UNIVERSITY OF PORT HARCOURT

THE ANAESTHETIST: WORKING BEHIND THE SCENE, EVER-PRESENT, EVER-WATCHFUL

An Inaugural Lecture

By

Prof. Christie Nwidum Mato
MB, BS; PgDA; FMCA; FWACS; FICS
Department of Anaesthesiology, Faculty of Clinical Sciences,
College of Health Sciences

INAUGURAL LECTURE SERIES

NO. 107

JULY 17, 2014

CONTENTS

DEDICATION

With utmost humility, I dedicate this work to
The Almighty God, the Father of Anaesthesia who made it all possible

And

Chief Israel Lomma Mato, my late father, who considered that the only legacy he could leave for his children, was a good education; he made no discrimination, but sent all his children, both male and female to school.

THE ANAESTHETIST: WORKING BEHIND THE SCENE, EVER-PRESENT, EVER-WATCHFUL

1.0 PREAMBLE

Vice-Chancellor Sir, there are many great Universities, but only one Unique University – the University of Port Harcourt. I therefore consider it a great honour and privilege to stand here this afternoon to deliver the 107th in the Inaugural Lecture Series of this Unique University.

This is a once-in-a-life time event in the life of a Professor, and I am grateful for this opportunity to share some of my experiences, as I pursued excellence in Anaesthetic practice, and stood watching, while many slept.

History has been made in this auditorium by many lecturers who gave first lectures in their Departments or Faculties. History is again being made today, not only because this is the first inaugural lecture from the Department of Anaesthesiology, but also because this is the first time Anaesthesia is coming out from 'behind the scene' in this southernmost part of Nigeria to be in the glare of the whole world. This is the first time many in this audience will understand what goes on 'behind the scene' in the operating theatre; this is the first time many will see what the 'Backstage actor' in the operating room looks like and does.

The Anaesthetist has for years worked behind the scene in the operating room, away from public view; unknown and unsung by the numerous patients they watched over while they were sleeping, forgotten sometimes even by their colleagues.

Behind the scene in the operating theatre are Anaesthetists, peri-operative nurses, technicians, secretaries, health attendants, theatre porters and recently in our setup, Pharmacists. These prepare the patient for the 'star actor' – the surgeon. The patient is rendered numb or unconscious, physiological systems are regulated and maintained by the Anaesthetist before the star actor can start work with his scalpel. As the surgeon continues, behind the scene, the Anaesthetist works quietly to ensure the patient remains asleep and pain-free, with normal physiological processes under very watchful eyes. The operation is concluded; the surgeon thanks everybody and goes off to give the good news of a successful operation to the patient's relatives. He receives all the appreciations and gratitude. Meanwhile, the Anaesthetist is behind the scene with other back-stage workers, ensuring that the patient wakes up and is made comfortable in the recovery room. Still behind the scene, the Anaesthetist ensures appropriate monitoring and pain relief for the patient in the recovery room, and when he is fully awake, signs him off to the ward and into the arms of grateful relatives; away from public view, mostly unknown and unsung.

Vice-Chancellor, Sir, ladies and gentlemen, every successful operation, every significant breakthrough in every branch of surgery in the world of medicine has been possible as a result of major technological advances in anaesthesia and the skills of the Anaesthetist. It is to these events, as they concern the Anaesthetist that today's lecture addresses itself.

2.0 INTRODUCTION

In order to make my presentation easy to follow, I would be using the following broad format:

1. Anaesthesia and the Anaesthetist

2. Historical Perspectives
3. My contributions to knowledge as an Anaesthetist
4. Challenges of the Academic Anaesthetist in Nigeria
5. What future for Anaesthesia

Mr. Vice-Chancellor, Sir, distinguished ladies and gentlemen, in November 2012, while teaching a 400-level class of 70 medical students during the Introduction to Clinical Medicine Course, I did a brief survey on career choice. This was the result:

Table 1: Specialty choices of 400-Level Medical Students

S/No	Specialty	Number (N=70)	Percentage (%)
1.	Surgery	31	44.3
2.	Paediatrics	9	12.9
3.	Obstetrics & Gynaecology	8	11.4
4.	Internal Medicine	8	11.4
5.	Dentistry	5	7.1
6.	Public Health	2	2.9
7.	Anaesthesia	0	0
8.	Undecided	7	10
	Total	**70**	**100**

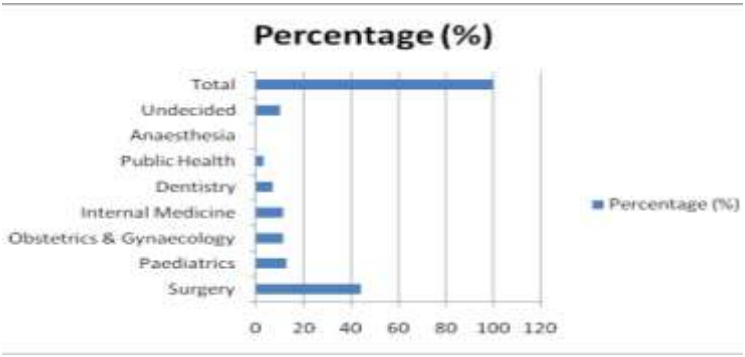


Fig. 1: Percentage specialty choice

No student wanted to specialize in Anaesthesia. This was not surprising as studies in Nigeria and other developing countries have reported the unpopularity of anaesthesia as a career choice among medical students (Akinyemi & Soyannwo **1980**; Khan, Minai, Siddiqui **2011**), as well as the reasons for such unpopularity (Eguma, Mato, Nabh, **2005**).

Further discussions with the students however revealed that about 8.6% did not know that Anaesthetists were physicians; they thought they were nurses. It was therefore not surprising that none wanted to specialize in anaesthesia. How could they, when they do not know who an Anaesthetist is?

3.0 ANAESTHESIA AND THE ANAESTHETIST

So what is Anaesthesia, and who is an Anaesthetist?

3.1 Definitions / Explanations

3.1.1 What is Anaesthesia?

Anaesthesia: The Webster Dictionary defines anaesthesia as a word derived from the Greek words "an" meaning without, and "aisthēsis", meaning sensation. Anaesthesia therefore means 'without sensation'.

Anaesthesia is British, while **Anesthesia** is American.

Anaesthesiology which connotes the science of administering anaesthetics is European. In North America it is **Anesthesiology** and in the United Kingdom it is **Anaesthesia**. They all mean the same thing.

Anaesthesiologist is a terminology used in continental European countries meaning a Physician with specialist training and certification in anaesthesia. **Anesthesiologist** is North American while **Anaesthetist** is British (and Commonwealth).

From my training background, the term Anaesthesia comes more readily to me. I will be using the UK terminology in this Lecture.

Anaesthesia as we know and practice it, means a reversible condition induced with drugs which may be injected, inhaled, or applied topically or directly to the surface of the body. This may be local, involving only a part of the body or general, involving the entire body and associated with loss of consciousness. Thus, it is a state of <u>controlled</u> and <u>reversible</u> loss of sensation to a part or the whole body, and is usually associated with varying degrees of muscle relaxation.

3.1.2 **Who is the Anaesthetist?**

To lay people, the easiest way of describing an Anaesthetist is 'the doctor who puts people to sleep', though I am always quick to add 'and also wakes them up afterwards'. To the Igbo patient, the Anaesthetist is 'Dibia ura'; to a patient from my community – Bua Yeghe, the Anaesthetist is 'Dam pie a we do kor ne a daa kpor ba ba ye'; to his medical colleague, the Anaesthetist is the 'Gas Man'.

These terms define the old, traditional Anaesthetist. Today, the Anaesthetist refers to the Physician who is specially trained to administer Anaesthesia as defined above. Prior to surgery, it is the Anaesthetist who determines if the patient is healthy enough to withstand the stress of surgery. In the operating theatre, the Anaesthetist administers anaesthetic drugs and is responsible for recognizing and treating whatever complications may develop during surgery; the Anaesthetist is the one who is trained to understand how anaesthetics work, and how they may interact with a patient's health problems and whatever medications they may be taking; after surgery, it is the Anaesthetist who monitors the patients and decides when they should be moved from the recovery room, or sent home in the case of day-case surgeries. Because the Anaesthetist is trained to deal with emergencies in the operating room, his / her services are often needed for resuscitation in the Emergency room as well as with care and stabilization of the critically ill in the Intensive Care Unit. Furthermore, the Anaesthetist is trained in various modes of pain relief, and is needed to run pain clinics and administer pain relief for acute as well as chronic pain. This expertise in the management of pain is also the reason the Anaesthetist's services are required in Palliative care and end of life situations. The Anaesthetist's patients, male and female include: the new born,

the neonate, the infant, the child, the adolescent, the young adult, the adult, the middle aged, the elderly and geriatric, and the pregnant woman; with their various peculiarities, concomitant medical conditions and medications.

The Anaesthetist thus stands as a complete Peri-operative Physician.

3.2 **Historical perspectives**

For many of us Anaesthetists, the history of anaesthesia dates back to the story of Creation as recorded in the Holy Bible, and I quote – "*And the Lord God caused a deep sleep to fall on Adam, and he slept; and He took one of his ribs, and closed up the flesh in its place*." (***Genesis Ch. 2 vs. 21***. *NKJV*). That was the first general anaesthetic as well as the first surgical procedure in history. To most Anaesthetists, therefore, God Almighty is the Father of Anaesthesia, and Anaesthesia is the oldest medical specialty.

3.2.1 Ancient Anaesthesia

Attempts at producing a state of general anaesthesia can be traced throughout recorded history among the Sumerians, Babylonians, Assyrians, Egyptians, Greeks, Indians and the Chinese. In an effort to produce anaesthesia in ancient times, drug and non-drug methods were used. Drug methods included: Alcohol, Opium (poppy), Mandrake (Hyoscine), cannabis (Hemp), and later cocaine. Non-drug methods employed included extreme cold, concussion, carotid compression, nerve compression, hypnosis and bloodletting (phlebotomy). Most of these methods promptly led to the patient's death. Surgeries carried out were mainly amputations and dental extractions.

Patients were often held down by the surgeon's assistants (who were burly hefty young men) while the surgeon carried out the operation. The surgeon's success was determined by the speed with which he carried out the surgeries.

3.2.2 Modern Anaesthesia

The introduction of anaesthesia changed all of this. Surgery could slow down - become more accurate and could move into 'forbidden areas' of abdomen, chest and brain.

The history of modern anaesthesia is said to have started with the synthesis of Nitrous oxide by the English natural philosopher and chemist Joseph Priestley in 1772, although ether (from the Latin 'aether' and the Greek 'eithr' or 'the upper and purer air') is believed to have been first synthesized around 1540 by the German botanist and chemist Valerius Cordus who called his discovery 'sweet oil of vitriol' and praised its medicinal properties.

Nitrous oxide, named laughing gas because it produced a state of euphoria was used as a recreational drug in 'laughing gas parties' in the UK and USA. It was at one of the 'laughing gas' parties in the USA that a young Dentist, Horace Wells noted that one of the entertainers at the party who suffered an injury was unaware of this, and using it for the extraction of a troublesome wisdom tooth, and feeling no pain during what was usually a painful procedure, Wells believed that he had invented painless dentistry – "a new era in tooth-pulling". His public demonstration of its use in Boston, USA in January 1845 however failed and nitrous oxide was abandoned.

Around the same time, Ether frolics like laughing gas parties were also popular in the United States, and noting its possible analgesic properties, William T. G. Morton (1819-1868), a student at Harvard Medical School, on the 16th of October 1846 arranged for a public demonstration of surgery without pain (Fig. 2 &3). It was very successful.

