International Journal of Science and Research Archive
eISSN: 2582-8185
Cross Ref DOI: 10.30574/ijsra
Journal homepage: https://ijsra.net/

(RESEARCH ARTICLE)

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Differential surgical outcome in Federal Medical Centre Owerri, Nigeria

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International Journal of Science and Research Archive, 2022, 06(02), 016–025

Publication history: Received on 29 April 2022; revised on 05 July 2022; accepted on 07 July 2022

Article DOI: https://doi.org/10.30574/ijsra.2022.6.2.0098

Abstract

Background: Global understanding of surgical outcome is still limited, with data lacking in some areas of the world. Global studies most times are dominated by data sourced from high income and developed countries.

Aim: This study is aimed at evaluating the differential surgical outcomes in a Health Institution in Nigeria, to help understand how patients develop postoperative complications and the severity of such complications.

Methods: We recruited 200 patients that were booked for elective or emergency in-hospital or day case surgery. The patients were followed up for maximum of 30 days postoperatively. Perioperative outcomes were evaluated.

Results: The majority of the participants were in ASA II class (46%), while the others were in class ASA III (31%), ASA I (20%) and ASA IV (3%). There were 35% participants that had intraoperative complication, while 29% had postoperative complication. The rate of ICU admission was 5%, while the duration of postoperative ICU and hospital stay were 1.7±0.90 days and 13.28±2.97 days respectively. Surgical related mortality rate was 3%.

Conclusion: The findings show that despite the high intraoperative complication rate of 35%, postoperative complication rate of 29% and critical care admission rate of 5%, mortality rate (3%) was the same with other global studies.

Keywords: Safe-Surgery; Safe-Anaesthesia; Outcomes; Morbidity; Mortality

1. Introduction

Access to safe surgery remains far-fetched in the developing countries, and it's been suggested to be 3.5% in the world third poorest countries (1). Globally 4.8 billion people are unable to access safe surgical treatments (2). In another epidemiological study, it was recorded that 30% of the world's population lack access to surgery, as well as safe anaesthesia (3). However, surgery is necessary to alleviate some disabilities and reduce the risk of death from some common conditions, and it is estimated that 234 million surgeries are performed every year[1]. The outcomes of surgery have been improved in developed countries, but there is still some great disparity in the developing countries (4, 5). Some authors found the indices associated with surgical outcome to be modifiable, such as anaesthesia related morbidity and mortality, and availability of critical care personnel and unit (4, 5).

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World Federation of Societies of Anesthesiologists is globally uniting Anaesthesiologists to improve care and patients access to safe anaesthesia (6). World Health Organization in an effort to make surgery safe and save lives, designed a surgical checklist (7). The checklist aims at decreasing the errors and adverse events associated with surgery, and increase teamwork and communication, and this has been found to reduce morbidity from 11.0% to 7.0%, while mortality associated with surgery has also been reduced from 1.5% to 0.8% (7, 8). Lancet Commission on Global Surgery 2030 calls for equity and integration in the provision of surgical and anaesthetic care (9). With the target of achieving a minimum of 80% coverage of essential surgical and anaesthesia services per country by 2030, 100% of countries with at least 20 surgical, anaesthesia and obstetric physicians per 100,000 population by 2030, 80% of countries by 2020 and 100% of countries by 2030 tracking surgical volume, and 80% of countries by 2020 and 100% of countries by 2030 tracking perioperative mortality rate, thus enabling evaluation of global data and setting up of national target by 2030 (9).

Postoperative complications are associated with increase in treatment costs and reduces both life expectancy and quality. Yet global understanding of surgical outcome is still limited, with data lacking in some areas of the world (10, 11). In a study conducted in Africa, there was no enough data describing surgical outcome, and the results of global studies most times are dominated by data sourced from high income and developed countries, with little or no contribution from African or low-income countries (12). It's been estimated that postoperative complications in high-income countries is about 20%, and short-term mortality is found to vary between 1 – 4% (13, 14). However, another study conducted in South Africa recorded postoperative mortality rate of 3.1% (15). In another study conducted in Nigeria, they recorded a perioperative mortality rate of 6.4% (16).

Effective perioperative care is essential to the safe provision of surgical and anaesthetic treatments, and this is expected to improve postoperative outcomes. However, as we seek to ensure the global availability of surgical and anaesthesia treatments, there is need to understand how patients develop postoperative complications. Thus, this study aimed at determining the differential outcomes of elective and emergency surgeries in our Institution. We also, determined the incidence of postoperative intensive care unit admission, and the relationship of preoperative clinical status of patients and postoperative complications.

