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Original Research Article

Factors affecting the outcome of anaesthesia in surgically operated patients in two tertiary hospitals in Osun state, Nigeria

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ABSTRACT

Background: Few patients face surgery without some degree of anxiety. The concerns and fear vary from one person to another. Some may be anxious about the pain, disfigurement, incapacity and loss of control of self or death. The study investigated factors affecting the outcome of anaesthesia in surgically operated patients in two tertiary hospitals in Osun State, Nigeria.
Methods: The study adopted a retrospective study design. Case file identification numbers of patients who had surgical operations under general anaesthesia between January 1st, 2015 and December 31st, 2019. The sample for this study consisted of 2,524 case notes purposely selected using purposive sampling technique. A checklist was developed which indicated all the variables needed from the patients case files. Data collected was analyzed using descriptive statistics of frequency and percentage.
Results: The findings of this study showed that among the comorbidity of surgical operated patients, hypertension was mostly reported while the most prevalence risk behaviour was obstructive sleep, alcoholism, smoking, delay in waking up and delirium.
Conclusions: It was also concluded that there is significant effect of age and gender on some comorbidity, risk behaviour of the anaesthesia process and outcome of anaesthesia. Based on the findings, it was recommended among others that the anaesthesia team must kindly investigate more on the patient before the commencement of anaesthesia during surgery.

Keywords: Anaesthesia, Factors, Outcome, Surgically operated patients

INTRODUCTION

Anaesthesia side effects are almost inevitable in most situations. In order to optimize the anaesthetic experience from the patient's viewpoint, it makes intuitive sense to attempt to avoid the side effects that the patient fears the most. Surgery and anaesthesia result in the development of pain, nausea and other adverse effects. Historically, physician and nurse anaesthetists have applied their own judgments in determining which of these experiences are most important to avoid and have designed anaesthetic and surgical techniques accordingly. In order to provide the most satisfactory outcome to the person actually experiencing the process, it is important to try to understand which adverse outcomes are most dreaded by patients and to incorporate these preferences into the design of perioperative care.

However, it is worthwhile to assume that in the midst of variety of safe and effective techniques or drug sequences available, anaesthesia experiences that reduce the adverse effects most dreaded by patients will be the most favourably received. Aitkenhead[1] defined Anaesthesia from a Greek word meaning ‘‘without sensation”.

Anaesthesia allows invasive and painful procedures to be performed with little distress to the patient. Anaesthesia is a process whereby medications are administered either by injection or inhalation to humans and other living creatures to produce a state of unconsciousness, eliminate all sensations, including pains and other unpleasant sensations which allow medical and surgical procedures to be performed on them without causing undue distress or discomfort.[1]

Factors that tend to affect outcome of anaesthesia include age, co-morbidities, risk behaviours like anxiety, substance abuse, obstructive sleep apnoea, obesity, positive history of post-operative nausea and vomiting, motion sickness and non-adherence to preoperative rules of fasting. Poor or undesired outcome of anaesthesia can be in form of pain, post-operative nausea and vomiting, post-dural puncture headache, chills, delayed recovery from anaesthesia, airway obstruction, and aspiration of gastric content among others.

In a retrospective analysis of anaesthetic factors affecting outcome after bariatric surgery, continuous clinical deep neuromuscular block and opioid free anaesthesia are independently associated with fewer complications after bariatric surgery.[2] Doyle et al explained that factors affecting outcome of anaesthesia are related to pre-operative anaesthetic evaluation, surgical anaesthesia and disease status, patients 'reception in the operating theatre and intra-operative management, post-operative anaesthetic visits, anaesthesia related discomforts and complications as well as medical conditions and comorbidities.[3] Similarly, these factors according to Agarwal et al are opioid, alcohol, tobacco and cocaine tolerance and abuse, thyroid diseases, depression, chronic liver and kidney diseases, epilepsy and seizures, exogenous steroids, gastroesophageal reflux disease and diabetes.[4] Others according to them include obesity and obstructive sleep apnoea, chronic obstructive pulmonary disease, asthma, acute respiratory respirations and cardiac conditions like hypertension, atrial fibrillation, valvular heart diseases, congestive heart failure and coronary artery diseases.