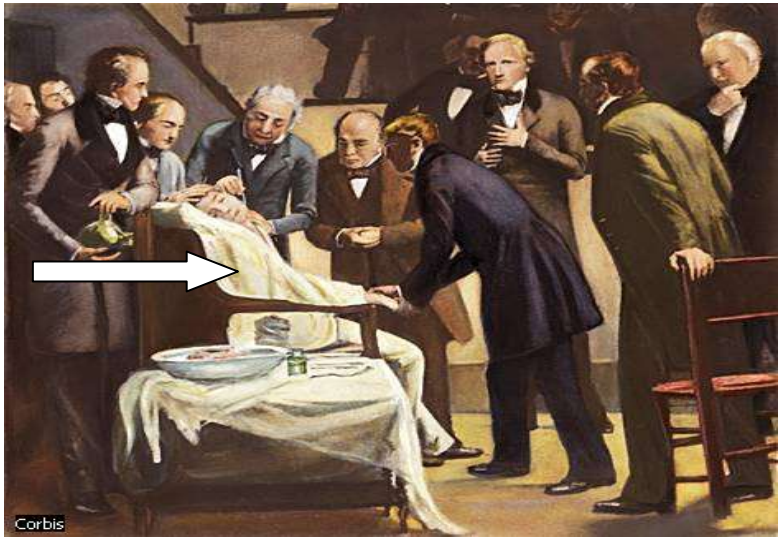


Fig. 2: First successful Public demonstration of Anaesthesia

Fig. 3: The Original Ether Inhaler used by William Morton *(arrowed above)*

Other pioneers such as James Young Simpson (1811 – 1870) used Chloroform for obstetric anaesthesia.

John Snow, acknowledged as the first full time Anaesthetist administered chloroform to Queen Victoria for the delivery of two of her children – Prince Leopold (1853) and Princess Beatrice (1857).

Since then, anaesthesia has enjoyed varying degrees of popularity, with examinations and chairs in anaesthesia being introduced as well as Colleges of Anaesthesia.

3.2.3 History of Anaesthesia in Nigeria

The earliest group of Nigerian doctors ever to be trained in Anaesthesia came back from the United Kingdom in the late 1950s, having acquired the Diploma of Anaesthesia qualification.

(Oduntan, **1998**). The first autonomous academic department of Anaesthesia in Nigeria was established in collaboration with the University of Toronto in 1962 at the College of Medicine, University of Lagos and was headed by the late Professor Shirley Fleming from Toronto, Canada. Dr. V. Fowler was the first Nigerian to head that Department in 1968. In Ibadan, the Department of Anaesthesia became an autonomous academic department in 1968 and the first Nigerian to head the Department was S. A. Oduntan, who became the first Nigerian Professor of Anaesthesia in 1971.

3.2.4 History of Anaesthesia in the University of Port Harcourt

The Department of Anaesthesiology, University of Port Harcourt was established in 1980 with Dr. P. Dakaraju as Head of Department, assisted by Dr. B. E. N. Mengot. In 1990, Prof. C. T. John, an Obstetrician & Gynaecologist headed the Department until 1992 when Dr. Mato was appointed the Co-ordinator. Between 1997 and 2001 the Department was headed by Prof. Datubo-Brown, Prof. Adotey and Dr. Allison, all of the Department of Surgery.

From late 2001 till date, Anaesthetists have piloted their affairs both in the University and the Teaching Hospital with the first Professorial chair established on the 15th October 2010, announced on the 27th of July 2012 and occupied by this Inaugural Lecturer.

4.0. SCOPE OF MODERN ANAESTHESIA

Anaesthesia as practiced today is very different from what was known in the past when the anaesthetist was generally relegated to the background, working only behind the scene in the

operating theatre. Today, the scope of modern anaesthesia is much wider and comprises most of the following –

1. Administration of anaesthetics for ALL surgical specialties both within and outside the operating room
2. Management of critically-ill patients and the Intensive Care Unit
3. Management of Emergency Response and Resuscitation
4. Management of Acute Pain Services
5. Management of Chronic Pain Clinics
6. Undergraduate Teaching
7. Postgraduate Teaching
8. Academic Research

4. 1 Types / Techniques of Anaesthesia

Anaesthesia may be divided broadly into General and Regional Anaesthesia. However, there are factors which determine the choice of technique and they include:

1. The type of surgery
2. Site of operation
3. Nature of surgery
4. Age of patient
5. Skill of the Anaesthetist
6. Presence of concomitant disease
7. Patient's preference
8. Available equipment / drugs

4.1.1 General Anaesthesia

General anaesthesia (GA) refers to anaesthesia of the whole body during which there is no sensation, memory or movement. Gases are administered through breathing tubes connected to an Anaesthetic machine (Figs. 4 & 5). The Anaesthetist watches while the patient sleeps, unaware, not in pain, and during which

time, physiological functions are maintained as near baseline as possible. At the end of the procedure, the effect of the general anaesthetic is reversed and the patient gradually wakes up.

General Anaesthesia may be with endotracheal intubation (with a tube passed into the patient's throat) and the patient paralyzed with muscle relaxants and respiration controlled either manually or mechanically (Fig. 5), or with such intubation and the patient breathing spontaneously. General anaesthesia may also be instituted without such a tube and the patient breathes spontaneously through a face mask.

Total intravenous anaesthesia where all drugs are administered intravenously with no gas is also a form of general anaesthesia.

Fig. 4: The Boyle's International Machine (old) Vs The Dragger Fabius Machine (Newer)

Fig. 5: General Anaesthesia in progress

4.1.2 Regional Anaesthesia

Regional anaesthesia is anaesthesia affecting a large part of the body, such as a limb or the lower half of the body. Regional anaesthetic techniques can be divided into central and peripheral techniques. The central techniques include neuraxial blockade – Epidural and Spinal anaesthesia; or a combination of both – combined spinal epidural (CSE). The peripheral techniques can be further divided into plexus blocks such as brachial plexus blocks and single nerve blocks.

Regional anaesthesia may be performed as a single shot or with a continuous catheter through which medication is given over a prolonged period. Regional anaesthesia can also be provided by injecting local anaesthetics directly into the veins of a limb - venous flow is usually impeded by a tourniquet. This is called intravenous regional anaesthesia (IVRA or Bier's block).

4.1.3 Local Anaesthesia

This form of anaesthesia in a strict sense is anaesthesia of a small part of the body such as a tooth or an area of skin.

Vice-Chancellor Sir, I have described who an Anaesthetist is and the nature of his / her work. Let me now go on to give an account of some of my contributions to the body of scientific knowledge while practicing this Specialty for the past twenty-six years.

5.0 MY CONTRIBUTIONS TO KNOWLEDGE AS AN ANAESTHETIST

5.1 **Pre –operative care**

Proper assessment of a patient about to undergo an operation is the foundation of good clinical practice in anaesthesia. Therefore, every patient, whether for emergency or elective surgery needs to be prepared as much as possible prior to anaesthesia and surgery. Good and appropriate pre-operative care reduces morbidity and mortality and failure to carry out this very important function may be regarded as negligence should a critical incident occur. This process involves seeing the patient, asking relevant questions, carrying out physical examination and reviewing the patient's investigation reports. An anaesthetic action plan is usually developed based on the findings at the pre-operative review in order to provide appropriate care.

The following are some scientific applications of certain pre-operative findings:

Patient's Occupation: Roasted plantain & Fish Vendor It is known that wood smoke pollutants cause respiratory problems, even at relatively low levels (Naeher LP et al **2007**), and finding several women in our locality daily breathing wood smoke while

at work roasting and selling plantain, yams and fish; we wondered if they may not pose a risk should they require anaesthesia. We therefore carried out a survey among them to assess their respiratory status (Mato, Onajin-Obembe, **2008**).

We did not find the women in this occupational group to be at risk despite being on the job full-time (83% of them) for an average of 7hours daily for up to 10 years in some cases. This was because they cooked with charcoal and were in the open air which diluted the pollutants thus reducing the effective dose. However, biomass-smoke-related pulmonary disease may develop several years after exposure. We also know that people cook with fire wood and sleep in the same room in communities in Nigeria. A non-infectious, non-malignant respiratory manifestation of chronic, high level exposure to biomass smoke has been reported amongst such persons. Therefore, the Anaesthetist would consider preoperative assessment of the respiratory function of such a patient, oxygen saturation, and chest x-ray prior to anaesthesia. The choice of anaesthetic technique may be altered, depending on the findings.

Patient's Age and Weight: A patient's age and size, noted at the pre-operative visit and evaluation also guide the anaesthetist. It is important to weigh every patient coming for anaesthesia and if possible calculate the Body Mass Index (BMI). In a survey of fasting blood sugar of adult elective surgical patients (Mato, Onwuchekwa & Ebirim, **2010)** a significant association was found between impaired fasting glycaemia (IFG) and age over forty years. There was also a significant association between IFG and BMI greater than 26.7 kg/m^2.

Therefore, for patients over age forty, especially if BMI is greater than 27 kg/m^2, the Anaesthetist would request for fasting blood sugar before anaesthesia, because they may have an elevated blood sugar which would be further aggravated by the stress of anaesthesia and surgery. Again, the course of anaesthesia may be altered. For such patients, if the surgery is amenable, a regional technique would be very strongly advocated because as we found in a recent study comparing patients' stress response to surgical stimuli, regional technique (epidural) significantly reduces stress response (Aggo, Fyneface-Ogan, Mato, **2012**).

5.2 **Airway assessment**:

The Mallampati Classification (Fig. 6) is often used pre-operatively to assess a patient's airway and determine ease of intubation. The seated patient is asked to open his mouth and protrude the tongue to see if the uvula, faucial pillars and soft palate are visible. Classes I and II are associated with relatively easy intubation while higher scores mean more difficult intubation.

Fig. 6: Mallampati Classes

We studied the atlanto-occipital gap (AOG) which is the vertical distance between the occiput of the skull and the superior surface of the posterior tubercle of the atlas. The AOG is one of the major factors that limit extension of the head on the neck. We found that it varies widely in the Nigerian population, with a value of 8.75 ± 3.90mm in the general population; 9.96 ± 3.10 mm for males and 6.20 ±3.10mm in females. We also found that a short AOG is strongly linked to difficult intubation, and for female patients in whom intubation was impossible, the mean AOG was 5 ±2.00mm. This study showed that the AOG is a predictive variable in difficult intubation, and its pre-operative assessment will be of immense benefit to Anaesthetists (Didia, Aniemeka, Mato & Dapper, **2006).**

This study was carried out in patients who on physical examination were apparently not expected to have difficulty, but were impossible to intubate showing that lower Mallampati scores may still be difficult to intubate. Therefore, the Anaesthetist must bear this in mind when preparing to intubate a patient, but no patient should be anaesthetized without being asked to open the mouth.

5.3 **Choice of Anaesthetic Technique**

At the end of the pre-operative review, the Anaesthetist explains the possible procedure from pre-operative care, through the intra-operative procedures to post operative care to the patient, who now may ask questions and express his doubts and fears. An understanding of what to expect enables the patient to give *Informed Consent* to the procedure. The inclusion of patients' preferences in their care is increasingly gaining worldwide attention, and it is now accepted practice in anaesthesia to include

patients in decision making processes regarding their care. This trend is modifying the choice of available options of care.

The preference of many patients to remain awake during surgery was noted in a survery among hospital staff. Quite often, patients express fears about general anaesthesia and the feeling that one may "sleep off" or "sleep on" from there. Hospital staff also expressed the same fears as we noted in that survey; more than 86% said their greatest fear was death during general anaesthesia, and would prefer to be awake if they required anaesthesia (Mato, Fyneface-Ogan, Edem **2007).** Remaining awake may give a patient a sense of control over what is happening to him, but in another study, we found that this also affected the level of satisfaction.