2. Methods

Ethical clearance was obtained from the Health Research and Ethics Committee of our Institution, as well as a written informed consent from each of the patients, or guardian/parents of the patients who were recruited for this study. In this observational cohort study, we recruited a total of 200 patients that were booked for elective or emergency in-hospital or day case surgery based on the sample size calculation using the Schwartz formula for prevalence determination (17). All the surgical patients that refused to participate, or those undergoing radiological procedures were excluded from this study. However, they were accorded the due standard healthcare. All the patients were evaluated preoperatively, to establish rapport and assess their fitness for anaesthesia and surgery. Their laboratory investigations were done and reviewed based on hospital's management protocol and findings from patient's evaluation. They were all classified using the American society of Anaesthesiologist (ASA) health status classification criteria. The perioperative plans were explained to the patients or caregiver and documented.

In the theatre, a multi-parameter monitor was used to record patient's electrocardiogram, peripheral oxygen saturation, non-invasive blood pressure, and peripheral temperature. Intravenous access was secured on the non-dominant upper limb. The study is purely observational, and all basic intraoperative procedures as it relates to surgery and anaesthesia were not altered. All the patients were followed up for maximum of 30 days postoperatively. Perioperative events were documented, and pain was assessed with numerical rating scale.

The perioperative outcomes evaluated included the differential intraoperative and postoperative complications for emergency and elective surgeries, incidence of postoperative intensive care unit admission, postoperative mortality rate, relationship of clinical status of patients and complications, and postoperative duration of hospital stay. Data were entered into a data collection form and analyzed with the statistical package for social sciences (SPSS) 21 version. Tables and figures were used to present the result, and expressed as mean, median (interquartile range), proportion (number of patients), percentages and standard deviation. A p-value of < 0.05 will be considered significant. Chi-squared (x^2) test will be used to analyze the categorical data. Age, weight, height, pain score, duration of surgery, preoperative and postoperative haemoglobin level, baseline blood pressures, and highest postoperative blood pressures were analyzed with student's t-test and one-way ANOVA. Univariate analysis was performed to test factors associated with postoperative complications, critical care admission and in-hospital death.

3. Results

There were 200 patients that participated in this study. The preoperative patient variables are shown in Table 1. The mean age, weight and haemoglobin level of the patients were 38.02± 2.72 years, 68.06±6.71 kg and 10.80±0.22 g/dl respectively. The majority of the participants were in ASA II (46%), while the others were in ASA III (31%), ASA I (20%) and ASA IV (3%). Of note, is that the elective surgeries contributed 66%, while the emergencies contributed 34% of the total surgical cases. The total number of patients with comorbid illness was 44 and the distribution is shown in Table I. The distribution of preoperative laboratory investigations done are depicted in Figure 1. A total of 48.5% of the cases were done with general anaesthesia, while 30% were done with spinal anaesthesia. The combination of spinal and epidural anaesthesia was used in 10.5% of the surgical cases, while combination of local infiltration and sedation, combination of spinal anaesthesia and sedation were used for 6.5% and 4% of the patients respectively. Epidural anaesthesia was used for 0.5% of the surgical cases (Figure 2).

Table 1 Preoperative patient's characteristics

Variables	**Mean±SD, (%)**
Age (Year, n=200)	38.02± 2.72
Weight (Kg, n=200)	68.06±6.71
Haemoglobin (g/dl, n=200)	10.80±0.22
Health Status (n=200)	
ASA I	40 (20.0)
ASA II	92 (46.0)
ASA III	62 (31.0)
ASA IV	6 (3.0)
Nature of Surgery (n=200)	
Elective	132 (66.0)
Emergency	68 (34.0)
Comorbid Condition (n=44)	
Hypertension	28 (63.6)
Hypertension & Diabetes Mellitus	4 (9.0)
Diabetes Mellitus	3 (6.8)
HIV Infection	3 (6.8)
HIV Infection & Diabetes Mellitus	1(2.3)
Bronchial Asthma	1(2.3)
Anaemia	1(2.3)
Psychiatric illness	1(2.3)
Peptic Disease	1(2.3)
Motor Neuron Disease	1(2.3)

The mean duration of surgery was 85.10±8.10 minutes, while the duration of anaesthesia was 106.51±8.51 minutes. The mean estimated blood loss was 441.2±61.82 ml, while the mean volume of whole blood transfused was 953.57±215.08 ml (Table 2). The distribution of types of surgeries that were done during this study are described in Figure 3. There were 35% participants that had intraoperative complication(s), while 29% of the recruited population had postoperative complication(s), and these are described in Table 3. The rate of ICU admission was 5%, while the duration.

