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ABSTRACT

Background: Intra-operative death is an unusual devastating occurrence in anaesthetic practice, and it is of serious concern when it happens.

Objectives: To assess the causes, the effects and the perception of Nigerian anaesthetists to intra-operative death.

Design: A cross-sectional and questionnaire-based study

Setting: Five University Teaching Hospitals in South-Western Nigeria.

Subjects: Nurse anaesthetists, resident doctors in anaesthesia and consultant anaesthetists

Results: One hundred and five anaesthetists participated in the study (72.9% response rate). Seventy seven (73.3%) of the respondents had experienced an intra-operative death with most of them having five or more years of experience ($p = 0.0001$). Majority 53 (68.8%) of the respondents felt that the deaths were avoidable, and most deaths occurred mainly during emergency surgery (96.1%). Forty three (55.8%) of them were psychologically disturbed, fifty six (53.3%) respondents were of the opinion that it is reasonable for the anaesthetists involved not to take part in further surgery for that day. Sixty (57.1%) respondents considered discussion at mortality meeting as appropriate after an intra-operative death.

Conclusion: This study showed that most anaesthetists would want those involved in the intra-operative death not to take part in further surgery for that day. Adequate preventive measures should be put in place with departmental or institutional policies on what to do after such events.

INTRODUCTION

Most surgical procedures under anaesthesia are uneventful but intra-operative death sometimes occurs. Intra-operative death also known as "death on the table" refers to the demise of the patient while still on the operation table. Recent reports (1, 2), show that anaesthesia related deaths have declined from an estimated rate of 1 in 5,000 three decades ago to about 1 in 200,000 in industrialised nations. Conversely, the rates remain high in the sub-Saharan Africa with estimates ranging from 1 in 3,000 in Zimbabwe to 1

in 150 in Togo (1). Intra-operative death is a more common event and rates ranging from 1 in 274 to 1 in 119 have been reported in Nigeria (3, 4).

Sequel to the advice in 1999 by the Scottish royal medical colleges that a surgeon should stop further operation for the rest of the day after a death on the operating table (5), the management of intra-operative death has continued to generate discussions both in the surgical and anaesthetic literature. A questionnaire survey by White and Akerele (6) in the UK suggested that anaesthetists are likely to experience intra-operative death during their clinical practice and the

consequences may be extremely stressful. Majority of the respondents in their study felt it was reasonable for medical personnel to stop further work for 24 hours after an intra-operative death. Ogunbiyi and colleagues (7) reported that 86% of the 56 responding Nigerian physician anaesthetist in their survey reported psychological effects including lingering bad memories, depression and cardiac dysrhythmias following a death on the table. In view of the higher rate of intra-operative death in our environment compared to the developed nations, it is important to identify the causes (8) and institute preventive measures. It is also imperative to put in place guidelines in the management of such anaesthetic mishap to reduce its impact on the wellbeing of the affected anaesthesia provider and the patient's relations (6, 9). This study was designed to identify the causes, the effects and the attitude of Nigerian anaesthetists to intra-operative death. We also hope to offer suggestions that will assist with the management of events after an intra-operative death among anaesthesia care providers in Nigeria.

MATERIALS AND METHODS

Across-sectional study was conducted between March and August, 2012. Five public university teaching hospitals in the South-Western Nigeria namely: the Obafemi Awolowo University Teaching Hospitals Complex (OAUTHC), Ile-Ife, University College Hospital (UCH), Ibadan, Olabisi Onabanjo University Teaching Hospital (OOUTH), Sagamu, Lagos University Teaching Hospital (LUTH), Lagos and Lagos State University Teaching Hospital (LASUTH), Lagos were involved in the study. There were a total of 144 anaesthetists (including consultants, residents and nurses) in these tertiary institutions at the time of the study. A semi-structured questionnaire was sent via e-mail to the co-investigators in the participating institutions. The questionnaire included questions regarding demographic data; past experience, causes and effects of intra-operative deaths on the anaesthetists. It also included the attitudes of anaesthetists following an intra-operative death. This was printed out and administered by the institutional coordinator to the anaesthetists at these institutions. The filled questionnaires were returned by post for central collation. Data contained in the questionnaires were analysed using SPSS version 15.0 and the results presented in descriptive and tabular forms as percentages. A p-value of <0.05 was taken to be significant. Missing data were treated as part

of the variables.