One hundred and twenty parturients scheduled for elective caesarean section were recruited into a cross-over study which compared patient's satisfaction following two techniques of anaesthesia – awake or asleep. The demographic data and mean satisfaction scores obtained from questionnaire and visual analogue scale (VAS) were subjected to analysis. The mean satisfaction score of the parturients in the epidural anaesthesia (awake) group using questionnaire was 149.0±10.65 while that in the general anaesthesia (asleep) group was 105±12.42. The mean satisfaction score was VAS 9.0±1.50 for the epidural group while it was 2.6±0.70 in the general anaesthesia group. The differences in the mean satisfaction scores from both instruments of measurement were statistically significant at $P<0.05$. Ninety-eight patients of the total study population felt more satisfied, more in control as they were awake, and desired to have a repeat Caesarean section awake while only 12 would want to have a

repeat section under general anaesthesia (Fyneface-Ogan, Mato, Ogunbiyi, **2009**).

The patient's choice therefore, is important in the choice of technique emphasising the shift in health care to a patient-centred focus. However, the skill of the Anaesthetist is also important, and in the past, this frequently influenced the choice of technique. In a 10-year review of our anaesthetic practice, we found that spinal anaesthesia was not a routine technique of anaesthesia in 1994; many patients were simply given a general anaesthetic. Epidural anaesthesia was not practiced until 10 years later. In that 10th year which coincided with the active presence of the second author, there was a reversal of trend and a 9-fold increase in the number of patients receiving spinal anaesthesia. The challenge at that time had been a lack of necessary skills to carry out techniques other than general anaesthesia, therefore the routine technique was general anaesthesia.

The findings while researching this report which was finally published in 2005 (Fyneface-Ogan, Mato, Odagme **2005**), resulted in our acceptance to organize and host the 1st Eastern Regional Refresher Course of the Nigerian Society of Anaesthetists, the report of which was published by World Anaesthesia (Mato, **2003**). Since then, intense training has resulted in significantly improved knowledge and skills such that today, almost every known technique of anaesthesia is possible in our practice and patients have more options available to them as highlighted in this report where the presence of concomitant disease was an important modifying factor in the choice of technique for a patient with extreme cardiovascular and respiratory disease. The choice of epidural anaesthesia was best as it avoided the tachycardia and hypertension associated with

general anaesthesia which would have adversely affected the patient's very compromised and fragile system (Mato, Fyneface-Ogan, Aggo, **2003**). Without improved knowledge, skills and training, the management of this patient would have been significantly more difficult at that time.

5.4 **Endotracheal intubation**

Endotracheal intubation which involves the passage of a tube through a patient's throat to enable access of gases to the lungs is frequently indicated in clinical situations where loss of airway control is anticipated. It can also be used to protect the airway from gastrointestinal soilage as well as in conditions of upper airway obstruction from mechanical or airway pathology. An intubation is said to be difficult if a trained anaesthetist needs more than three attempts or more than 10 minutes for a successful intubation. A possible difficult intubation can be detected pre-operatively in about 50 – 70% of patients with apparently normal cervical anatomy. Generally intubation will be difficult in patients with a small mouth opening, protruding upper teeth, a stiff neck, enlarged tongue, or in patients with an unstable cervical spine.

A 'cannot intubate, cannot ventilate' situation is predictably the Anaesthetist's worst nightmare and various devices have been designed to ease difficulty in viewing the access to passage of a tube through the throat (laryngoscopy and endotracheal intubation). The fibre-optic laryngoscope is the acceptable standard in the management of anticipated difficult airway but in developing countries with limited facilities, Anaesthetists resort to the use of the Laryngeal Mask Airway and mask ventilation to maintain oxygenation. We however succeeded in intubating several difficult airways using the two-operator laryngoscopy and

intubation technique. (Fyneface-Ogan, Mato**, 2006).** This technique (Fig. 7) has been used with success in several cases involving oral tumours, neck tumours, short neck, and obese patients (Figs 7a).

Fig. 7: Two-Operator Technique

Fig. 7a: Neck and Jaw Tumours

5.5 **Intra-operative care**

While the patient is asleep under anaesthesia, very critical and tender care is administered by the Anaesthetist through close monitoring. In 2009, the World Health Organization developed a checklist in order to further ensure the safety of patients undergoing surgery.

The checklist essentially identifies three distinct phases of an operation, each corresponding to a specific period in the normal flow of work in the operating room:

a. Before induction of anaesthesia – the patient must confirm his / her identity, the site of operation, what procedure is to be carried out, and that consent has been given.
b. Before incision of the skin – the entire team of doctors and nurses must pause to introduce themselves by name and role. The surgeon and anaesthetist must confirm the name of the patient, and what procedure is to be carried out.
c. Before the patient leaves the operating room – the nursing staff must count instruments, swabs, sponges and needles; equipment must be checked and specimens checked to confirm appropriate labelling. The surgeon, anaesthetist and nursing staff should also discuss necessary aspects of the patient's recovery.

In each phase, a 'checklist coordinator' must confirm that the surgical team has completed the listed tasks before it proceeds with the procedure.

However, the presence of the Anaesthetist has been stressed as the single most important requirement in the monitoring of the patient under anaesthesia. He monitors the anaesthetic machine, the surgeon and the monitors. He thus is the Master Monitor.

5.5.1 Blood loss and replacement during surgery

Monitoring of blood loss and replacement during surgery is part of the intra-operative care rendered by the Anaesthetist; once the patient is under anaesthesia he becomes the sole responsibility of the anaesthetist. Blood for transfusion may be necessary especially for major surgeries and in children who have a smaller blood volume – a newborn with a birth weight of 3kg has an average blood volume of about 270ml (90ml/kg). In a crude assessment of blood loss, a fully soaked and dripping gauze contains approximately 30ml of blood which is > 10% of the baby's blood volume (Mato **2007**). Therefore, that baby's condition would become critical if the surgeon uses more than one fully soaked gauze during surgery. Blood therefore must be available if extensive surgery is planned in a child.

5.5.2 Recording of Data

Recording of events during anaesthesia is a critical aspect of intra-operative care and the anaesthetic record is an essential part of a patient's record, providing useful information for the management of the patient. In many hospitals in sub-Saharan Africa including ours, the anaesthesia record is manually written; but we noted in a study of anaesthetic record charts in our operating theatres that almost one half of the records were incorrectly filled and had an illegible parameter (Mato, Otokwala **2007**). We therefore advocate that electronic record charts would ensure that records are legible and can be retrieved when needed.

The anaesthetic record chart is of medico-legal importance, and can be used for quality assurance and research purposes. While patient care takes precedence over record keeping, every effort must be made to keep the anaesthesia record current, legible and correct. Information recorded on the basis of the anaesthetist's

memory may be suspect especially if it does not tally with the observed events.

5.5.3 Termination of Anaesthesia

At the end of surgery, anaesthesia is terminated, and effects of muscle relaxants reversed if a general anaesthetic was administered and the tube in the patient's throat removed if an endotracheal tube was inserted. This is usually done when the patient is awake.

In the past, red rubber throat tubes were used, and in our environment because of frequent re-use, we observed and later reported cases of intact and inflated cuffs on these tubes which at termination should deflate for easy removal but did not, and had to be forcefully removed in some cases thus posing potential dangers to the patients. We no longer use red rubber endotracheal tubes, rather, clear plastic single use endotracheal tubes such as the Portex tube are used (Soyannwo, Elegbe, Orubo **1995)**.

5.5.4 Recovery / Recovery Room

The Recovery Room, also called the Post Anaesthesia Care Unit (PACU) is the area where patients recover from the immediate effects of anaesthesia and surgery. It provides a setting for the detection and treatment of early post-operative complications. Vital signs such as pulse rate, blood pressure, temperature, level of consciousness and colour are monitored by the staff. Particular attention is paid to the patient's level of consciousness, respiration and ventilation. The operation site and drains, if any, are also monitored.

Anaesthesia may cause a patient's core body temperature to drop several degrees, and retaining body heat to prevent hypothermia

and encourage good circulation is also an important part of recovery room care.

Shivering is one of the most undesirable complications that may follow anaesthesia, and may occur during anaesthesia, just as anaesthesia is terminated, or in the recovery room.

In the Recovery room, patients may be wrapped in blankets warmed in a heated environment or covered with a forced warm-air blanket system to bring body temperature back up to normal. They may also receive heated intravenous fluids. Pethidine and tramadol are drugs routinely used to abort shivering in patients, but at a time when especially Pethidine was not available in Nigeria, we sought for an alternative. We studied Ketamine hydrochloride, a relatively cheap anaesthetic agent which is readily available in sub-Saharan Africa.

Sixty patients were randomly allocated to three groups of twenty. Each of the groups received different agents. Group A had Ketamine (in sub-anaesthetic doses); while group B had tramadol and group C received normal saline. A different assessor studied the time taken to abort shivering by the various agents. The sedation levels in each group were also assessed. Results showed that there was no significant difference ($p = 0.201$ kruskal wallis ANOVA) between groups A and B in terms of aborting shivering. However, in group C, 70% of the patients had shivering beyond the target time (15mins); 30% of the patients in group B scored 1 on the sedation scale, while no patient in groups A and C developed sedation. We concluded that Ketamine hydrochloride in sub-anaesthetic doses is just as effective in aborting shivering as tramadol but without causing sedation

(Mato, Fyneface-Ogan, Isa **2002**). We have used Ketamine to successfully abort shivering in our practice since then.

5.6 Total Intravenous Anaesthesia

Total intravenous anaesthesia (TIVA) can be defined as a technique of general anaesthesia using a combination of agents given solely by the intravenous route and in the absence of all inhalational agents including nitrous oxide. Anaesthetic care in developing and economically disadvantaged countries routinely faces enormous obstacles that are functionally unknown in the highly developed economically advantaged countries like the US and Canada. In Africa, challenges such as lack of qualified manpower, inadequate and inappropriate equipment, irregular power supply, as well as lack of essential drugs and the clinical state of patients who present late after exhausting other perceived avenues of help (traditional, herbal and spiritual healers) often make TIVA the logical choice of technique.

Total intravenous anaesthesia (TIVA) as a technique of anaesthesia has become widely popular in the developed world with the availability of computerized infusion devices and appropriate drugs making its use easy and safe for the practitioner, and acceptable, tolerable and cost-effective for the patient. Such infusion devices (Fig. 8) and new drugs such as propofol and remifentanil are not readily available in the developing world.

Fig. 8: Target-controlled Infusion Device

The practice in our environment without the use of sophisticated equipment and opioid analgesics is rather peculiar, but is easy to master. It is cost-effective and safe; therefore, it is possible to use what is available in the developing environment to obtain what is necessary.

Appropriate technology for developing countries should ideally be simple, require minimal special technical expertise, require no special storage conditions, perform to acceptable standards of quality at extremes of environmental conditions and of course be affordable.

Carter in an editorial (Carter, **2004)** commented on the availability of alternative power supply sources such as solar energy to recharge battery banks and generators for emergency lighting for operating theatres and delivery rooms in African

countries, adding that no health facility, however remote, need be without a power supply.

Perhaps in some countries, alternative power supply is used for back-up, but what happens when the alternative source is the main power supply? What happens when the generator is to be serviced? What of purchasing of diesel and spare parts for maintenance? That is our experience as Anaesthetists in Nigeria, and we have variously devised means of administering anaesthesia with our own adaptations.

