0.05, **p<0.01, ***p<0.001*

Discussion

Preparing a patient for anaesthesia requires an understanding of the patient's pre-operative status, the nature of the surgery and the anaesthetic techniques required for surgery, as well as the risks that a particular patient may face during this time (20). Pre-operative assessment is an important component of anaesthesia. It is the most efficient and accurate way of initially detecting significant morbidity (25).

Pain management is a vital component of post-operative nursing care (32, 33). The anaesthetist should be the one responsible for the management of immediate post-operative care especially in the management of outcomes related to anaesthesia. However, in all our settings, anaesthetist are not involved in such a care and the work of the anaesthetist is usually confined in the operating room. In reflection to this, the experience of postoperative pain was high in which the total experience of pain was 82.6%, of whom 43.6% experienced “quite a bit” to “extreme” pain. This could also be associated with the generally neglected postoperative pain management in our settings. Similar to this, in studies done using the same questionnaire, postoperative pain was among the most frequently experienced complaints (26, 27, 34, 35).

Similar results were also reported in another study from the Netherlands by Kalkman and colleagues in which the incidence sever pain was 25.8%, measured one hour after surgery (36). Another similar result was also reported in a study done in Saudi Arabia, in which postoperative pain was the most frequenly mentioned complaint (34). In the studies done by Jlala et al (2010) and Calijouw et al. (2008), thirst was another frequently mentioned complaint but not in this current study. The other postoperative side effects (back pain, headache, hunger, nausea and vomiting) were less frequently reported with the lowest median score in all studies. While according to a study done in Rwanda, patients’ report of discomfort and needs was a lot including thirst & hunger (35).

Perioperative anesthesia outcomes are usually associated with the type of anaesthesia given as well as to the type of surgery done. In this current study, no significant difference was scored in the occurrence of postoperative pain between the two types of anaesthesia. Unlike in this study, in a study done by Caljouw et al., 2008, a significant difference was observed in the occurrence of postoperative pain between general anesthsia (82.1%) and regional anesthesia (34.3%). The type of surgery also had an influence in the occurrence of postoperative pain.

Despite anesthetic and pharmacological advances post-operative nausea and vomiting (PONV) can often be complex and can be a significant problem in anesthesia practice. It is also often described as to be the second most common complaint after pain during the postoperative period. Understanding the mechanism and careful assessment of risk factors help in its management (5, 14, 37). Normally, the occurrence of these symptoms is expected to be more commonly seen in those patients who took general anaesthesia while back pain in those who took spinal anaesthesia which is associated with the procedure. Despite these facts, in this study, the occurrence of nausea and vomiting was found to be higher in those patients who took spinal anaesthesia. Meanwhile, as general anaesthesia involves manipulation of the airway, it is obvious that the occurrence of sore throat to be higher in those patients who took general anesthesia when compared with those who took regional anaesthesia. The very few sore throat that occurred among those who took regional anaesthesia may not be purely associated with the anaesthetic procedure.

The type of anaesthesia given to all those who took regional anaesthesia was spinal and the experience of back pain is expected to be more common among these groups which is related to the anaesthetic

procedure. However, in this study, surprisingly, the opposite finding was observed. Significant difference was observed in the occurrence of back pain and the occurrence was surprisingly higher among those who took general anesthesia. There wasn't any significant difference in the occurrence of the rest of undesirable anaesthesia outcomes like cold, hunger, thirst and headache. Jlala et al., (2010) found out a significant difference in the experience of headache in which 46% of those who took regional anesthesia had the experience compared to 12% of those who took general anesthesia ($p = 0.01$).

Conclusion

Postoperative pain is the most prevalent undesirable anesthesia outcome. Proper management of postoperative pain is required through the development and implementation of specific pain management modalities. Preoperative assessment may contribute identifying the potential clinical patient risk factors and preventing the occurrence of anesthetic related undesirable outcomes. Efforts should be made on providing consistent preoperative information regarding choices for anaesthesia, post-operative analgesia, prevention and treatment other outcomes.

Abbreviations

ENT: Ear, Nose and Throat; Gyn/Obs: Gynecology and Obstetrics; LPPSq: Leiden Perioperative Care Patient Satisfaction questionnaire. PONV; Postoperative nausea and vomiting.

Declarations

Ethics approval and consent to participate

Ethical clearance and approval were obtained from the ethical and scientific committee of the Asmara College of health Sciences as well as that of the Ministry of Health. The members of the ethics committee are namely, Dr. Brhane Debru, Mr. Salih Gemam and Mr. Mehari Weldu. Permission was also secured from both hospitals. After explaining the purpose of the study and assurance of confidentiality and anonymity, informed written consent was obtained from each participant and the interview was conducted. Name and other identifying information were not included in the study.

Consent for publication

Not applicable

Availability of data and materials

The datasets generated and/or analyzed during the current study are available from the corresponding author on a reasonable request.

Competing interests

The authors declare that they have no competing interests.

Funding

The research was funded by the National Commission for Higher Education (NCHE). The funder had no role in the design of the project and collection, analysis, and interpretation of data or in writing and publication of the manuscript.

Authors' contributions

YM: Study conception and design of study, acquisition of data, analysis and interpretation of data, drafting and submission of manuscript; GG: participated in designing and coordination of the study, revising the manuscript critically for important intellectual content; TE: participated in designing and coordination of the study, drafting and revising the manuscript critically for important intellectual content, EH: analysis and interpretation of the data, drafting of manuscript. All authors have read and approved the manuscript.

Acknowledgements

The authors would like to thank the National Commission for Higher Education (NCHE) for funding the research and also the supervisors, data collectors, study participants as well as family and friends for their invaluable support.

Author's information

[1]Department of Anesthesia and Critical Care, School of Nursing, Asmara College of Health Sciences, Asmara, Eritrea. [2]Asmara College of Health Sciences, Asmara, Eritrea. [3]Department of Epidemiology and Biostatistics, School of Public Health, Asmara College of Health Sciences, Asmara, Eritrea.

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Figures

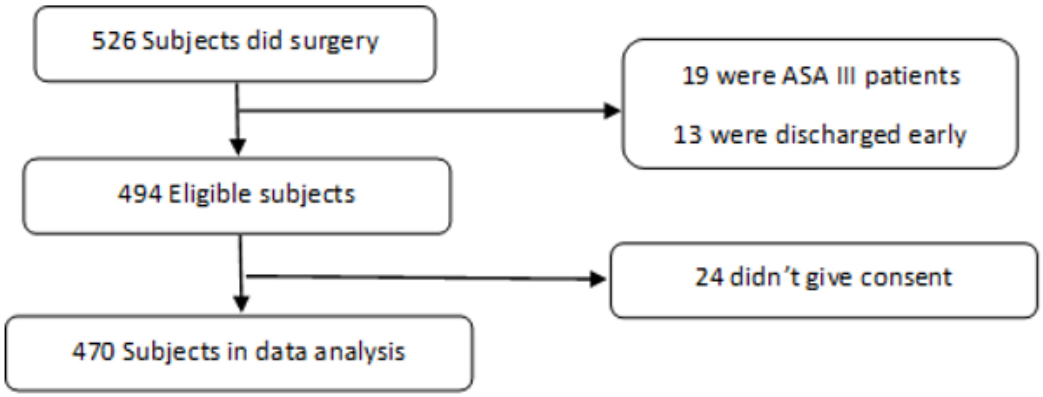

Figure 1

Number of patients eligible for the study, included in the study, and analyzed