Table 2 Intraoperative patient characteristics

Variables	Mean±SD (n=200)
Duration of Surgery (minute)	85.10±8.10
Duration of Anaesthesia (minute)	106.51±8.51
Estimated Blood Loss (ml)	441.2±61.82
Volume of Blood Transfused (ml)	953.57±215.08

Table 3 Intraoperative and postoperative complications

Complication	Intraoperative n=200 (%)	Postoperative n=200 (%)
Shivering	8 (4.0)	1 (0.5)
Restlessness	1 (0.5)	0 (0.0)
Pain	2 (1.0)	4 (2.0)
Haemorrhage	4 (2.0)	1 (0.5)
Hypertension	7 (3.5)	4 (2.0)
Hypotension	5 (2.5)	2 (1.0)
Tachycardia	3 (1.5)	2 (1.0)
Bradycardia	1 (0.5)	0 (0.0)
Hypotension & Haemorrhage	1 (0.5)	0 (0.0)
Hypertension and Haemorrhage	3 (1.5)	0 (0.0)
Hypotension & Bradycardia	1 (0.5)	0 (0.0)
Hypertension & Tachycardia	4 (2.0)	1 (0.5)
Hypotension & Shivering	2 (1.0)	0 (0.0)
Hypertension & Shivering	1 (0.5)	0 (0.0)
Hypotension & Restlessness	1 (0.5)	0 (0.0)
Shivering, Nausea & Vomiting	1 (0.5)	0 (0.0)
Shivering & Bradycardia	1 (0.5)	0 (0.0)
Shivering & Tachycardia	5 (2.5)	0 (0.0)
Shivering & Restlessness	1 (0.5)	0 (0.0)
Shivering & Pain	2 (1.0)	1 (0.5)
Pain & Restlessness	2 (1.0)	0 (0.0)
Pain & Tachycardia	2 (1.0)	1 (0.5)
Restlessness & Tachycardia	1 (0.5)	0 (0.0)
Haemorrhage & Vomiting	1 (0.5)	0 (0.0)
Haemorrhage, Hypotension & Pain	1 (0.5)	0 (0.0)
Haemorrhage, Restlessness & Shivering	1 (0.5)	0 (0.0)
Shivering, Pain & Tachycardia	1 (0.5)	0 (0.0)
Shivering, Pain, Nausea & Vomiting	1 (0.5)	0 (0.0)

Shivering, Bradycardia, Nausea & Vomiting Shivering,	1 (0.5)	0 (0.0)
Hypotension & Restlessness	1 (0.5)	0 (0.0)
Tachycardia, Hypotension & Restlessness	1 (0.5)	0 (0.0)
Tachycardia, Hypertension & Restlessness	1 (0.5)	0 (0.0)
Bradycardia, Hypotension, Pain & Shivering	1 (0.5)	0 (0.0)
Tachycardia, Hypertension, Pain & Shivering	1 (0.5)	0 (0.0)
Fever	0 (0.0)	1 (0.5)
Dizziness & Restlessness	0 (0.0)	1 (0.5)
Headache, Tachycardia & Pain	0 (0.0)	1 (0.5)
Tachycardia, Dizziness & Anaemia	0 (0.0)	1 (0.5)
Anaemia	0 (0.0)	2 (1.0)
Wound infection & Fever	0 (0.0)	2 (1.0)
Headache & Tachycardia	0 (0.0)	2 (1.0)
Hypertension & Headache	0 (0.0)	2 (1.0)
Headache & Dizziness	0 (0.0)	2 (1.0)
Pain & Headache	0 (0.0)	4 (2.0)
Death	0 (0.0)	6 (3.0)
Headache	0 (0.0)	17 (8.5)
Total	70 (35)	58 (29)

Table 4 Postoperative outcome

Variables	**mean±SD, (%)**
Duration of ICU stay (n=10, day)	1.7±0.90
Rate of ICU Admission	10 (5)
Duration of Hospital Stay (n=200, day)	13.28±2.97