We reported our technique of TIVA in a developing environment without sophisticated equipment and noted that a maintenance infusion of Ketamine hydrochloride set at 3mg/min using a flow regulator or 60 drops/min using a regular infusion set and titrated to patient's response was most effective. We suggested injection of 500mg of Ketamine into a 500ml bag of 5% dextrose in water to give a concentration of 1mg/ml and connecting through a regular infusion set to the patient through a flow regulator (Fig.9) set to give 3ml/min (3mg/min) after an induction dose of 1-2mg/kg.

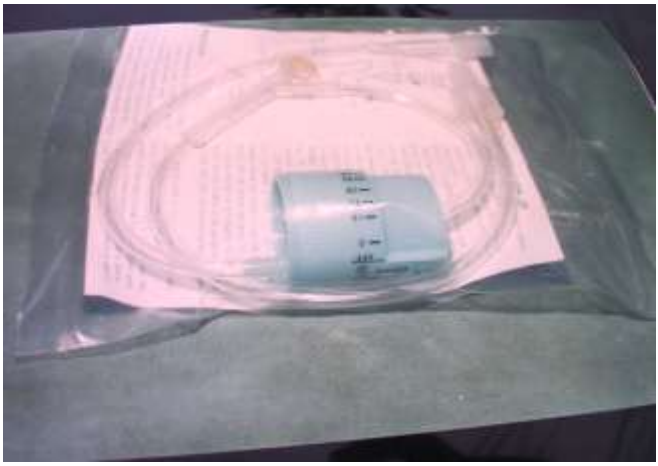


Fig. 9: Flow Regulator

In the absence of a flow regulator counting drops to 60drops/min to give 3ml/min for an infusion set that gives 20 drops/ml or 45 drops/min if the infusion set gives 15 drops/ml gives the same result **(**Mato et al, **2007**). The publication of this technique resulted in an invitation to speak at the All Africa Anaesthesia Congress in 2009 (**Mato CN, Total Intravenous anaesthesia: the African Context – dealing with equipment issues.** ***All Africa Anaesthesia Congress Nairobi 2009***).

In developed countries, Propofol is readily available for TIVA and is often delivered using a special target-controlled device – the Diprifusor. Following the input of patient's data – height, weight, sex, this computerized device using pharmacokinetic parameters for propofol ensures that appropriate concentrations of propofol are delivered to the patient.

Propofol, also called 'milk of amnesia' because of the milk-like appearance is a very potent intravenous anaesthetic agent that

causes hypnosis and amnesia; it should only be administered by an Anaesthetist who understands its unique properties. Propofol was brought to public attention by its incrimination in the death of the Pop Star, Michael Jackson. It has a short duration of action and when given intravenously, it causes sleep and the patient wakes up with no hang over effect, nausea or vomiting. It however slows the heart and no patient receiving it should be left unattended.

Anaesthesia is safe, but only in trained hands.

5.7 **The Pregnant Woman (Obstetric Anaesthesia)**

The Anaesthetist may encounter the pregnant woman under the following conditions:

1. For surgery unrelated to pregnancy (e.g. appendicectomy)
2. For pain relief in labour
3. For operative delivery (Caesarean section)
4. For management of complications related to childbirth (ruptured uterus)

Significant anatomical, physiological and psychological changes occur in women during pregnancy and labour. The fact that the lives of the mother and baby (or babies) are under the care of the anaesthetist makes it imperative for the Anaesthetist to understand these changes in order to administer appropriate anaesthesia without morbidity and/or mortality; it also makes obstetric anaesthesia particularly challenging. The increasing number of pregnant women of advanced age in recent times adds to the challenge as co-existing medical conditions such as cardiovascular disease and diabetes mellitus may be present.

5.7.1 Pain relief in Labour

Childbirth used to be considered as a "natural" event that did not require medical supervision; and just as natural as the fact of being born, was the fact that women were expected to suffer pain during the process *(Genesis 3: 16a – " I will greatly multiply your sorrow and your conception; in pain you shall bring forth children;")*.

Epidural analgesia is now an accepted and most widely used method of pain relief in labour worldwide. Because of cultural beliefs and taboos, many women in Nigeria still go through the birthing experience in a lot of pain but we sought the views of some women in this environment to determine the acceptability of epidural analgesia in labour.

After approval from the local ethics committee and obtaining informed written consent, fifty (50) consecutive multiparous women in labor requesting pain relief were enrolled in this prospective study. After providing description of the two options of pain relief available to them, they were allocated into two groups according to their request – to receive either parenteral opioid/sedative or epidural labor analgesia. Both groups received analgesia of choice at 4-cm cervical os dilatation. The epidural group received 0.125% plain Bupivacaine, while the other group received pentazocine/promethazine intravenously.

The two groups were comparable in terms of socio-demographic data. The mean duration of the 1^{st} and 2^{nd} stages of labor respectively were significantly shorter in the epidural group when compared with those in the non-epidural group. There was no statistical difference in the rate of Caesarean delivery between them – epidural 32% vs non-epidural 44% (Table 2). The

maternal blood loss from the delivery was minimal in both groups. Neonatal outcome was the same in both groups. Closed questionnaire showed that the overall experience of labor was considerably better in the epidural group (80% vs. 4%). 72% of the women had inadequate pain relief in the non-epidural group compared to 8% in the epidural group.

Table 2: Labour Characteristics & Outcome, Epidural vs. Non-Epidural

Variable	Epidural	Non-Epidural	P-value
Duration of 1st stage (min)	173.9±11.2	194±25.1	0.01
Duration of 2nd stage (min)	23.5±4.8	28.5±3.3	0.02
Mode of delivery			0.60
- **Normal**	17(68%)	14 (56%)	
- **Emergence C/S**	8 (32%)	11 (44%)	
Post-delivery events			
- **Retained placenta**	2 (8%)	3 (12%)	
- **Maternal blood loss (ml)**	149.7±37.2	136.3±27.1	
Neonatal Outcome			
- **Apgar 1 min > 7**	23 (92%)	21 (84%)	
Patient's grade of pain relief			
- **Adequate**	22 (88%)	4 (16%)	
- **Inadequate**	2 (8%)	18 (72%)	
- **Not sure**	1 (4%)	3 (12%)	

The study thus showed that the overall experience of labor was better in women who had epidural labor analgesia compared to those who did not, but rather had the traditional pentazocine/phernegan combination (Fyneface-Ogan, Mato, Anya**, 2009)** and confirms the findings of other authors (Robinson et al, 1980; Phillipsen, Jensen, 1990).

Localization of the epidural space is one of the key steps in the provision of epidural analgesia / anaesthesia. Various methods have been used in identifying the epidural space, and the traditional methods depend on the negative pressure produced during the introduction of the epidural needle into the space. An effective method should be simple, straightforward, effective, easy and reliable to minimize the number of complications associated with the procedure.

We studied 50 consecutive parturients requesting pain relief in labour in a prospective study. They were allocated to receive either air (LORA) or epidural balloon (EB – Fig. 10) to assist in the identification of the epidural space. The end-point for the EB was marked by the collapse of the balloon while for LORA; it was dependent on the loss of resistance felt on the syringe plunger. The primary outcome was ease of epidural space identification and adequate pain relief between the 2 groups.

Fig. 10: Epidural balloon

There were no statistical differences in age, height, weight, gestational age, gravidity and parity between the 2 groups.

Twenty-two women in the EB group had successful localization at first attempt as compared to 14 women in the LORA group ($p<0.0126$). The time taken to localize the epidural space was less in the EB group than in the LORA ($p<0.0001$). There were more accidental dural punctures and failed blocks in the LORA group. The overall quality of block was better in the EB group (Table 3). This study showed that the epidural space was identified more often at the first attempt and more swiftly with the epidural balloon **(**Fyneface-Ogan & Mato**, 2008).**

Table 3: Characteristics of Epidural Space Localization

Variables	EB	LORA	P-value
No. Of insertion attempt - 1 **≥ 2**	22 3	14 11	<0.0126
Time to reach end-point (sec)	28.36±5.98	76.88±21.78	<0.0001
No. Of accidental punctures	0	2	<0.0001

5.7.2 Operative Delivery (Caesarean Section)

Any technique of anaesthesia may be used in the pregnant woman, but for operative delivery in our set up, regional anaesthesia especially spinal anaesthesia has been the default technique since 2002. **(**Fyneface-Ogan, Mato & Odagme**, 2005).**

Spinal anaesthesia is not without complications and a fall in blood pressure (hypotension) caused by vasodilatation and a functional decrease in effective circulating volume is fairly common. Compression of the great vessels by the gravid uterus as well as cephalad spread of the local anaesthetic causing

chemical sympathectomy have been identified as contributory factors, and these are influenced by the parturient's position during and immediately after spinal injection. Hypotension here may be defined in absolute terms as systolic blood pressure ≤ 90mmHg or in relative terms as a fall in systolic blood pressure > 20% of the baseline. Prophylactic measures to reduce the incidence of hypotension include fluid preloading, left lateral uterine displacement and the use of vasopressors. Despite these measures, hypotension has been reported to have an incidence of 30 – 90% **(Edomwonyi et al, 2005; Imarengiaye & Isa 2005).**

The use of plain Bupivacaine in obstetrics is unpopular, and we are one of the very few Hospitals where it is used routinely. In a recently published work, we compared the haemodynamic effects of the lateral and sitting positions during induction of spinal anaesthesia for caesarean section using plain Bupivacaine and found a relationship between patient's position during induction of anaesthesia with plain bupivacaine and haemodynamic status. Induction of spinal anaesthesia in the lateral position (Fig 11) resulted in a more stable blood pressure, and therefore should be used as a method of preventing hypotension during subarachnoid block. **(**Obasuyi, Fyneface-Ogan, Mato, **2013).**

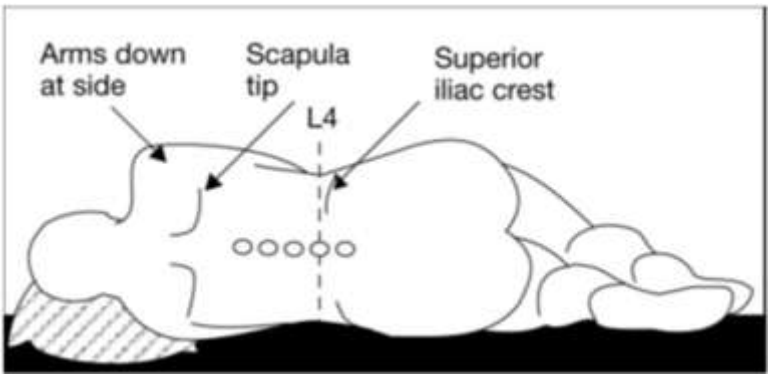


Fig 11 Lateral Position

One of the most disabling complications following spinal anaesthesia is post-dural puncture headache (PDPH), which has been a problem since it was reported by August Bier in 1898. It is related to excessive loss of cerebro-spinal fluid and the International Headache Society has categorized it as headache that develops less than 7days after spinal puncture, occurs or worsens less than 15minutes after assuming the upright position and improves after less than 30 minutes in the recumbent position. In the last 50 years, the development of fine-gauge spinal needles and needle tip modification has enabled a significant reduction in its incidence.

We evaluated the role of needle diameter of the same tip configuration in the causation of PDPH and found that PDPH occurred in no woman in whom the Becton Dickson Whitacre needle size 26G was used compared to 6% in women in whom the size 25G was used (Fyneface-Ogan, Mato, Odagme, **2006**). PDPH can therefore be minimized by using small gauge spinal needles.

Treatment of PDPH includes provision of emotional support and reassurance, oral hydration and simple analgesics. Autologous epidural blood patch is however considered the 'gold standard', and is quite effective as we found, when simple methods had failed (Ofoegbu, Mato **2004**).