Risk behaviours being the ways and manners that living creatures act with the likelihood of a negative outcome can affect outcome of quality anaesthesia in surgical patients, these include substance abuse such as cigarette and tobacco smoking, alcoholism, binge eating, obesity, depression, obstructive sleep apnoea, age related cognitive impairment like delirium, motion sickness and a host of others. Substance abuse also known as drug abuse is a patterned use of a drug in which the user consumes the substance in amounts or with methods which are harmful to themselves or others.[5] However, the variables under consideration include patient's age, comorbidities, risk behaviours and lifestyles. Children over the age of 3 years are also at high risk of developing post-operative nausea and vomiting, in comparison to adults.[1] In paediatric patients, there is an increased risk of respiratory complications associated with the copious amount of secretions during upper respiratory tract infections (URI), which lead to airway irritability and increase the risk of laryngospasm and bronchospasm.[6]

Common medical conditions that affect outcome of anaesthesia in patients according to Agarwal et al cardiovascular diseases, respiratory diseases, endocrine diseases, hepatic and renal diseases, gastrointestinal and neuromuscular diseases.[7] Risk behaviours and lifestyles like substance use in form of smoking, alcoholism and opioid use are implicated in the development of cardiac complications and respiratory insufficiencies, postoperative alcohol withdrawal syndrome and increased tolerance of analgesics respectively. Both smoking and drinking can alter the hepatic metabolism of commonly used drugs.[8]

Anaesthesia outcome has increased tendencies to be affected in the population of extreme ages and comorbidities. According to American Society of Anesthesiologists, it appears that a subset of the elderly population stands at the top of a "slippery slope", vulnerable to prolonged or permanent cognitive decline after surgery.[9] At present, it is incumbent upon anaesthetists, surgeons and all involved in the perioperative care of the elderly patients to consider the risk of postoperative cognitive dysfunction whenever surgery is contemplated and to discuss the issue with patients and their families. Perioperative delirium and longer term cognitive disturbance are common and disabling consequences of anaesthesia and surgery in the elderly.

Poor outcome of anaesthesia varies from intra operative regurgitation, post-operative cognitive dysfunction, especially in the elderly, post-operative nausea and vomiting, respiratory impairment to prolonged effect of anaesthesia, thus prolonging patient's recovery from general anaesthesia and death.[9] Occurring from regional anaesthesia include delirium, post-operative cognitive dysfunction, post dural puncture headache, hypotension and death.[10]

The pre-operative review with the patient is essential in preparing the patient for surgery. It has a potential protective influence on adverse side-effects of anaesthesia and recovery which are usually not investigated within the context of other perioperative factors. This allows detection and quantification of all causal relationships and mediator effects in their various forms. Therefore, this work aimed at discovering the factors that affect the outcome of anaesthesia.

METHODS

A retrospective study design was used. The population consist of case notes of patients who have undergone surgical operations under general anaesthesia with

endotracheal intubation and had undesired or poor outcome from anaesthesia.

Sample and sampling technique

Total enumeration was utilized to for the study. A sampling frame of case files of patients who had surgical operations under general anaesthesia with endotracheal intubation between January 1st, 2015 and December 31st, 2019 were identified from the perioperative registers of LAUTECH Teaching Hospital, Osogbo and OAUTHC, Ile Ife. Average of 80 and 120 surgeries per month will give a total of 2400 cases annually.

Method of data analysis and presentation

Descriptive method of analysis was used to analyze the data using frequency table, mean and mode for research questions. Chi-square was used for categorical variables and T- test for testing the relationship between the continuous data.

Ethical consideration

Permission and ethical clearance were sought from the ethical committees of LAUTECH Teaching Hospital, Osogbo and OAUTHC, Ile Ife, Osun State for ethical clearance. The Heads of Nursing and Medical Records Departments in both Hospitals were seen and permission to carry out the study was obtained.

