UNIVERSITY OF LAGOS, NIGERIA

Inaugural Lecture Series 2015

TOPIC:

WEEP NOT CHILD: THE ANAESTHETIST IS HERE

By
PROFESSOR OLUSOLA TEMITAYO KUSHIMO

WEEP NOT CHILD: THE ANAESTHETIST IS HERE

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An Inaugural Lecture Delivered at the University of Lagos Main Auditorium on Wednesday 4th March, 2015

By

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PROTOCOL

The Vice-Chancellor
The Deputy Vice-Chancellor
The Registrar
My Provost
Dean, Faculty of Clinical Sciences
Deans of other Faculties
Members of Senate, University of Lagos
My Lords, Spiritual and Temporal
Distinguished Ladies and Gentlemen.

Introduction

I welcome you all to this Inaugural Lecture, the 34th from the Faculty of Clinical Sciences and the second one from the Department of Anaesthesia.

Let me first thank the Vice Chancellor for giving his approval to deliver this lecture which was slightly delayed due to some logistical problems and other national commitments.

The 1st Inaugural lecture from this department titled "*Somnum Capere* – To sleep and to wake" was delivered almost two decades ago by no other person than my indefatigable boss and mentor, late Professor Dorothy ffoulkes-Crabbe. This long gap is due to the brain drain which left only Prof. ffoulkes-Crabbe and I in the department for several years before our trainees completed their courses and joined the academic department. Most of my senior colleagues joined other academic departments on their return from greener pastures where they eventually assumed professorial posts and delivered their inaugural lectures.

The title of my lecture this afternoon is "Weep not Child, the Anaesthetist is here".

"Weep not Child" is the title of a novel published by a Kenyan author – James Nguigi in 1964[1] – the first English novel published by an East African. This novel explores the negative aspects of colonialism and imperialism which was ravaging most parts of the African continent at that time and ponders on the role of saviours and salvation. Jomo Kenyatta, the first Prime Minister of Kenya is thus immortalized in "Weep not Child" as the author came to view Jomo Kenyatta as a messiah who will win the struggle against colonial powers.

Mr. Vice Chancellor Sir, ladies and gentlemen, this lecture is not about Jomo Kenyatta but rather the efforts of Anaesthetists over the years to free our children from the storms and agony of surgery when they have to undergo such necessary procedures but without claiming to be "Messiahs". This lecture will also highlight my modest contributions in terms of practice, research and training in this field.

There is a lot of myth surrounding the discipline of Anaesthesia. When my professorial appointment was announced some years ago, one distinguished eminent member of the society, after congratulating me commented "what amazes me is how someone can be professing something I am afraid of". I hope this distinguished personality is here today.

I quite appreciate the fact that we have a mixed audience here today; therefore, I will like to start by making some definitions, give a brief history of the specialty of Anaesthesia and its development in Nigeria.

What is Anaesthesia?

Anaesthesia is a state of controlled and reversible loss of consciousness usually associated with insensibility to pain, reflex depression and a variable degree of muscle

relaxation commonly produced by a combination of drugs including inhaled gases. The word anaesthesia is derived from the Greek words "a" meaning without, and "aesthesis" meaning perception. Anaesthesia therefore means "without perception". However, the use of the word to describe the state of insensibility produced by the inhalation of ether vapour was by Oliver Wendell Holmes in 1846.

Brief Historical Perspective and Development of the Discipline

The history of anaesthesia dates back to the time of creation in the garden of Eden[2]: "*And the Lord God caused a deep sleep to fall upon Adam and he slept, and He took one of his ribs and closed up the flesh instead thereof*" Genesis 2:21. That was the first medical feat of anaesthesia and surgery ever performed in history.

Nothing much was heard since this first feat till the middle of the 18th century. Prior to this, surgery was accompanied with a lot of agony. Unorthodox methods utilised included manual restraining, hypnosis, alcohol, opium, compression of the carotid arteries to cut off blood supply to the brain, phlebotomy etc. These latter methods of course led to several deaths. Nitrous oxide (laughing gas) was first prepared by Priestly in 1772 but it was Humphrey Davy who discovered that it relieved pain while suffering from a tooth ache. Its use was however temporarily forgotten when it was later associated with asphyxia.

Ether, originally prepared in 1540 by Valerius Cordus and used privately for several years, was not introduced into clinical practice until 1846. William Thomas Green Morton, a Boston dentist gave a public demonstration of ether anaesthesia at the Massachusetts General Hospital in Boston USA on October 16th 1846. The patient used

was Gilbert Abbot, a journalist who had a tumour in the floor of his mouth. The demonstration was a huge success and thus heralded the birth of modern day Anaesthesia. On the tombstone of William Morton in Mount Auburn cemetery in Boston USA is an inscription:-

"Inventor and Revealer of Inhalation Anaesthesia;
Before whom, in All Time, Surgery was agony,
By whom Pain in Surgery was Averted and Annulled;
Since whom, Science has Control of Pain"

The news spread rapidly throughout the world and initiated rapid research into other drugs. Within a few months, chloroform, discovered in the UK superseded ether as the most popular anaesthetic agent. John Snow, the first full time anaesthetist, administered over 400 chloroform anaesthetics without a single death. This soon changed over the years as many deaths started occurring possibly due to over dosage. John Snow also popularized chloroform analgesia for labouring women when he administered it to Queen Victoria during the delivery of her 8th child (Prince Leopold) in 1847. At that time, women were under the injunction that it was sinful to relieve the pain of labour. Cocaine was introduced for local anaesthesia in 1884 and by 1889, Spinal anaesthesia was used widely thus opening the doors to the development of Local and Regional Anaesthesia. A section of the body can now be rendered numb and painless by injection of local anaesthetic drugs around a nerve or cluster of nerves without the patient being rendered unconscious.