Many of the causes of death in pregnant women in our environment are preventable, and although the coverage and quality of health care services seem to have failed women and children, we found that sometimes, women failed or delayed to access available services thereby contributing to the poor outcomes reported.

The international standard decision-to-delivery interval (DDI) for emergency Caesarean sections is ≤30minutes. Singh et al confirmed this in their study (2012), and reported a significantly higher risk of poor perinatal outcome for babies with DDI > 60minutes.

In our study at the University of Port Harcourt Teaching Hospital, we also found that the interval between the decision to operate and delivery of the baby (DDI) can influence the feto-maternal wellbeing. This one year prospective audit was carried out to evaluate the DDI in 200 consecutive women who had emergency caesarean section in our hospital. Out of the number recruited, 71.5% had received antenatal care. The mean maternal age was 27.5±4.54 years and mean parity was 1.95± 1.61. The mean transit time during transfer of patient from labour ward to theatre was 47±3.81 seconds over a distance of 48.16 metres. The mean DDI was 4.2±0.7hours. Busy theatre suites, need for counselling from spiritual leaders, unwillingness to sign consent for surgery and delayed laboratory results caused delays in 36%,

24%, 13% and 11% women respectively (Table 4). We concluded that the peculiar socio-econo-cultural and religious inclinations of our women can influence the decision to delivery interval. Prolonged DDI has direct impact on APGAR scores of babies, an indication of the state of health of the newborn baby and an important measure of our perinatal morbidity and mortality index, and may contribute to maternal mortality. **(**Fyneface-Ogan**,** Mato, Enyindah, 2009).

5.8 The Child (Paediatric Anaesthesia)

Children have physiological and anatomical features that are different from the adult patient which require special care and attention in order to provide safe anaesthesia. Their pharmacological and psychological requirements also add to the challenge, making paediatric anaesthesia one of the most professionally difficult specialties. We did a very short review of anaesthesia for children in our practice over a 3 month period. The number and categories of physicians practicing anaesthesia in the hospital were noted. The number and indications/ types of surgery in children, as well as numbers of surgeries in children by specialty were considered. The categories of anaesthetists who administered anaesthesia, types of emergencies, and the types of anaesthesia administered, parameters monitored as well as outcome of anaesthesia were noted. We found that 62 surgeries were carried out in children especially general surgical and repair of cleft lip / palate procedures. Emergencies especially intestinal obstruction constituted 16.2% of these and they all presented late. Poverty, ignorance and superstition along with the difficult terrain contributed to late presentation to hospital, but the use of traditional medicine as well as intervention by native doctors were also explored before presentation. We found that monitoring was deficient, as temperature was not monitored in

any child. Delayed awakening due to hypothermia occurred in 8.1%.

As a result of these findings, Cotton padding, a heat conservation method is now used in our hospital for infants and is an effective method of preventing hypothermia (Fig 12). It is useful in resource-limited areas even during emergency surgeries at night. (***Mato CN, Onajin-Obembe BOI. The challenges of paediatric anaesthesia in the Niger Delta region of Nigeria; Pan-African Anaesthesia symposium, Nairobi, 2008***)

Fig. 12: Cotton padding for heat conservation

5.9 The Emergency Patient

Emergencies may occur in any operative specialty and these patients pose significant challenges for anaesthetists. The anaesthetist would be seeing the patient for the first time, and most often there is limited time for assessment and resuscitation

of the patient prior to surgery. There may have been significant blood loss or fluid and electrolyte imbalance; the patient may be in severe pain. A potentially full stomach and concomitant medical disease in these patients add to the challenges of administering anaesthesia to emergency patients and contribute to the high perioperative risk.

Irrespective of the situation and how much time is available, the anaesthetist must evaluate the patient and have an anaesthetic plan of action. Often, resuscitation would go hand in hand with the surgery especially when it is imperative that the patient be operated upon to save life. In our environment, we find significant delay on the part of patients in seeking appropriate care.

Late presentation may alter a patient's features and cause a misdiagnosis as we found in a 29-year old woman with an initial diagnosis of septicaemia, ruptured appendix and pelvic abscess; she was brought into theatre late at night for emergency abdominal operation (laparotomy). Pre-anaesthetic evaluation showed an emaciated ill-looking young woman with protuberant eyeballs. She was febrile, had marked tachycardia – the pulse rate was 172 / min, and a significantly raised blood pressure with wide pulse pressure. There was no obvious or palpable anterior neck swelling and a history of recent eye changes was denied. Time limited further investigations as the patient presented at night, so, with a high index of suspicion that this patient may be thyrotoxic; emergency laparotomy was carried out under general anaesthesia with available hypotensive anaesthetic drugs. We started with one agent but continued with another for logistic reasons. Thyroid function tests done postoperatively confirmed

the suspicion of thyrotoxicosis and she was commenced on treatment. (Mato, Johnson, Odagme**, 2007).**

This case highlights some of the logistic challenges of emergency anaesthesia; late presentation, insufficient time to properly investigate patient, and anaesthesia after regular hours. Without a high index of suspicion, this patient would probably have been treated like a regular emergency case possibly precipitating a thyroid storm which has a high mortality. Since this report, Anaesthetists now consider thyrotoxicosis as a differential diagnosis in any adult presenting with a pulse rate higher than 120.

5.10 The Intensive Care Unit (ICU)

The creation of ICUs owes much to the introduction of intermittent positive pressure ventilation (IPPV), the therapeutic potential of which was first recognized during the 1950s when it was used to support patients with respiratory failure due to poliomyelitis. Since then awareness of its possibilities in the care of the critically ill has grown and ICUs have developed into purpose-built facilities, fully equipped with the most advanced medical technology and skilled personnel.

The appropriateness of ICUs in developing countries has been questioned, considering the fact that many of them face one economic crisis after another, but there are critically ill patients in most hospitals, whether in developed or developing countries. In developing countries, the emphasis should be on effective use of valuable resources as opposed to accumulation of non-functional equipment and/or admission of patients who do not require intensive care.

As in other Hospitals in Nigeria, the Intensive Care Unit is a unit in the Department of Anaesthesiology, and we found in our series in the UPTH while still at the temporary site with a Level 1 ICU, that 42% of the patients admitted had no justifiable reason for admission into the ICU. At that time, the ICU was the only ward with air conditioning and most VIPs were admitted there. We also found that almost 50 % of the admissions were from the O&G Department; no bed space was the indication for 85% of the post C/S admissions. The mortality rate of 24% was much lower than other reports from Nigeria, because majority of the patients admitted did not require critical care **(**Mato, Onwuchekwa, Aggo**, 2009).**

The ICU in UPTH has evolved from Level 1 care (basic monitoring of pulse, blood pressure, respiration, temperature, level of consciousness and urine output; regular turning of patient, nasogastric tube feeding and suctioning of intubated patients – Fig 13) to Level 2 care with mechanical ventilation and cardiovascular monitoring over and above the basic care level (Fig 14). Patients are now admitted with justifiable indications and the outcome is similar to the pattern in other Hospitals in Nigeria (Mato, 2007).

Fig 13: Old Level 1 ICU

Fig 14: New Level 2 ICU

A very sad finding in one of our surveys was that the households of many of the patients admitted into our ICU had become impoverished as a result of out-of-pocket spending for care of their relatives **(**Mato, Tobin**, 2009).** Medical care is expensive and intensive care is even more expensive. In most developed countries, health insurance is available, and sick persons rarely pay out of pocket especially in emergencies. In Nigeria, the National Health Insurance Scheme (NHIS) is still developing and many patients pay out of pocket for medical care. Because of chronic gross underfunding of the health sector, healthcare facilities must charge user fees in order to render services to the sick (Onwujekwe et al, **2013**).

5.11 Critical Incidents in Anaesthesia

Working in an anaesthesia department today means performing a highly specialized task with a team. With the help of sophisticated equipment, surgery can now be performed in extremely ill patients than in the past. Performing this task is often characterised by stressful conditions, high workload, intense time-schedule, lack of personnel, long working hours and the requirement from surgeons, patients, relatives and society to achieve a high level of safety without complications. Because

human performance has limitations, errors will certainly occur, but due to an error-free performance goal, we often respond to the failure by blaming individuals. This is unrealistic and prevents open discussion of errors in health care (Staender, **2000**).

Critical incidents in anaesthesia may be considered as mishaps that could have led (if not discovered or corrected on time), or actually led to undesirable outcomes. These undesirable outcomes may range from prolonged hospital stay to permanent disability or death **(**Cooper et al **1978).** Critical incidents may be due to human error or mechanical failure; the majority of critical incidents however are due to human error, either related to errors in management, or deviation from accepted practice**.**

In our practice, we reported critical incidents caused by medication errors which occurred as a result of deviation from standard practice and could have resulted in serious morbidity if they had not been detected and corrected. We noted that a change in packaging in the centrally-procured drugs without informing the end-users was the remote cause of those mishaps (Mato & Fyneface-Ogan**, 2003)**.

Although anaesthetic deaths are uncommon, most anaesthetists are likely to be involved with an anaesthetic catastrophe at some point in their careers. This experience may have significant psychological impact on the staff concerned. Formal incident reporting accompanies anaesthetic deaths, and in addition, involved personnel frequently need professional counselling.

We looked at the attitude of anaesthetists to intra-operative catastrophes and found that out of a total mortality of 77 in 545

cumulative years in the specialty, 29 (38%) were in very critically ill patients whilst 48 (62%) were unanticipated. Emergency procedures accounted for 61(79%) of these mortalities. Only 32 (41%) of the critical incidents were formally reported. Forty-eight (86%) of the respondents were psychologically affected by the intra-operative catastrophes. In order of frequency of incidence, lingering memories of the event accounted for 38%, depression 28%, and cardiac dysrrhythmias 2% amongst others (Table 5). Most of the respondents 42/48 (88%) that were psychologically affected did not have any form of debriefing or counselling.

Table 5: Psychological affectation among Respondents

Affectation	**Frequency (%)**
Unpleasant memories	19(38)
Depression	14(28)
Sleep disorders	9(18)
Feeling of guilt	5(10)
No desire to go back to work	2(4)
Perceived cardiac dysrrythmias	1(2)

(Two respondents had more than one affectation)

Critical incident reporting should be encouraged in Nigeria, with a view to correcting systems that encourage critical incidents rather than individual blame, whilst anaesthetic departments should have departmental guidelines for managing the aftermath of critical incidents, and psychological support for practitioners.

Trainees should undergo a training module in psychological debriefing following critical incidents as part of their curriculum.

As stated earlier, sometimes, critical incidents may also occur as a result of equipment failure. Equipment malfunction which results in technical failure is less common in advanced countries. However, in Nigeria, not all surgical centres have standard anaesthetic machines, thus anaesthetists resort to different techniques in an effort to deliver anaesthesia especially in Private Hospitals. Sometimes, oxygen is not available, or a procedure lasts longer than expected and the private facility does not have oxygen back up as was the case when the Portable Anaesthesia Circuit (PAC – Fig 15) was in use without sufficient oxygen back up (Ogunbiyi & Mato**, 2006)**.

Fig 15: PAC

Fig 16: The Dräger Fabius Interlocking System

The experience with the Dräger Fabius 2000 series anaesthetic machine was reported to alert anaesthetists of the possibility of mishaps occurring if the anaesthetist is not vigilant or fails to carry out a full machine check before anaesthesia. The Dräger Fabius 2000 series anaesthetic machine has safety features such as the Diameter-Index Safety System (DISS), low oxygen pressure alarm and vaporizer interlock safety system (Fig 16).