RESULTS

Table 1 showed that the respondents which were infant had 3.4% and 5.9% were toddlers and teens each and 5.8% were in early childhood and 4.8% were in late childhood and 16.7% were adult while 9.4% were elderly and 44.3% were males while 55.7% were females and 62.8% were married and 35.2% were singles while 2% were widowed and 48.9% were unemployed or have been retiree and 16.2% were artisan and 29.6% were self-employed while 5.3 were civil servants. Moreover, 12.4% of the respondents were done in year 2015 and 14.7% were done in year 2016 and 15.9% were done in year 2017 and 24.2% were done in year 2018 while 32.7% were done in year 2019.

Table 2 showed that diabetes mellitus of 14.9% respondents in 2015, 2016 and 2017 each while 20.9% were for 2018 and 44.4% were for 2019 and 10.5% of hypertension were recorded in 2015and 23.8% were for 2018 while 31.4% were for 2019 and 18.2% respondents were recorded of peptic ulcer for 2018 and 21% were recorded for 2017 while 35.7% were recorded for 2019 and chronic liver diseases were only found in 2019.

Additionally, 15.4% respondents of asthma were recorded for 2015 and 2018 and 2019 and 30.8% were recorded for 2016, while 23.1% were recorded for 2017 and all respondents of Congestive cardiac failure were found in 2017 and 50% of respondents gastrophaen reflux were recorded in 2016 and 2017 each and 25% of the respondents who had epilepsy and 75% were recorded in 2019.

Table 1: Socio demographic data.

Variable	Frequency	Percentage
Age group		
Infant	87	3.4
Toddlers	148	5.9
Early childhood	147	5.8
Late childhood	120	4.8
Teen	148	5.9
Adults	1637	64.9
Elderly	237	9.4
Gender		
Male	1118	44.3
Female	1406	55.7
Marital status		
Married	1584	62.8
Single	890	35.2
Widowed	50	2.0
Occupation		
Civil servant	133	5.3
Self employed	746	29.6
Artisan	410	16.2
Unemployed/ retiree	1235	48.9
Years		
2015	312	12.4
2016	372	14.7
2017	402	15.9
2018	612	24.2
2019	826	32.7

On the risk behaviour the table showed that patients with obesity were recorded in 2019 and 7.7% respondents of smokers were recorded in 2015 and 33.3% were recorded in 2018 while 23.1% were recorded in 2019. Similarly, 2.4%of the respondents were drunkard of alcoholism were recorded in and 31%were recorded in 2017 while 42.9% were recorded in 2019 and 26.7% of patients that taken cannabis or Indian hemp were recorded in 2015 and 33.3% were recorded in 2016 and 20% were recorded in 2018 and 18.2% of the patients with obstructive sleep were recorded in 2015, 27.3% were recorded in 2016 while 33.3% were recorded in 2018. Finally, 50% of patients with motion sickness were recorded in 2017 and 2019 each. The above Table 3 showed that 6.7% respondents in 2015 had PONV, 10% were recorded in 2016 and 2018 each while 55.5% were recorded in 2019 and 9.1% had bronchospasm in 2015,2016 and 2018 each and 45.5% had it in 2017 while 27.3% had it in 2019 and 15.2% had post-operative pain in 2017 and 21.9%had it in 2018 while 42.9% had it in 2019 and 25.4% had delay in waking up in 2017 and 21% had it in 2018 while 32.1% had it in 2019 and 25.5% of patient with

laryngospasm in 2015 and 18.2% had it in 2016 while 43.6% had it in 2018.

Table 2: Distribution of factors that affects outcome of anaesthesia in surgically operated patients.