Table 5 The relationship of ASA clinical status and surgical outcomes

ASA Class	**All Patients n=200 (%)**	**Patients with intraoperative complication n=70 (%)**	**Patients with postoperative complication n=58 (%)**	**Patients admitted into ICU n=10 (%)**	**Patients who died n=6 (%)**
ASA I	40 (20.0)	7 (17.5)	7 (17.5)	0 (0)	0 (0)
ASA II	92 (46.0)	44 (47.8)	33 (35.9)	1 (1.1)	2 (2.2)
ASA III	62 (31.0)	17 (27.4)	15 (24.2)	8 (12.9)	4 (6.5)
ASA IV	6 (3.0)	2 (33.3)	3 (50.0)	1 (16.7)	0 (0)

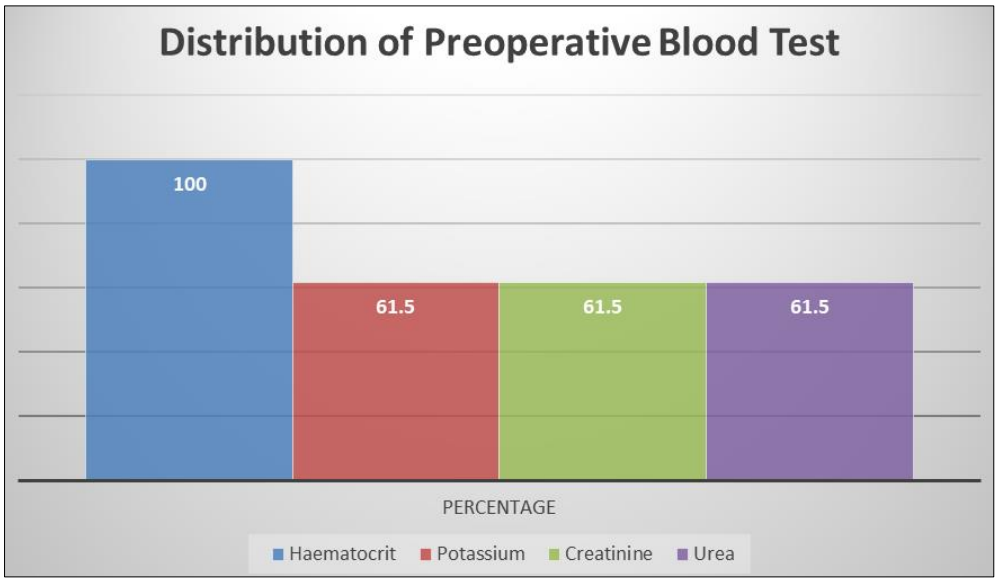

Figure 1 Distribution of preoperative blood test

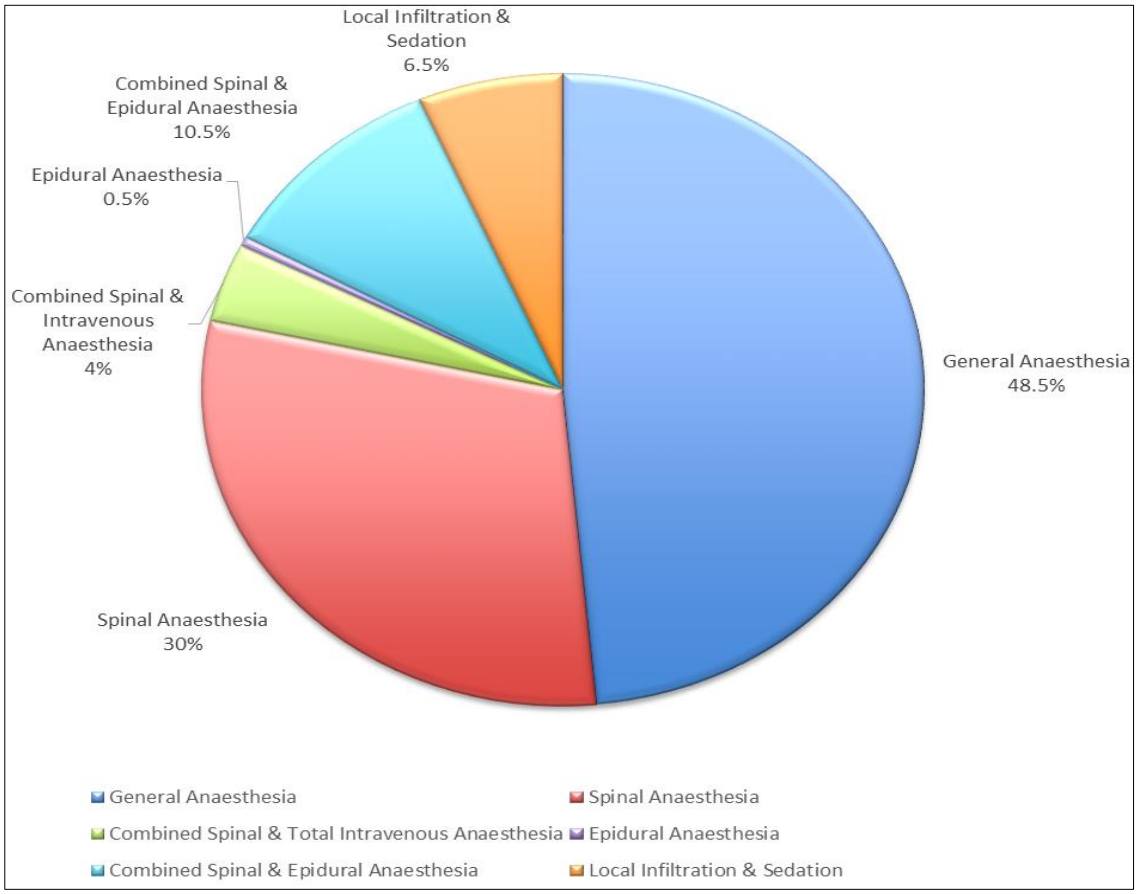

Figure 2 Distribution of anaesthesia techniques

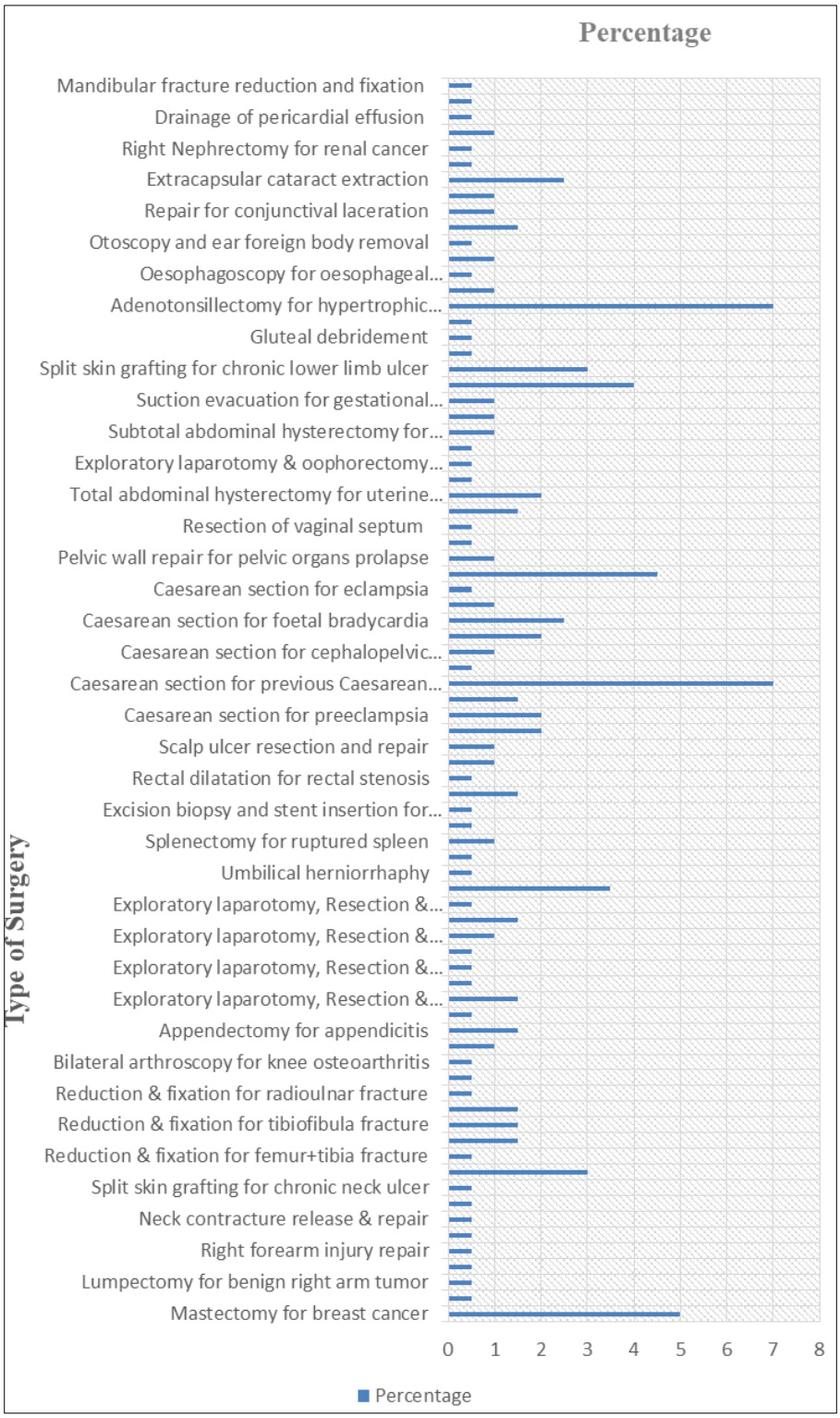

Figure 3 Distribution of types of surgery

4. Discussion

We evaluated the differential outcomes of wide range of elective and emergency surgeries across different age groups and discovered that we had an intraoperative complication rate of 35%, postoperative complication, critical care admission and mortality rates of 29%, 5% and 3% respectively.

The intraoperative complication rate of 35% found in our study differs from that of a prospective study conducted by Terrac SE (18) in an acute care Hospital and level II trauma Centre in San Diego, that had an intraoperative complication rate of 3.8%, and that of a retrospective study conducted by Riss et al (19) in Austria, that had a rate of 10.9%. These show that there is a clear disparity between surgical outcome in low-income countries (LIC) and high-income countries (HIC) (4, 5). In another global study conducted by the International Surgical Outcomes Study group, there were no enough data describing intraoperative surgical outcome in low income regions, thus resulting in a global study being dominated by data sourced from HIC of the world, with little contribution from LIC (12).