There are two openings with nibs on the control dial of each vaporizer. The nib prevents the interlocking bar from sliding into the opening unless the vaporizer is first turned off. If the nib is broken or missing, the bar can easily slide into the opening on the vaporizer without the vaporizer being turned off. Thus, in this case halothane and isoflurane, two potent anaesthetic agents may be in use at the same time, 5% halothane in use with 1% isoflurane. In the absence of a thorough machine check, this situation has the potential for intra-operative fatal anaesthetic incident. (Mato & Tobin**, 2009)**.

Although the Anaesthetist must remain vigilant, ever present, ever watchful, in order to prevent catastrophes, standard operating procedures and well displayed protocols need to be developed to help the Anaesthetist especially when fatigued not to deviate from laid down guidelines.

We advocate a Risk Analysis before the commencement of Anaesthesia in every situation where anaesthesia is to be administered, especially in private hospitals. For example, because oxygen is so vital to the patient under anaesthesia, the Anaesthetist should check and confirm that there is sufficient oxygen to last for the duration of the surgical procedure and patient recovery before commencing anaesthesia. This will ensure that critical incidents are reduced to the barest minimum.

5.11.1 The Anaesthetist and Cardiopulmonary Resuscitation

The Anaesthetist is trained to respond rapidly and precisely to critical situations, and when critical incidents occur, appropriate response by the anaesthetist may mean the difference between life and death. Cardiac arrest or cardiopulmonary arrest defined as the abrupt cessation of normal circulation of blood due to

failure of the heart to contract effectively during systole is a medical emergency. Cardiac arrest may occur within or outside the operating room and knowledge of Cardiopulmonary Resuscitation (CPR) is imperative if that life would be saved.

There are two recorded cases of CPR in children in the Bible by prophets Elijah and Elisha. (I Kings 17: 17, 19 – 22 "*.....And he stretched himself out on the child three times and cried out to the Lord.....then he revived...*'; (II Kings 4: 34 – 35 "*...And he went up and lay on the child, and put* ***his mouth on his mouth****, his eyes on his eyes, and his hands on his hands, and he stretched himself out on the child.....then the child sneezed...*").

Mouth-to-mouth resuscitation is still taught in Basic Life Support (BLS) training, and practiced today with some modifications as part of CPR when equipment is not available.

When the heart stops, ability to re-start it within a stipulated time (< 5mins) often makes the difference between life and death. The knowledge and training of the Anaesthetist is invaluable in such a situation. However, every health professional should know how to carry out CPR, and though not yet mandatory in Hospitals in Nigeria, certification from a recognized body in Basic Life Support (BLS) and Advanced Cardiovascular Life support (ACLS) is mandatory before employment to work as a doctor or nurse in Hospitals in the US and Canada, especially in critical areas such as the operating room, emergency room and ICU.

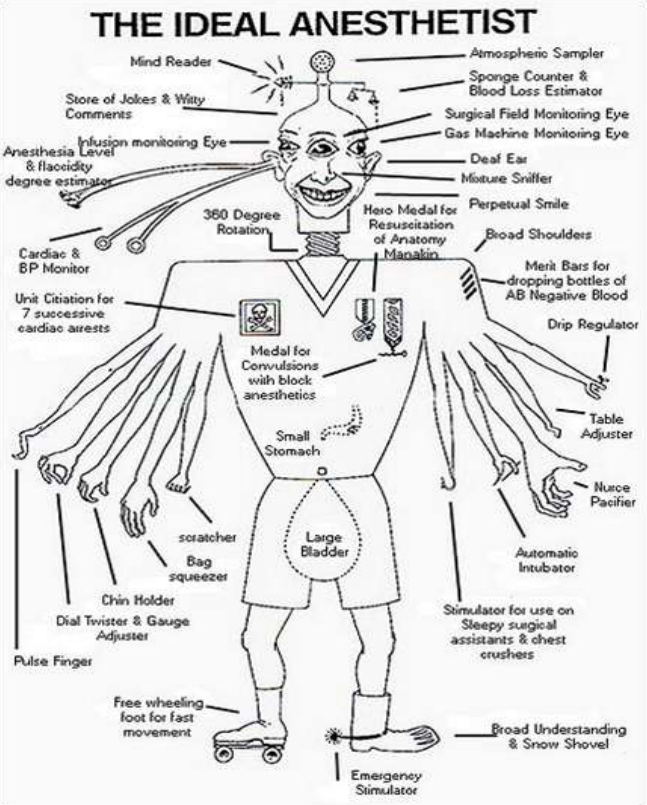
We carried out a census among some physicians, and found that < 2% had formal training or certification in Resuscitation. Successful resuscitation would therefore be challenging and

frequent training was agreed by responders as necessary for improved care (Fyneface-Ogan, Mato, **2011**).

6.0 Challenges of the Academic Anaesthetist in Nigeria

There are significant challenges to the academic anaesthetist in this sub-region.

1. Manpower & Workload: Although there are more Physician Anaesthetists today compared to > 20 years ago when I was in training, the number is nowhere near adequate. The workload of the anaesthetist continues to increase and with more complicated surgeries in severely ill patients, the stress on the anaesthetist from surgeon, other operating room staff as well as patients and their relatives is on the increase. Surgeons often take turns to operate, such that one surgeon may operate on one or two patients and leave while another surgeon takes over to complete the list, but the same anaesthetist will anaesthetize all the patients. The expectation from the anaesthetist by operating room colleagues resulted in this cartoon character referred to as the Ideal Anaesthetist (Fig 17):



He should be a mind reader to know what the surgeon wants, a sponge counter, and a blood loss estimator. He should have 4 eyes, one for the surgeon, one for the patient, one for the monitor and one for the intravenous infusion. He should have 10 hands to be used as bag squeezer, vaporizer dial adjuster, pulse monitor, drip regulator, table adjuster, operating lamp adjuster, surgeon's back scratcher, surgeon's mask adjuster, nurse pacifier and as stimulator to pinch surgeon's assistants who sleep and lean on the patient's chest.

The ideal anaesthetist should have a small stomach as there is often no time to eat in between cases, but he should have a large capacity bladder (10liters) for he cannot use the bathroom during cases as he must be present and watchful. He should have a sensitive nose to perceive odours in the theatre and smell trouble before it occurs, his ears should be sensitive and discriminate between the different alarms. He should have a neck that rotates through 360 degrees, freewheeling feet for fast movement and a perpetual smile to assure surgeon and other operating room staff that all is well.

2. Training: I am proud to have received all my educational and professional training in Nigeria. I therefore stand as a totally home-grown Physician Anaesthetist. There were fewer Physician Anaesthetists especially as a result of the brain drain at that time and the workload was heavy, but we thrived on that knowing that our skills and competence depended on how much exposure we had; completing a paediatric surgical list with 10 babies was routine. Determination, diligence and hard work were encouraged and celebrated. However, the Nigeria of 1987 – 1991 when I trained as an Anaesthetist is very different from the Nigeria of today; professional development is now personal rather than institutional, resulting in significant competence gaps in training and skills.

3. Equipment: All equipment for anaesthetic services are imported and expensive; most depend on electricity which is erratic. There is no local training for technicians in equipment maintenance. Adaptation of some anaesthetic techniques such as TIVA to our environment of no regular electricity is stressful; patient-controlled analgesia cannot be

practiced as the equipment is imported, uses electricity and local maintenance may not be available.

4. Academic Research and Publication: The expanding role of the Anaesthetist and the increasing complexity of the anaesthetic domain cause an increase in service load to the detriment of academic pursuit. As Coordinator, and later acting Head of anaesthesia, my job involved provision of clinical services as an anaesthetist, administration of the Department of Anaesthesiology in University of Port Harcourt and the Teaching Hospital, maintenance and repair of equipment, purchasing of anaesthetic consumables and equipment, supervision of the Intensive Care Unit, teaching and training at undergraduate and postgraduate levels as well as project manager of the theatre revolving fund, the second largest in the UPTH. Research for the academic anaesthetist who needs publications for progress in his career is extremely difficult and a huge challenge.

7.0 What Future for Anaesthesia

7.1 Globally

Anaesthesia is a rewarding and challenging specialty which combines manual dexterity with intellectual stimulation and is truly one of the few specialties where decisions made in critical situations can mean the difference between "life and death."

With a total of 12,000 Anaesthetists in the UK, and 23,000 in the USA, there is still a manpower shortage in this specialty and Physicians are encouraged to specialize in Anaesthesia. Higher remunerations have been used in developed countries to attract Residents and in the USA, Physician Anesthesiologists earn a

median salary of $349,261 per annum (salary.com). The high pay reflects the inherent stress in a job that is literally about life and death.

7.2 In Nigeria

7.2.1 Manpower: In Nigeria, there is a significant dearth of Physician Anaesthetists and to date, there are less than 500 Physician Anaesthetists in the country. At the University of Port Harcourt Teaching Hospital; there are 64 Consultants in the operative specialties to 10 Consultant Anaesthetists as shown in Fig 18. The breakdown is as follows: General surgery, 9; ENT 4; Ophthalmology 7; O&G 18 ; Orthopaedics 7; OMFS 4; Burns & Plastics 3; Paediatric Surgery 3; Cardiothoracic surgery 4; Neurosurgery 1; Urology 4. All these specialties are served by the Department of Anaesthesiology.

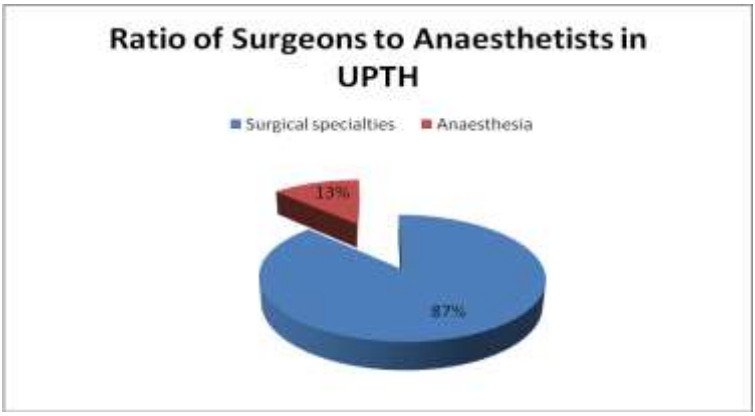


Fig 18: Ratio of Anaesthetists to Surgeons

The image of the Anaesthetist has improved since the previous surveys, and a more recent survey among final year medical

students in University of Port Harcourt, who had completed their posting in Anaesthesia showed the following:

Table 6: Specialty choices of 600-Level Medical Students (2014)

S/No	Specialty	Number (N=110)	Percentage (%)
1.	Surgery	7	6.4
2.	Paediatrics	2	1.8
3.	Obstetrics & Gynaecology	16	14.5
4.	Internal Medicine	14	12.7
5.	Ophthalmology	6	5.5
6.	Public Health	30	27.3
7.	*Anaesthesia	10	9.1
8.	Family Medicine	8	7.3
9.	Laboratory Medicine	3	2.7
10	Medical Officer	4	3.6
11	Undecided	10	9.1
	Total	**110**	**100**

At least ten students (9.1%) wanted to specialize in Anaesthesia.

Now, if you have been challenged today and are considering a career in Anaesthesia, we welcome you gladly.

However, this Specialty is not for every Physician, therefore you may consider anaesthesia if:
You are a good communicator
You are sociable and like people
You do not mind working in isolation at times
You do not mind not being seen as a leader
You have an interest in gadgets
You enjoy clinical pharmacology and physiology
You have flexibility in thought and action
You respond well and can think clearly under pressure
You have an innovative, research orientated mind

But please Do not consider anaesthesia if

You do not deal well with stress

It is your second or third choice of specialty

You want to be in the limelight

You do not agree with most of the above reasons to join

You like regular meals

You think you'll be sitting around in the coffee room all day **(Wilkinson, 1999).**

7.2.2 Professional and Academic Development: I feel that professional and academic development of Anaesthetists should be Institution-based and competence gaps when identified should be addressed by the institution and not left to the individual. Institutional partnerships should be developed and a one year abroad training made compulsory for all trainee anaesthetists after the Part I Fellowship. This would expose the trainee to clinical activities with appropriate technology in an ideal situation, as well as research. Such a trainee would return to adapt that training to his environment with resultant improvement in service delivery.