Variable	2015	2016	2017	2018	2019
Diabetes mellitus	15 (14.9)	15 (14.9)	15 (14.9)	11 (20.9)	45 (44.4)
Hypertension	36 (10.5)	63 (18.3)	55 (16.0)	82 (23.8)	108 (31.4)
Peptic ulcer	24 (16.8)	12 (8.4)	30 (21.0)	26 (18.2)	51 (35.7)
Chronic liver diseases	0	0	0	0	18 (100.0)
Asthma	6 (15.4)	12 (30.8)	9 (23.1)	6 (15.4)	6 (15.4)
Congestive cardiac failure	0	0	3 (100.0)	0	0
Gastrophaen reflux	0	3 (50.0)	3 (50.0)	0	0
Epilepsy	0	3 (25.0)	0	0	9 (75.0)
Risk behaviour					
Obesity	0	0	0	0	15 (100.0)
Smoking	9 (7.7)	24 (20.5)	18 (15.4)	39 (33.3)	27 (23.1)
Alcoholism	9 (7.1)	3 (2.4)	39 (31.0)	21 (16.7)	54 (42.9)
Cannabis	12 (26.7)	15 (33.3)	6 (13.3)	9 (20.0)	3 (6.7)
Obstructive sleep	18 (18.2)	27 (27.3)	9 (9.1)	33 (33.3.)	12 (12.1)
Motion sickness	0	0	9 (50.0)	0	9 (50.0)

Table 3: Observed outcome of anaesthesia in surgically operated patients.

Variable	2015	2016	2017	2018	2019
PONV	12 (6.7)	18 (10.0)	33 (18.3)	18 (10.0)	99 (55.5)
bronchospasm	3 (9.1)	3 (9.1)	15 (45.5)	3 (9.1)	9 (27.3)
Post-operative pain	21 (6.7)	42 (13.3)	48 (15.2)	69 (21.9)	135 (42.9)
Delay in waking up	45 (10.0)	51 (11.4)	114 (25.4)	94 (21.0)	144 (32.1)
Laryngospasm	42 (25.5)	30 (18.2)	9 (5.5)	72 (43.6)	12 (7.3)
Delirium	24 (7.5)	54 (16.9)	18 (5.6)	115 (36.1)	108 (33.9)
Hypertension	9 (5.2)	21 (12.1)	51 (29.3)	30 (17.2)	63 (36.2)
Delay exubation	9 (5.7)	30 (22.2)	21 (15.6)	24 (17.8)	51 (37.8)
ICU admission	3 (3.8)	9 (11.5)	18 (23.1)	15 (19.2)	33 (42.3)
Respiratory insufficiency	3 (9.1)	9 (27.3)	3 (9.1)	3 (9.1)	15 (45.5)
Cardiac arrest	0	0	12 (66.7)	3 (16.7)	3 (16.7)
Death	0	0	3 (33.3)	3 (33.3)	3 (33.3)
Hypotension	3 (8.3)	0	9 (25.0)	0	24 (66.7)
Palpitation	0	0	3 (50.0)	0	3 (50.0)

Again, 5.5% respondents of 2017 had delirium and 36.1% had it in 2018 while 33.9% had it in 2019 and 5.2% of the patients had hypertension and 29.3% had it in 2017 while 36.2% had it in 2019 and 5.7% of patients had delay exubation in 2015, 22.2% had it in 2016 while 37.8% had it in 2019 and 3.8% of the patient in 2015 were admitted in intensive care unit and 23.1% had it in 2017 while 42.3% had it in 2019 and 9.1% patients had respiratory insufficiency in 2015, 2017 and 2018 each and 27.3% had it in 2016 while 45.5%had it in 2019. In addition,66.7% of the respondents had cardiac arrest in 2017 while 16,7% had it in 2018 and 2019 each and 33.3% resulted to death each in 2017, 2018 and 2019 and 25% had hypotension 2017 while 75% had it in 2019 and 50% had palpitation in 2017 and 2019 each.

Table 4 revealed factors that affect outcome of anaesthesia in surgically operated patients. These factors are grouped into two as 1) comorbidity and 2) associated risk behaviour. The section on the comorbidity showed that 4% had diabetes mellitus, 13.6% had hypertension, 5.7% had peptic ulcer, 0.7% had chronic liver diseases, 1.5% had asthma, 0.1% had congestive cardiac, 0.2% had gastrophaen reflux, and 0.5% had epilepsy. The risk behaviour section revealed that 0.6% had obesity, 4.6% were smokers, 5% were alcoholic, 1.8% ever used Indian hemp and cannabis, 3.9% had obstructive sleep and 0.7% had motion sickness. The implication of this results is that over the 5 years of study, hypertension (13.6%), peptic ulcer (5.7%) and diabetes mellitus (4%) are the main three (3) comorbidity shown while alcoholism

(5%), smoking (4.6%), and obstructive sleep (3.9%) are the major risk factors observed.