We also recognized that in our study that evaluated both elective and emergency surgeries, the postoperative complication rate (29%) was higher than that obtained in an Osinaike et al (20) (18.5%) study, as well as other studies conducted by Ghaferi et al (13) (20%) and Terrac SE (18) (23.4%). But, in a comprehensive literature review of previous studies Tevis et al (21) found that the reported incidence of 30 days postoperative complications in general surgery patients ranged from 5.8% to 43.5%. Osinaike and colleagues (20) study was conducted in Nigeria, as well as the present study, but the lower incidence of postoperative complication they observed could have been due to the recruitment of only elective in-hospital surgeries for their study.

Treatment of surgical patients can be difficult in LIC, especially for emergency surgery. In most public hospitals in developing nations, patients pay out of the pocket for their resuscitation and treatment (2). This usually delays surgical intervention and result in increase in morbidity and mortality. Adamu and colleagues (22) evaluated this scenario and discovered that it took an average of 22.3 hours for patients to access emergency surgical care on arrival to a health care facility in Nigeria, due to financial constraint, delayed investigation results, lack of blood components, personnel problems and inability to secure theatre space.

Inadequate access to surgical and anaesthesia care can also increase surgical related increase in morbidity and mortality. When the effects of death from acute abdominal conditions in India were matched with accessibility to hospitals capable of providing appropriate emergency surgical care, it was observed that most of those hospitals were more than 100 km away (9). Surgical and anaesthesia related complications are global issues, however, the incidences are higher in LIC and some of these are preventable (4, 9). Weisser et al (1) in their study reported that in Sub-Saharan African, anaesthesia related death is as high as 1:150.

Anaesthesia care is fundamental to healthcare delivery for any country at any level of development, but the provision of these treatment in LIC remains challenging, making it difficult to develop safe anesthesia and surgical care (9, 23). Although this study was no designed to evaluate the effect of medical personnel training on the utilization of different anaesthetic techniques, it's been shown that the type of anaesthesia given to patients for surgeries may be influenced by the level of training of the medical personnel and availability of lifesaving drugs and anaesthetic agents (23, 24). This can be explained by the declining general anaesthesia utilization rate of 48.5%, and the rising utilization rate of spinal anaesthesia (30%), as well as combination of spinal and epidural anaesthesia (10.5%) in the study location due to rising number of trained physician anaesthetists, compared with a previous report that showed general anaesthesia (inhalational anaesthesia with face mask) rate of 79%, spinal anaesthesia rate of 15% and CSE rate of 1.5%. Epidural anaesthesia was given to 0.5% of the surgical cases.