7.2.3 Equipment: Collaboration / Partnership between the Department of Anaesthesiology and the Engineering community is imperative for equipment manufacturing and maintenance. Most of the equipment in use in Anaesthesia require pneumatics, electronics and calibration. We have people in the engineering industry who are well-versed in these. You do not need to be an Original Equipment Manufacturer (OEM) to understand how an anaesthetic machine functions, so we have challenged the Engineering community and they have

risen up to the challenge and are working closely with us to address the maintenance of our equipment. We believe that this partnership will provide local training for biomedical technicians and improve services in equipment maintenance.

7.2.4 Research: There is dwindling research capacity among young anaesthetists today, because the emphasis is more on service. Anaesthesia is generally portrayed as a service specialty (which it is), and following a marathon 24 hour call duty with 13 Caesarean sections and repair of 2 ruptured uteri, few anaesthetists would have the capacity to think of academics for at least 72 hours. I believe a pathway may be designed for clinical academics in Anaesthesia for collaborative research and cross-disciplinary interaction with the Departments of Physiology and Pharmacology. The clinical programme will be constructed in such a way that common core competencies in clinical anaesthesia training are maintained while protecting research time in the University. Mr. Vice Chancellor, ladies and gentlemen, as Anaesthetists, we have observed certain patterns to which we have adapted our practice with excellent outcomes; some of these practices are not in any formal text book of anaesthesia, but they work for us. It would be a welcome development if we could develop research activities in these areas to understand the molecular basis for some of these observations. This to my mind is the future for anaesthesia in Nigeria.

8.0 Acknowledgement

Vice Chancellor, Sir, before I conclude, kindly permit me to acknowledge some of those on whose shoulders I rode to arrive here today.

I wish to express with humility, my profound gratitude to God for His love, guidance and succour all through my life; His daily miracles in my life continue to overwhelm me, and I acknowledge today as always, that I am here because of His love and mercy.

My father, late Chief Israel Lomma Mato taught me very early in life that there is dignity in labour, that ignorance is not bliss and education is the key. My mother, whom we fondly call Maama, has been a tower of strength, and an encourager par excellence. I am eternally grateful and thank God that she is here to witness today.

My brothers and sisters, Kpobari, Bura, Tam, Nalor, Bariyaa for sharing in all my struggles and triumphs, and making every effort to be at this Inaugural Lecture; I couldn't have asked for a more supportive family and your pride in my modest achievements has been most humbling; my cousin, Senator (Dr.) Ben Nwiezor Birabi, for not leaving me under the bread fruit tree when bullets were whizzing past our heads during the Biafra war. I also acknowledge another cousin, late Ernest T. Mato, who showed up after he had been presumed dead, to take me to Calabar to continue my education when my father was incarcerated in a Biafra prison. That singular act ensured that my education was minimally interrupted by the Biafra war.

I remain ever grateful to my teachers in the University of Ibadan Medical School, and Rev. (Dr.) Israel Kue, who first told me of

the possibilities in Residency training; he very wisely omitted telling me how difficult it could be.

I acknowledge with gratitude, all my trainers in Anaesthesia, Professors Olaitan Soyannwo, Eniola Elegbe, Simbo Amanor-Boadu and Dr. Patience Sotunmbi, who helped train my colleagues and I when all the men were gone.

I appreciate my Anaesthesia family in Port Harcourt, and my son and research partner, Dr. Sotonye Fyneface-Ogan for their support, encouragement and pride in my work.

The University of Port Harcourt and the University of Port Harcourt Teaching Hospital with their principal officers are specially acknowledged for providing an enabling environment for academic and clinical growth.

Finally, my Baby-girl, my friend, my confidante and my greatest fan Singto; you've shared my joys and travails; you've carried burdens heavier than your tender years; you've wisdom beyond your few years. God has really used you as your name connotes, to wipe away my tears. You're my jewel, my pride and my joy. Thank you for finding me worthy to be called Ma Mia.

9.0 Conclusion

Through all the defining moments in the history of Anaesthesia is a story of the human spirit that refuses to give up; the skill, dedication and training of the Anaesthetist continues to make possible the increasingly complex surgeries being carried out today. But, until the pivotal role of the anaesthetist is recognized and compensated, there will remain the very obvious dearth of anaesthetists in Nigeria and patients with surgical ailments will continue to queue for months before obtaining relief.

I watched "Gifted Hands – the Ben Carson story" and observed the aspect of the movie detailing the separation of the conjoined twins that made headlines. It was the first successful separation of craniopagus conjoined twins. I watched the lead surgeon Ben Carson address the press after he had unscrubbed and noted that at the time he was addressing the press, the separated babies were still in the operating room. Behind the scene, unknown and unsung were the anaesthetists; their names were never mentioned yet without their skills, that surgical feat would never have been possible. Behind the scene for every surgical procedure in the world of medicine is the Anaesthetist, watching while the patient sleeps, and providing critical but very tender care.

Behind the scene
In every operating theatre
Unknown and unsung
The Anaesthetist

Behind the scene
In every surgical operation
Under the ever watchful eyes
Of the Anaesthetist
The Team works

Behind the scene
In every operating room
Under his ever watchful eyes
The patient sleeps and wakes

Without pain or pang
The Surgeon performs his feat
Behind the scene
In every operating room

The Anaesthetist
Stands in selfless service
That the Grace of God
May manifest

Mr. Vice Chancellor, Sir, distinguished ladies and gentlemen, I thank you all for listening.

10.0 References

1. Akinyemi OO, Soyannwo OA. The choice of anaesthesia as a career by undergraduates in a developing country. Anaesthesia 1980; 35: 712 – 715
2. Khan FA, Minai FN, Siddiqui S. Anaesthesia as a career choice in a developing country; effect of clinical clerkship. J Pak Med Assoc 2011; 61 (11): 1052 – 1056
3. Eguma SA, Mato CN, Nabh NK. Anaesthesia as a career choice among Nigerian Medical students. World Anaesth. 2005; 8 (3): 37 – 40.
4. Oduntan SA. History of the Faculty of Anaesthesia National Postgraduate Medical College of Nigeria (1968 – 1987). Nig Postgrad Med J 1998; 5 (4): 155 - 158
5. Naeher LP, Brauer M, Lipsett M, et al. Wood smoke health effects: a review. Inhal Toxicol 2007; 19 (1) 67 – 106.)
6. Mato CN, Onajin-Obembe BOI. Charcoal-roasted Plantain and fish vendors in Nigeria: a potential anaesthetic high risk group? S Afr J Anaesth Analg 2008; 14 (6): 7 – 9)
7. Mato CN, Onwuchekwa AC, Ebirim LN. A survey of fasting blood glucose of adult elective surgical patients at the University of Port Harcourt Teaching Hospital. Afr J Anaesth Intens Care 2010; 10 (2): 6 – 9
8. Aggo AT, Fyneface-Ogan S, Mato CN. The differential impact of two anaesthetic techniques on cortisol level in Nigerian surgical patients. Nig J Clin Pract 2012; 15 (1) 68 – 74.
9. Didia BC, Aniemeka JI, Mato CN, Dapper DV. Atlanto-occipital gap in Nigerians: its relationship to difficult intubation. Port-Harcourt Med J 2006; 1: 48 – 51.
10. Mato CN, Fyneface-Ogan S, Edem B. A survey of anaesthetic preferences among hospital staff J Clin Eval 2007; 13:825 – 828

11. Fyneface-Ogan S, Mato CN, Ogunbiyi OA. Comparison of Maternal satisfaction following Epidural and General Anaesthesia for repeat Caesarean Section. East Afr Med J 2009; 86: 557 – 563
12. Fyneface-Ogan S, Mato CN, Odagme MT. Anaesthesia for Caesarean section: a ten-year review. World Anaesth 2005; 8 (3): 18 – 21
13. Mato CN. Organizing a Refresher Course in Nigeria: A joy or a nightmare? World Anaesthesia 2003; 7 (1): 5-6.
14. Mato CN, Fyneface-Ogan S, Aggo AT. Epidural anaesthesia for caesarean section in a patient with extreme cardiovascular and respiratory disease. Nig J Med 2003; 12 (1):54 – 56.
15. Fyneface-Ogan S, Mato CN. Two-man laryngoscopy and intubation: another twist around the bottleneck. The Nig Health J 2006; 6 (1&2): 381 – 382
16. www.who.int/patient safety/safesurgery/en. Safe surgery saves lives. 2009. Accessed 9th April 2013
17. Mato CN, Otokwala J. An audit of anaesthetic record charts in the Orthopaedic theatre of a Nigerian Teaching Hospital. Nig J Surg 2007; 13 (1&2): 12 – 15).
18. Mato CN**.** Anaesthetic considerations for the Paediatric patient. In: Paediatrics & Child Health in a Tropical region, 2nd Ed. Azubuike & Nkanginieme. University of Port Harcourt Press. 2007: 714 – 718.
19. Soyannwo OA, Elegbe EO, Orubo CN. Problems in extubation of endotracheal tube in anaesthesia in the West African Sub-Region. West Afr J Med 1995; 14 (2):124 – 126
20. Mato CN, Isa IJ, Fyneface-Ogan S. Post-spinal shivering: comparing the effects of Ketamine and tramadol Nig J Orth Trauma 2002; 1 (1):17 – 19).
21. Carter JY. Modern technology in peripheral health care in developing countries. East Afr Med J 2004; 277-278).

22. Mato CN, Eguma SA, Eshiet A, Akpan SG. Total intravenous anaesthesia in a developing environment. Port Harcourt Med J 2007; 2 (1): 81 - 86.
23. Mato CN. Total Intravenous anaesthesia: the African Context – dealing with equipment issues. All Africa Anaesthesia Congress Nairobi 2009
24. Fyneface-Ogan S, Mato CN, Anya SE. Epidural analgesia: Views and outcomes of women in labor in a Nigerian hospital. Ann Afr Med 2009; 8(4): 250 – 256
25. Robinson JO, Ronsen M, Evans JM, Revill SI, David H, Rees GA. Maternal opinion about analgesia in labour: A controlled trial between epidural block and intramuscular pethidine combined with inhalational. Anaesthesia 1980; 35:1173 – 1181
26. Phillipsen T, Jensen NH. Maternal opinion about analgesia in labour: A comparison of epidural blockade and intramuscular pethidine. Eur J Obstet Gynecol Reprod Biol 1990; 34: 295 - 210
27. Fyneface-Ogan S, Mato CN. A clinical experience with the Epidural balloon in the localization of the epidural space in labouring parturients. Nig Quart J Hosp Med 2008; 18 (3): 166 – 169.
28. Edomwonyi NP, Ekwere IT, Egbekun R, Idehen HO, Sadiq A. Anaesthesia-related complications in obstetric patients. Afr J Anaesth Intensive Care 2005; 6:5-7.
29. Obasuyi BI, Fyneface-Ogan S, Mato CN. A comparison of the haemodynamic effects of lateral and sittints. Afr J Anaesth Intensive Care 2005;6:8-13
30. Imarengiaye CO, Isa IF. Spinal anaesthesia and caesarean delivery: hypobaric Bupivacaine increases the risk of maternal hypotensionng positions during induction of spinal