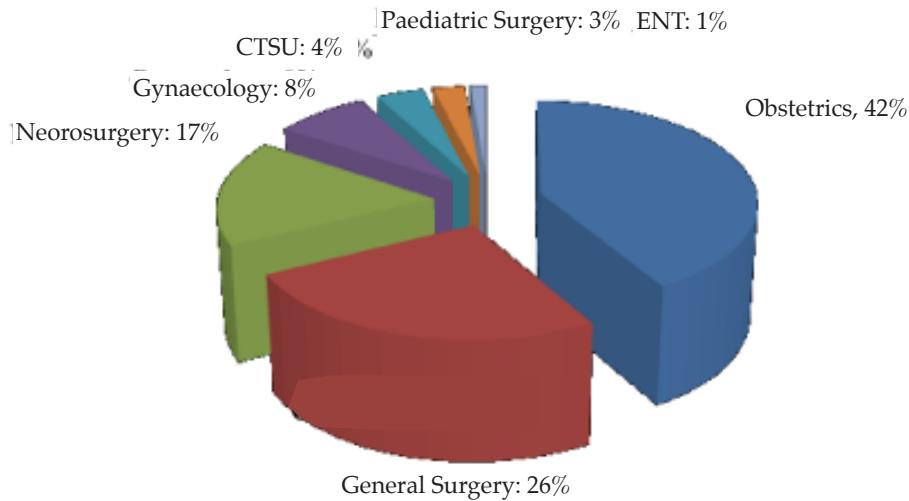
RESULTS

One hundred and five anaesthetists participated in the study (72.9% response rate) with a male to female ratio of 2.3:1. Eight (7.6%) of these were consultant anaesthetists, 24 (22.9%) were senior residents, 54 (51.4%) were junior residents and 17 (16.2%) were nurse anaesthetists. Sixty (57.1%) of the respondents had less than five years experience in anaesthetic practice while the remaining 45 (42.9%) had ≥ 5 years of experience. Seventy-seven (73.3%) of the respondents had experienced one or more intra-operative death in their practice. Respondents with five or more years of experience were more likely to have experienced intra-operative death than those with less than five years in anaesthetic practice ($p = 0.0001$). Twenty eight (36.4%) of the respondents with previous intra-operative death experience had it within the preceding 12 months. Fifty-three (68.8%) felt that majority of the deaths were avoidable. Most of the deaths (96.1%) occurred during emergency surgeries. Six respondents (7.8%) reported intra-operative death during regional anaesthesia. The distribution of surgical specialties in which the intra-operative deaths occurred is shown in Figure 1.

The identified cause(s) of the intra-operative deaths reported as shown in Table 1, while the contributory factors to these deaths are shown in Table 2. Forty three respondents (55.8%) reported psychological disturbance, ten (13%) reported feelings of sadness only and seven (9.1%) were indifferent following the most recent intra-operative death they experienced.

Regarding who should break the news of patient's death on the operating table to the relatives, 46 (43.8%) respondents opined that all members of the team (the surgeon, the anaesthetist, and the perioperative nurse) should be involved. Thirty-three (31.4%), four (3.8%), and five (4.8%) of the respondents were of the opinion that the news should be broken by the surgeon, the anaesthetist, and the peri-operative nurse respectively while four (3.8%) expressed that it should be broken by social health workers. Thirteen respondents (12.4%) were silent on this issue. Tables 3 shows respondents' perception on further work in the theatre following an intra-operative death and Table 4 shows respondents' perception on methods of debriefing and appropriate action(s) following an intra-operative death

Figure 1
Surgical Specialties in Which Intra-operative Deaths Occurred (N = 77)



NB: CTSU – Cardiothoracic Surgery
ENT – Ear, Nose and throat Surgery

Table 1
The identified causes of the intra-operative deaths reported by Respondents (n=77)

Cause	Number of respondents (%)†
Severe haemorrhage	40 (51.9%)
Airway related problems	27 (35.1%)
Pathology of patient's disease	32 (41.6%)
Inadequate preparation	11 (14.3%)
Power failure	4 (5.2%)
Drug error	6 (7.8%)
Others	3 (3.9%)

Multiple causes were reported to have lead to some of the intra-operative deaths

Table 2
Perceived contributing factors to intra-operative death (n=77)