Shivering accounted to 4% of our intraoperative complications and 1% of the postoperative complications. We also observed that shivering coexisted with other complications. The incidence of shivering was observed more in the patients that received neuraxial blocks. In another study conducted by Nnaji et al (25), it was observed that among the population of patients that had perioperative complication, the patients that received spinal anaesthesia with bupivacaine-fentanyl had a lower incidence (3.84%), compared to the population that received spinal anaesthesia with bupivacaine alone (17.85%). Mechanism of shivering is not well understood however, it may be a normal thermoregulatory mechanism in response to core hypothermia due to redistribution of heat from core to periphery. Non-thermoregulatory shivering can occur in normothermic patients. Shivering following neuraxial block can occur as a result of fall in body temperature of about 1-3 °C, which is probably due to the loss of thermo-sensory inputs, and heat loss from vasodilated anaesthesized areas (24).

Irrespective of the high rate of intraoperative and postoperative complications, the mortality rate (3%) we discovered was not different from that found in multiple studies done in HIC (13, 14, 15). Ghaferi and colleagues (13) as well as Pearse et al (14) observed a short-term postoperative mortality rate of 1 – 4%. Another report from South Africa recorded a postoperative mortality rate of 3.1%[15]. Death is one of the most feared complications of surgery, yet the magnitude of risk of death related to surgery and anaesthesia is not well understood (4).

In the present study, we evaluated the effect of ASA clinical status of our patients, instead of Lee revised cardiac index on surgical outcome and observed that surgery-related and patient-related factors interacted to increase postoperative morbidity and mortality. This is not different from the findings of other studies (4, 12, 14). The ASA score describes the severity of coexisting medical disease relative to predicting the operative risks (26). When we assessed the surgical outcomes relative to the number of patients in each of the ASA classification, we observed that there was a rising trend in the surgical outcomes relative to the rising ASA classification. The postoperative complication was more in more in ASA IV (50%) patients, while the mortality was highest in the ASA III (6.5%) class of patients. This is not different from findings of Bainbrigde et al (4) and that of the International Surgical Outcomes Study group (12).

The ICU admission rate was also highest in the ASA IV patients (16.7%), with no postoperative mortality. This observation corroborates Pearse et al (14) suggestion that critical care based cardiorespiratory interventions can improve outcomes among high risk surgical patients. In another study conducted Oji (27), he reported that studies from Africa shows that the main groups that benefits from ICU care are postoperative surgical patients. However, Okafor (28) observed that critical care services in LIC is hampered by economic hardships and government apathy towards funding of hospitals (28). Despite all the odds, Pearse and colleagues (14), discovered that heath care institutions involved in surgical treatment are increasingly recognizing the importance of the entire perioperative care, as well as advanced haemodynamic monitoring during surgery, early admission to critical care unit, acute pain management and critical care services and organized discharge planning.

5. Conclusion

The findings of this study that evaluated the differential outcomes of elective and emergency surgeries across different age groups, show that despite the high intraoperative complication rate of 35%, postoperative complication rate of 29%, critical care admission rate of 5%, mortality rate (3%) was the same with other global studies. We also observed that surgery-related and patient-related factors interacted to increase postoperative morbidity, thus recognition of the importance of entire perioperative care and surgical safety should be of great concern. We recommend that strategies to improve surgical treatments outcomes should take account of the increased demand placed on perioperative care services, as well as limited number of manpower in developing countries.

Compliance with ethical standards

Acknowledgments

We wish to warmly acknowledge the various clinical departments and Management of Federal Medical Centre Owerri, Imo State, Nigeria, for their cooperation during the to conduct this study.

Disclosure of conflict of interest

There were no conflicts of interest

Statement of informed consent

We obtained a written informed consent from each of the patients, or guardian/parents of the patients before they were recruited into this observational cohort study.

References

[1] Weiser TG, Regenbogen SE, Thompson KD, Haynes AB, Lipsitz SR, Berry WR, Gawande AA. An estimation of the global volume of surgery: a modelling strategy based on available data. The Lancet. 2008; 372(9633): 139-144.

[2] Alkire BC, Raykar NP, Shrime MG, Weiser TG, Bickler SW, et al. Global access to surgical care: a modelling study. Lancet Glob Health. 2015; 3: 316–323.

[3] Funk, LM, Weiser TG, Berry WR, Lipsitz SR, Merry AF, Enright AC, Gawande AA et al. Global operating theatre distribution and pulse oximetry supply: an estimation from reported data. The Lancet. 2010: 376(9746); 1055-1061.

[4] Bainbridge D, Martin J, Arango M, Cheng D. Perioperative and anaesthetic-related mortality in developed and developing countries: a systematic review and meta-analysis. The Lancet. 2012: 380 (9847); 1075-1081.

[5] Khan M, Khan FA. Anesthetic deaths in a developing country. Middle East J Anesthesiol. 2007; 19: 159– 172.