Table 4: Factors that affects outcome of anaesthesia in surgically operated patients.

Variable	Yes (%)	No (%)
Comorbidity		
Diabetes mellitus	101 (4.0)	2423 (96.0)
Hypertension	344 (13.6)	2180 (86.4)
Peptic ulcer	143 (5.7)	2381 (94.3)
Chronic liver diseases	18 (0.7)	2506 (99.3)
Asthma	39 (1.5)	2485 (98.5)
Congestive cardiac failure	3 (0.1)	2521 (99.9)
Gastrophaen reflux	6 (0.2)	2518 (99.8)
Epilepsy	12 (0.5)	2512 (99.5)
Risk behaviour		
Obesity	15 (0.6)	2509 (99.4)
Smoking	117 (4.6)	2407 (95.6)
Alcoholism	126 (5.0)	2398 (95.0)
Cannabis /Indian hemp	45 (1.8)	2479 (98.2)
Obstructive sleep	99 (3.9)	2425 (96.1)
Motion sickness	18 (0.7)	2506 (99.3)

Table 5: Observed outcome of anaesthesia in surgically operated patients.

Variable	Yes (%)	No (%)
PONV	180 (7.1)	2344 (92.9)
bronchospasm	33 (1.3)	2491 (98.7)
Post -operative pain	315 (12.5)	2209 (87.5)
Delay in waking up	448 (17.7)	2096 (82.3)
Laryngospasm	165 (6.5)	2359 (93.5)
Delirium	319 (12.6)	2205 (87.4)
Hypertension	174 (6.9)	2305 (93.1)
Delay exubation	135 (5.3)	2389 (94.7)
ICU Admission	78 (3.1)	2446 (96.9)
Respiratory insufficiency	33 (1.3)	2491 (98.7)
Cardiac arrest	18 (0.7)	2506 (99.3)
Death	9 (0.4)	2515 (99.6)
Hypotension	36 (1.4)	2488 (98.6)
Palpitation	6 (0.2)	2518 (99.8)

The outcome of this research question revealed that 7.1% respondents had post-operative nausea and vomiting, 1.3% had bronchospasm, 12.5% had post-operative pain, 17.7% had delayed in waking up from the surgery, 6.5% respondents had laryngospasm, 12.6% had delirium, and 6.9 had hypertension. Also, the table revealed further that 5.3% of the respondents had delay in exubation, 3.1% had ICU admission, 1.3% had respiratory insufficiency, 0.7% had cardiac arrest 0.4% resulted to death, 1.4% respondents had hypotension and 0.2% had palpitation. It could be said that the main observed outcome of anaesthesia in surgically operated patients are delay in waking up (17.7%), delirium (12.6%), and post-operative pain (12.5%). Others are post-operative nausea and vomiting (7.1%), hypertension (6.9%) and laryngospasm (6.5%) (Table 5).

DISCUSSION

The study revealed that majority of the respondents was Adults while few of them were infants and females respondents were more than male counterpart in the study. This is similar to Kim et al.[11] The larger percentage of the respondents were married and they were either retiree or unemployed and there is tremendous increase in respondents as year increases. Also, it was observed that the prevalence comorbidity in the study period was hypertension and on the risk behaviour, it was obstructive sleep in 2015 and 2016 and in 2016 and 2019 it was alcoholism while smoking was the prevalence risk behaviour in 2018. The prevalence anaesthesia outcome of surgical operate patients in 2015 and 2019 was delay in waking up while deliriums was the prevalence anaesthesia outcomes in 2016 and 2017 and 2018.