Contributing factor	No of Respondents (%)†
Surgeon's pressure to do the case	53 (68.8)
Non availability of adequate units of blood	38 (49.3)
Inadequate monitoring	35 (45.4)
Working without assistant	34 (44.1)
Pressure from senior colleague	26 (33.8)
Inexperience	26 (33.8)
Stress	21 (27.3)
Faulty equipment	5 (6.5)
Not stated	2 (2.6)

Multiple contributory factors were reported for some of the intra-operative death

Table 3
Respondent's perception on further work following an intra-operative death

Respondents' perception	n (%)
Another anaesthetic team should continue the elective list in the affected suite	56 (53.3)
Further electives in the affected suite should be cancelled for that day	35 (33.3)
Further electives in all the suites should be cancelled for that day	2 (1.9)
Not stated	12 (11.4)

Table 4
Methods of debriefing and action considered appropriate after intra-operative death

Suggested action	n = 105 (%)
Discuss at mortality review meeting	60 (57.1)
Hospital debriefing	15 (14.3)
Sanction the attending anaesthetist(s) involved	10 (9.5)
Query the attending anaesthetist(s)	8 (7.6)
Not stated	12 (11.4)

DISCUSSION

Our study suggests that anaesthetists are likely to experience intra-operative death of patient as their career progresses in keeping with previous report by White and Akerele (6). It is noteworthy that most intra-operative deaths (68.8%) in our hospitals were preventable with 41% occurring during obstetric procedures and 26% following general surgical procedures. This is in contrast to the report from the United Kingdom where only 16% of the deaths were noted to be preventable and most deaths followed vascular surgery (41%) followed by trauma and orthopaedic surgery (15%) (6).

The identified causes of intra-operative deaths in this study included severe haemorrhage, airway related problems, inadequate preparation, electricity failure and drug error. Hansen (10) in a study on anaesthesia related complications and deaths in a Malawian hospital reported a similar finding. Hansen noted that intubation difficulties were responsible for 25% of complications and 14% of anaesthesia related deaths in his study. He attributed this to low level of training and limited experience of the anaesthesia care givers to his findings. Garba and colleagues (3) in their retrospective audit of intra-operative deaths in Zaria, Nigeria reported that a third of the nine deaths during the study period resulted from wrong or difficult intubations performed by less experienced hands. In a prospective observational study conducted in hospitals across the Netherlands, Arbous and colleagues (11) reported that about 10% of the anaesthesia-related deaths observed were associated with substandard respiratory management ranging from inappropriate use of a laryngeal mask

airway instead of endotracheal intubation and sedation of agitated hypoxaemic patient to failure to administer oxygen to a hypoxaemic patient. Thirty-five percent of the anaesthetists in this study attributed intra-operative death of patients to airway related challenges. This finding suggests a need for increase training in difficult airway recognition and management through direct teachings and workshops. Provision of difficult airway cart in the various anaesthesia departments across the country should be ensured for proper patient management.

Obstetric emergencies are common in our hospitals and were mostly affected, constituting 42% of intra-operative deaths reported. Severe haemorrhage was a major cause of death on the operation table with non availability of adequate units of blood for replacement accounting for over 50% of all the deaths. Although obstetric haemorrhage remains an important cause of maternal death in developed countries, the impact has been greatly reduced. The eighth report of the Confidential Enquiries into Maternal Deaths in the United Kingdom covering the year 2006 to 2008 showed that obstetric haemorrhage has reduced to being the sixth leading cause of direct maternal deaths with rate of 0.39 per 100,000 after cardiac diseases, sepsis, pre-eclampsia and eclampsia, thrombosis and thromboembolism, and amniotic fluid embolism (12). The situation in many developing countries is similar to ours. Ten (28%) of the thirty-five anaesthetic deaths reported by Khan and Khan (13) in Pakistan were due to massive haemorrhage. The challenge of providing adequate blood for obstetrics in many hospitals in developing countries has persisted over the years. Perhaps, a better approach to this problem

is establishment of protocols for identification and management of high risk obstetrics for major blood loss during the antenatal period. However, public enlightenment campaign targeted towards women of reproductive age group to encourage accessing of antenatal service is very important. Many women do not access antenatal services and only present to the hospital when complications develop, and often too late to be salvaged.