[6] https://wfsahq.org/about/vision-and-mission/ Retrieved March 16, 2019.

[7] https: //www.who.int/patientsafety/topics/safe-surgery/checklist. Retrieved March 16, 2019

[8] Haynes AB, Weiser TG, Berry WR, et al. A surgical safety checklist to reduce morbidity and mortality in a global population. N Engl J Med. 2009; 360: 491–499.

[9] Meara JG, Leather AJM, Hagander L, Alkire BC, Alonso N, Ameh EA, Bickler SW, Conteh L, Dare AJ, Davies J, et al. Global Surgery 2030: evidence and solutions for achieving health, welfare, and economic development. Lancet. 2015; 386: 569 – 624.

[10] Scally CP, Thumma JR, Birkmeyer JD, Dimick JB. Impact of surgical quality improvement on payments in Medicare patients. Ann Surg. 2014; 262: 249–52.

[11] Pearse RM, Holt PJ, Grocott MP. Managing perioperative risk in patients undergoing elective non-cardiac surgery. Br Med J. 2011; 343: d5759.

[12] The International Surgical Outcomes Study group. Global patient outcomes after elective surgery: prospective cohort study in 27 low, middle and high-income countries. Br J Anaesth. 2016: 117(5): 601–609.

[13] Ghaferi AA, Birkmeyer JD, Dimick JB. Variation in hospital mortality associated with inpatient surgery. N Engl J Med. 2009; 361: 1368–75.

[14] Pearse RM, Moreno RP, Bauer P, et al. Mortality after surgery in Europe: a 7 day cohort study. Lancet. 2012; 380: 1059–1065.

[15] Biccard BM, Madiba TE, South African Surgical Outcomes Study Investigators. The South African Surgical Outcomes Study: A 7-day prospective observational cohort study. S Afr Med J. 2015; 105: 465–75.

[16] Ekeke ON, Okonta KE, Igwe PO. Surgical inpatient mortality in a Nigerian Tertiary Hospital. Nig J Clin Pract. 2016; 19(3): 308-312.

[17] Daniel WW, Cross LC. Biostatistics: A foundation for analysis in health sciences. Tenth edition. New York: John Wiley and Sons. 2013; 161 – 211.

[18] Tarrac SE. A Description of Intraoperative and Postanesthesia Complication Rates. J PeriAnesthesia Nurs. 2006; 21(2): 88-96.

[19] Riss S, Mittlbock M, Riss K, Chitsabesan P, Stift A. Intraoperative complications have a negative impact on postoperative outcomes after rectal cancer surgery. International J Surg. 2014; 12: 833 – 836.

[20] Osinaike B, Ayandipo O, Onyeka T, Alaegbe-Briggs O, Mohammed A et al. Nigerian surgical outcomes – Report of a 7-day prospective cohort study and external validation of the African surgical outcomes study surgical risk calculator. International J Surg. 2019; 68: 148 – 156.

[21] Tevis SE, Kennedy GD. Postoperative complications and implications on patient-centered outcomes. J Surg Res. 2013; 181(1): 106–113.

[22] Adamu A, Maigatari M, Lawal K, Iliyasu M. Waiting time for emergency abdominal surgery in Zaria, Nigeria. African Health Sciences. 2010; 10(1): 46 – 53.

[23] Hodges SC, Mijumbi C, Okello M, et al. Anaesthesia services in developing countries: Defining the problems. Anesthesia. 2007; 62: 4 -11.

[24] Nnaji CT, Chikwe K. Anesthesia for abdominal myomectomy - A five years audit of a Federal Medical Centre in Owerri, Nigeria. J Anest Anesthes. 2017; 1(1): 16-19.

[25] Nnaji CT, Mato CN, Fyneface-Ogan S. subarachnoid block for transurethral resection of the prostate: a comparison of the block characteristics between 0.5% isobaric bupivacaine with fentanyl and 0.5% isobaric bupivacaine alone. Port Harcourt Med J. 2014; 8(1): 9-18.

[26] Doyle DJ, Goyal A, Garmon EH. American Society of Anesthesiologists Classification. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan–. PMID: 28722969.

[27] Oji A. Intensive care in a developing country: A review of the first 100 cases. Ann R Coll Surg Engl. 1986; 68: 122–124.

[28] Okafor UV. Challenges in critical care services in Sub-Saharan Africa: Perspectives from Nigeria. Indian J Crit Care Med. 2009; 13(1): 25–27.