The study revealed the factors that affect outcome of anesthesia in surgically operated patient. These are diabetes mellitus, hypertension, peptic ulcer, chronic liver diseases, asthma, congestive cardiac failure, Gastrophaen reflux and epilepsy which are comorbidity. This is line with Agarwal, Porter and Obeid[7] which says that hypertension is a common disease affecting more than 30% of adults in America and they further enlisted some common medical conditions identified during surgery which are hypertension, Coronary artery disease, valvular heart disease, congestive cardiac failure. Similarly, Joshi et al explained the effect of asthma patients on anaesthesia during surgery in which asthmatic condition predisposes patients to intra and post-operative bronchial spasms as some anaesthetic and neuromuscular agents release histamine.[12] Also, Johansen et al described diabetes mellitus as one of factor great importance because there is a 50% increase in morbidity and mortality in diabetic compared to non-diabetic counterparts and can cause a delay in emergence from anaesthesia after the surgery.[13]

Furthermore, the findings revealed that alcoholism and smoking of cigarette had higher frequencies followed by obstructive sleep then smoking of Cannabis /Indian hemp among the risk behaviour exhibited by the respondents motion sickness and obesity were the least findings.

This risk behaviour were in line with Ksir et al, findings which says that risk behaviours being the ways and manners that living creatures act with the likelihood of a negative outcome can affect outcome of quality anaesthesia in surgical patients, these include substance abuse such as cigarette and tobacco smoking, alcoholism, binge eating, obesity, depression, obstructive sleep apnoea, age related cognitive impairment like delirium, motion sickness and a host of others.[5]

Also, the observed outcome of this research revealed that 7.1% respondents had post-operative nausea and vomiting, 1.3% had bronchospasm, 12.5% had post-operative pain, larger percentage of outcome were discovered in delayed in waking up from the surgery, 6.5% respondents had laryngospasm, 12.6% had Delirium, and 6.9 had hypertension. Also, revealed further that 5.3% of the respondents had delay in exubation, 3.1% had ICU admission, 1.3% had respiratory insufficiency, cardiac arrest and death and palpitation outcome has the least number of occurrence. This is supported by Morales et al findings which uphold all above outcomes as anaesthesia outcomes.[14] Among the outcomes it reported were bronchospasm, post-operative pain and delay in waking up and laryngospasm and delirium delay exubation and hypertension and Palpitation.

CONCLUSION

It was gathered that surgical operation involved both males and females and from the study it revealed that majority of the patients attended both the tertiary teaching hospital in the study area were females. Also showed that larger number of surgical operated patient were higher in adulthood compare to other categories of the age group in which infant group were lowest number among them all. Each showed that there is an increases in the number of operated surgical patients in both teach hospitals. Among the comorbidity of surgical operated patients hypertension was shown as significant prevalence in each year while the most prevalence risk behaviour across the year of the study were obstructive sleep, alcoholism and smoking and Delay in waking up and delirium.

Moreover, there is significant effect of age on some comorbidity such as diabetes mellitus and hypertension, peptic ulcer and asthma which implies that the higher the age the closer of getting any of above mentioned ailments. Also, there are certain risk behaviour among the respondents which age group exhibit such as smoking of cigarette and cannabis or Indian hemp, heavy alcohol intake and obstructive sleep. All these can be exhibited based on ages increment.

Some of the outcomes which age determine are post-operative on nausea and vomiting, bronchospasm, post-operative pain and delirium, delay in waking up and hypertension. In addition, the findings showed that there is a significant relationship between the gender and the comorbidity which showed that females are higher in comorbidity status than male counterpart in diabetes mellitus, hypertension, peptic ulcer and gastrophean failure while in the risk behaviour male respondents were higher than female respondents in smoking, alcoholism, sniffing of cannabis or Indian hemp and obstructive sleep. Subsequently, gender of the respondents showed a significant effect on anaesthesia outcomes in which female respondents had higher outcome compare to male respondents in post- operative on nausea and vomiting, post-operative pain and hypertension while males respondents showed a significant difference in bronchospasm outcomes.

Recommendations

From the findings of the research work the following the following recommendations are proffered

1. The anaesthesia team must kindly investigate more on the patient before the commencement of anaesthesia during surgery.

2. The government at all levels should provide awareness for general populace on the effect of smoking and alcoholism that anybody can be a victim of having surgery that awareness can be in both electronic and print.

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