Inadequate preoperative preparation and intra-operative monitoring are other major causes of intra-operative death reported in this study as previously reported by other authors (9, 11). Anaesthetist are often faced with pressure from multiple sources including surgeons and other colleagues concerning their cases. The workload may also be overwhelming due to shortage of anaesthetic manpower. Despite these, patient's safety should not be compromised through substandard care. When in doubt, both the anaesthesia and the surgical team involved should have a round table discussion on how best to manage the patient. It is not unusual for surgeons to persuade anaesthetists to take an elective case during the call period based on surgeon's convenience and other reasons include huge backlog in our hospitals. Most of the deaths (96.1%) reported occurred during emergencies at periods when most experienced hands are not available in keeping with previous findings (12). A six-fold increase in the risk of death on the operating table has been associated with emergency surgeries compared to electives (12). None emergent case should not be treated as emergency and adequate preparation and availability of appropriate hands ensured.

Other contributing factors to intra-operative death identified in this study include working without appropriate assistance and inexperience. Stress and fatigue tend to impair judgement and increase the risk of human errors. Lienhart and colleagues (14) in their survey of anaesthesia-related mortality in France identified the other "root causes" associated with deaths including poor communication, lack of supervision, incompetence, and poor judgment, and also work environment factors. Strategic effort geared towards error reduction must be made.

Intra-operative death can have an immense psychological impact on the attending anaesthetist. On a background of chronic stress, this may tip the clinician towards acute personal, psychological or physical disaster (15). More than half of the respondents reported psychological disturbance in this study. In a study by Ogunbiyi and others (7) involving only physician anaesthetists, 86% reported various psychological effects including unpleasant memories, depression, sleep disorders, feelings of guilt, feelings of not going back to work and cardiac dysrhythmias. A third of the anaesthetists in the

survey by White and Akerele (6) in the UK felt a sense of personal responsibility for the death; though the deaths were 'expected' in 55% of the cases. Though the traditional support system within African society is sometimes extended to this situation, senior colleagues in the anaesthesia department should routinely provide support to the affected staff. A team approach has been advocated in breaking bad news to patient relatives as expressed by majority of the respondents (15). Trainee anaesthetist should be accompanied by a consultant and the spokesperson be decided before the interview. Other support staff including the chaplaincy staff and social workers should be involved and it should be done with empathy.

More than half of the anaesthetists in this study felt that another anaesthetic team should continue the elective list following an intra-operative death. A similar proportion of Nigerian surgeons expressed a similar opinion in another study (16). Seventy one percent of anaesthetist in the UK felt that medical personnel should take a break for 24 hours after witnessing an intra-operative death though 87% delivered another anaesthetic within 24 hours, and 77% of these did not feel professionally compromised (6). The decision to take a break or otherwise cannot be generalised; it should be taken only after the clinical head has reviewed the situation and the clinical commitment of the involved anaesthetist. Cancellation of further electives may be counter productive and further demoralise the whole team, other patients and the relatives.

Anaesthetists have different coping ability to stress (2). While some may not require any period of abstinence from work, others may require more than 24 hours to recover from the psychological effect depending on the degree of dysfunction. Each hospital should have a policy on management of intra-operative death. An important method of debriefing following an intra-operative death is mortality review meeting as suggested by 57% of the respondents in our study. Over two third of respondents in the study by White and Akerele (6) expressed the same view. We believe that this would allow identification of the circumstances that led to the accident, its contributing factors, a clear understanding of the subject, and critical-incident analysis in the prevention of further anaesthetic mishaps. Formal hospital debriefing is another method but this is less favoured among anaesthetists in the UK and Nigeria (16 and 14% respectively) (6). We suggest a combination of methods that will not worsen the psychological impact of the involved healthcare providers. Such methods may also include informal debriefing with other staff members present at death, counselling session, and coroner's inquest(15)

In conclusion, in this study, we observed that anaesthetists will likely encounter intra-operative deaths as they advance in their clinical practice. Severe haemorrhage was identified as a major contributing factor and most anaesthetists would want the elective list to continue in the affected suite by another anaesthetic team. The method of debriefing highly favoured was discussion at mortality meeting. Adequate preventive measures should be put in place and all must have a clear understanding of departmental or institutional guidelines on what to do after such events.

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