anaesthesia for caesarean section. Int J Obstet Anesth 2013; 22: 124 – 128
31. Fyneface-Ogan S, Mato CN, Odagme MT. Post-dural puncture headache following caesarean section in Nigerian parturients: a comparison of two spinal needles. Nig J Post grad Med J 2006; 13 (3): 200 – 202.
32. Ofoegbu VA, Mato CN. Epidural blood patch for post-dural puncture headache. Nig J Med 2004; 13 (1): 59 – 61).
33. Singh R, Deo S, Pradeep Y. The decision-to-delivery interval in emergency Caesarean sections and its correlation with perinatal outcome: evidence from 204 deliveries in a developing country. Tropical Doctor 2012; 42 (2): 76 – 69).
34. Fyneface-Ogan S, Mato CN, Enyindah CE. Decision-to-delivery interval: Reasons for delay. J Med Biomed Research 2009; 8 (1): 72 – 78)
35. Mato CN, Onajin-Obembe BOI. The challenges of paediatric anaesthesia in the Niger Delta region of Nigeria; Pan-African Anaesthesia symposium, Nairobi, 2008
36. Mato CN, Johnson UU, Odagme MT. Anaesthesia in the undiagnosed thyrotoxic patient: a case report Sahel Med J 2007; 10 (2): 63 – 66).
37. Mato CN, Onwuchekwa AC, Aggo AT. Pattern of admissions to the University of Port Harcourt Teaching Hospital Intensive care Unit – a 10-year analysis. S Afr J Crit Care 2009; 25 (1): 10 – 15.
38. Mato CN. University of Port Harcourt Teaching Hospital ICU Annual Report 2007.
39. Mato CN, Tobin M. Out-of-pocket health expenditure: A preliminary survey of impact on households of patients in the Intensive Care Unit of a tertiary hospital in Nigeria. Afr J Anaesth Intens Care 2009; 9 (2): 1 – 4).

40. Onwujekwe O, Hanson K, Ichoku H, Uzochukwu B. Financing incidence analysis of household out-of-pocket spending for healthcare: getting more health for money in Nigeria? Int J Health Plann Manage 2013.
41. Sven Staender. Critical incident reporting. With a view on approaches in Anaesthesiology. In: Vincent Ch and de Mol B. (eds): Safety in Medicine, Pergamon Elsevier Science, Amsterdam new York 2000; S. 65 – 82.
42. Cooper JB, Newbower RS, Long CD, McPeek B. Preventable anaesthesia mishaps: a study of human factors. Anaesthesiology 1978; 49: 399 – 406.
43. Cooper JB, Newbower RS, Kitz RJ. An analysis of major errors and equipment failures in anaesthesia management: considerations for prevention and detection. Anaesthesiology 1984; 60: 34 – 42
44. Mato CN, Fyneface-Ogan S. Drug errors in anaesthetic practice. Case reports. Nig J Med 2003; 12 (3): 157 – 159.
45. Ogunbiyi OA, Eguma SA, Mato CN. Attitude of anaesthetists to intra-operative catastrophes: a questionnaire survey. S Afr J Anaesth Analg 2006; May/June; 58 – 60.
46. Ogunbiyi OA, Mato CN. Anaesthetic accidents: an experience in sub-Saharan Africa. S Afr J Anaesth Analg 2006: 111 – 113.
47. Mato CN, Tobin M. Dragger Vaporizer alert. Update in Anaesthesia 2009; 25 (1): 56 – 57.
48. Fyneface-Ogan S, Mato CN. Assessment of knowledge of resuscitation of pregnant women among physician care givers in the south-south of Nigeria. Afr J Anaesth Intens Care 2011; 2 (1) 6 – 10.
49. www1.salary.com/anesthesiologist-Salary.html. Accessed 26th June, 2014
50. Wilkinson DJ. Anaesthesia. BMJ 1999; 318: S2-7187.
51. *Poem. The Anaesthetist© Ajienka JA*

CITATION ON
PROFESSOR CHRISTIE NWIDUM MATO
MB, BS; PgDA; FMCA; FWACS; FICS

Mr. Vice Chancellor, Sir, distinguished ladies and gentlemen I feel highly honoured and privileged to be standing before you today, to read the Citation on this distinguished Inaugural Lecturer.

Professor Christie Mato was born on the 17th of October 1955 at the St. Thomas Hospital, Enugu, to Chief Israel Lomma Mato, a Local Government Administrator of blessed memory and Mrs. Florence Kpigibeke Mato both of Bua-Yeghe, Ogoni. Her name, Nwidum, means 'Child of Life'.

Christie, as she is fondly called, started her academic life at the St. Bartholomew's Primary School, Asata, Enugu at an early age. In 1964, the family moved to Calabar and Christie continued school at the Holy Trinity Primary School, Calabar where she completed her primary education, passing the First School Leaving Certificate examination with Distinction to the joy and

excitement of the Headmaster Mr. Ansa; Christie was the youngest pupil in the history of the School at that time to have achieved such a feat. She went on to pass the interview and gained admission into the prestigious Queen's School, Enugu, the premiere girls' secondary school in the then Eastern Region.

School for Christie was interrupted by the Biafra war, and with her father in detention camp, it seemed as though young Christie's school days were over. However, her cousin, Ernest Mato stepped in and took her to Calabar where he was working at the time, to start secondary school afresh, and she was admitted into Holy Child Secondary School, Marian Hill, Calabar. In 1969, they had to move back home, where Christie continued school at the Holy Rosary Secondary School, Port Harcourt, graduating with a Grade 1 in 1972.

Higher School saw her as a pioneer student at the Federal Government College Port Harcourt, and following A-Levels at the then College of Science and Technology, Christie got admitted into the University of Ibadan to study Medicine and graduated in 1980, and did her House job at the General Hospital, Port Harcourt. It was during her National Youth Service at the General Hospital, Iquita, Oron, in 1982 that Christie lost her father.

Thus it was not until 1987 that Dr. Mato commenced Residency training in Anaesthesia at the University College Hospital, Ibadan. Christie completed her Residency training, and obtained the Fellowship of the Medical College of Anaesthetists (FMCA) of the National Postgraduate Medical College of Nigeria in 1991; in 1996, she was awarded by election the Fellowship of the West

African College of Surgeons in Anaesthesia, and the Fellowship of the International College of Surgeons in 2004.

Finding herself underutilized at the Health Centre of the University of Science and Technology, she transferred to the University of Port Harcourt and was appointed Lecturer 1 in the Department of Anaesthesiology in 1992. Later that same year, she was appointed a Consultant Anaesthetist in the University of Port Harcourt Teaching Hospital (UPTH).

From 2001 – 2006 under her leadership, the Department of Anaesthesiology was completely transformed, obtaining partial accreditation for residency training, and collaborating with the UCH, Ibadan for postings in ICU, Cardio and Neuro-Anaesthesia to help prepare resident doctors for Fellowship examinations.

Dr. Mato also introduced Medical students rotating through the Department to Preoperative ward rounds and call duty, attaching them to Resident doctors to learn firsthand how the Anaesthetist worked. She exhibited leadership by example and instilled discipline in all staff. Her hard work and personal sacrifice of time and resources resulted in an era of anaesthesia resident doctors from Port Harcourt being known for passing their examinations at the first attempt. The image of the Department was at an all-time high; Anaesthesiology as a Specialty became so attractive that doctors wanted to specialize in Anaesthesia (before this time, doctors came to 'mark time' in Anaesthesia, while awaiting openings in other Departments).

Dr. Mato's areas of interest have been in Critical Care and Medical Education. In 2003, as a beneficiary of the MacArthur Foundation teacher upgrade programme of the University of

Port Harcourt, she went to the Chris Hani Baragwanath Hospital in South Africa where she worked for three (3) months in the Hospital's Intensive Care Unit to gain experience in the care of the critically ill.

She brought that experience to bear on the Intensive Care Unit of the University of Port Harcourt Teaching Hospital, especially when the Hospital moved from the temporary site with a Level 1 ICU to the permanent site with a Level 2 ICU, introducing ward rounds, teaching sessions and tutorials in the ICU.

Dr. Mato served the Rivers State Government during her sabbatical leave in 2009 and was given the mandate to introduce postgraduate training in Anaesthesia at the Braithwaite Memorial Specialist Hospital (BMSH). This was successfully accomplished and an accreditation team from the Faculty of Anaesthesia, West African College of Surgeons visited the BMSH in December 2009, and later approved the Hospital for Postgraduate training to Diploma level in February 2010. Dr. Mato during that sabbatical year led a team of 13 Anaesthetists sponsored by the Rivers State Government to the All Africa Anaesthesia Congress in Nairobi where she had been invited as a speaker.

On her return from Sabbatical in 2010, Dr. Mato was by majority vote by the body of Consultants of the UPTH elected and later appointed the Chairman, Medical Advisory Committee of the Hospital, becoming the first female to be so appointed. After serving the first term of two (2) years, Professor Mato was unanimously voted unopposed to return and serve for another two years, now becoming the first Professor to hold that position in the Hospital.

There is a significant shortage of Physician Anaesthetists in Nigeria, but Professor Mato has supervised to Fellowship level, the training of twelve Physicians in Anaesthesia; six of them are lecturers in the Department of Anaesthesiology, University of Port Harcourt.

She has served the University, the State and the Nation in various capacities, as Co-ordinator for Anaesthesiology, Acting Head of Department, Associate Dean of Clinical Sciences, Faculty Representative in Senate, 3rd Member of Senate for Anaesthesia, National Postgraduate Medical College, Examiner, National Post graduate Medical College and West African College of Surgeons. She has also served as Member, Ministerial Committee for the Upgrading of Tertiary Hospitals for Advanced Medical Emergency and Referral Services, Member Nigerian Medical Association (Rivers) Committee on Emergency Preparedness and Disaster Management; and Board Member, Rivers State Agency for the Control of HIV/AIDS (RIVSACA). She is an Advanced Cardiovascular Life Support Training Center Faculty member for the American Heart Association Emergency Response Services.

Professor Mato is a Reviewer to nine Peer Review Journals, and an Editorial Adviser to the Gazette of Medicine.

Mr. Vice-Chancellor, Sir, Professor Mato has touched many lives seated here today, by her unique style of leadership, and has been honoured with the following awards:

1. Award of Excellence for contribution towards Residency Training in the UPTH (2003)
2. ARD Award in recognition of outstanding result-oriented performance in the training of Resident Doctors in Anaesthesia (2009)

3. Emergency Response International Award of Excellence in recognition of contributions to resuscitation training in Nigeria (2011)
4. ARD Award in recognition of Outstanding Achievement and Community Service (2011)
5. Forum of Federal Health Institution Nurses and Midwives Achievement Award (2012)
6. National Union of Bua-Yeghe Students Award of Excellence for outstanding academic Achievement as the 1st Professor in Bua-Yeghe and 1st female Professor in the Gokana Kingdom (2012).
7. PUMSA & PUMGRADA Distinguished Administrator Award for unparalled management of men and resources as well as continuous support and guidance to PUMSA (2013).

Professor Mato's very personal and deep faith in God has brought her to this platform today.

Mr. Vice-Chancellor, Sir, distinguished ladies and gentlemen, I present to you, today's inaugural lecturer, a gentle but tough woman of integrity, a mentor to many; a woman of many firsts, the 1st female CMAC of UPTH; the 1st CMAC of UPTH who is a Professor; the 1st Professor of Anaesthesia in UPTH; the 1st female Professor in the Gokana Kingdom; the 1st female Professor of Medicine in Ogoniland; the 1st Professor of Anaesthesia in Rivers State; the 1st Professor of Anaesthesiology in the University of Port Harcourt. She will now deliver her Inaugural lecture.

Thank you.

Professor O. B. da Lilly-Tariah
Orator