Balanced General Anaesthesia was embraced from 1926 when John S. Lundy of the Mayo Clinic introduced the term. He suggested that a combination of agents be used so that general anaesthesia and pain relief were obtained by a good balance of agents and techniques. With this

concept, it is now possible to avoid deep levels of anaesthesia and depression of vital centres in the brain.

The pace of development has since been sustained in all aspects – drugs, equipment and techniques - and has opened new frontiers in surgery. Surgery has grown exponentially as Anaesthesia expanded. Surgical procedures that were thought to be impossible are now possible with the growth of Anaesthesia. Surgery can also now be performed on the unborn child as well as the elderly 100 years old!

When did Anaesthesia Arrive in Nigeria

Even though modern day Anaesthesia commenced over 160 years ago, Anaesthesia in the West African sub-region is only about five decades old[3]. There are anecdotal reports of chloroform and ether administration with the Schimmel Busch Mask in the mid-20th century (1950's) by missionary expatriate surgeons who later taught some auxiliary nurses to facilitate some basic surgical procedures.

Formal organised anaesthesia by anaesthetists commenced in Nigeria in 1962 with the establishment of University of Lagos Medical School (College of Medicine). Prof. Shirley Fleming was seconded from the University of Toronto to start the newly created Department of Anaesthesia, thus establishing the first autonomous academic department of Anaesthesia in the sub-region.

The department first became active clinically when two patients were anaesthetized in the Casualty Theatre of the Lagos University Teaching Hospital on the 11th August, 1962 by Prof. Fleming herself who was the first Head of Department[4]. With the same collaboration extended to University of Ibadan, the second

autonomous department was created in 1967. Not long after this, Nigerians who had been training abroad started returning to join the two academic departments, thus forming the pioneers of indigenous physician anaesthetists in the country. These included Prof. Oduntan, Fowler, Magbagbeola, Awan, Obiakpani, Ezi-Ashi, Shodipo, Obiaya, ffoulkes-Crabbe, Oyegunle, Ene and Akinyemi who all made significant contributions to the growth of the specialty in Nigeria. I salute them all.

Who is the Anaesthetist?

Prior to World War I, anaesthesia was administered by unskilled and inexperienced care providers including surgeons as there were very few anaesthesia specialists. The danger of this soon became apparent during the war as many injured soldiers managed by these unskilled practitioners did not survive compared to those managed by the few skilled anaesthetists. Thus began the era of specialists in Anaesthesia.

To the patient, the anaesthetist is "the doctor that puts you to sleep" or in Yoruba language "Dokita a kun nilorun" and we quickly add – "and also wakes you up". This has always been the concern of people who are afraid to undergo General Anaesthesia – the fear that they may not wake up. This fear is unfounded as the anaesthetist is the doctor who ensures that patients are kept alive during surgery as well as administering anaesthetic drugs and gases to render them pain free. He is adequately equipped for this crucial and delicate role because he is a good physician who understands the pathology of patients' diseases, drug therapy and their possible effects on the course of anaesthesia and surgery. This allows him to take appropriate precautions and make adequate preparations for any problem in the perioperative period. His resuscitation skill is sharp

enough to detect quickly any physiological trespass and make prompt and appropriate intervention.

Anaesthesia has thus become so safe since its introduction (almost 170 years) that mortality associated with it has become increasingly small – 1:200,200 procedures.[5] The scope of anaesthesia and anaesthetists has however gone beyond the above. They are also actively involved in critical care medicine, trauma and disaster management, resuscitation, sedation for children undergoing radiological and oncological treatment, acute and chronic pain management and palliative care. The anaesthetist is the one who devotes all his professional life to the practice of anaesthesia.

PAEDIATRIC ANAESTHESIA – CHALLENGES/ STRATEGIES

With the development of anaesthesia as a specialty, it soon became apparent that children needed to be treated differently. This was informed by the knowledge that "a child is not a small adult". There are marked anatomical, physiological and pharmacological differences between an adult and a child. There are also marked developmental changes within the paediatric age group. The paediatric age group spans from the newborn to the adolescent 16 year olds. We have the neonates (babies in their first 28 days of life) who may also be preterm; the infants (1 month to 1year); preschool, school child and the adolescents. Presentation for surgery cuts across all subspecialties of surgery from neurosurgery to obstetrics. We now have the "girl child" presenting for caesarean section and other obstetric-related complications at ages 11 and 12, common in Northern Nigeria where children are given out into early marriage from about the age of 9 years.

At the Lagos University Teaching Hospital, children constitute about 20% of the surgical work load.

Most people often wonder why a new born baby would undergo surgery. There are many neonates (many preterm) who are born with life threatening congenital disorders that necessitate immediate surgery. There are also some born with unacceptable cosmetic appearances.

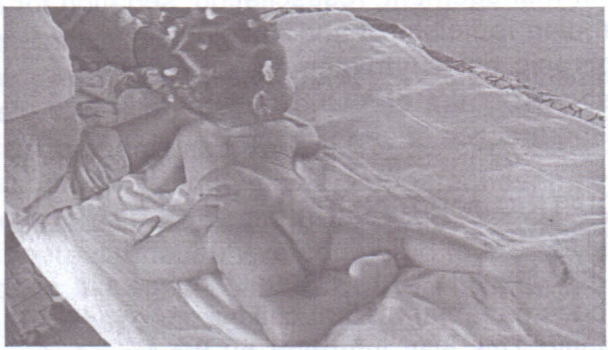

Fig 1 - Infant with Pyopagus Parasiticus

Fig 2 - Neonate with Cystic hygroma

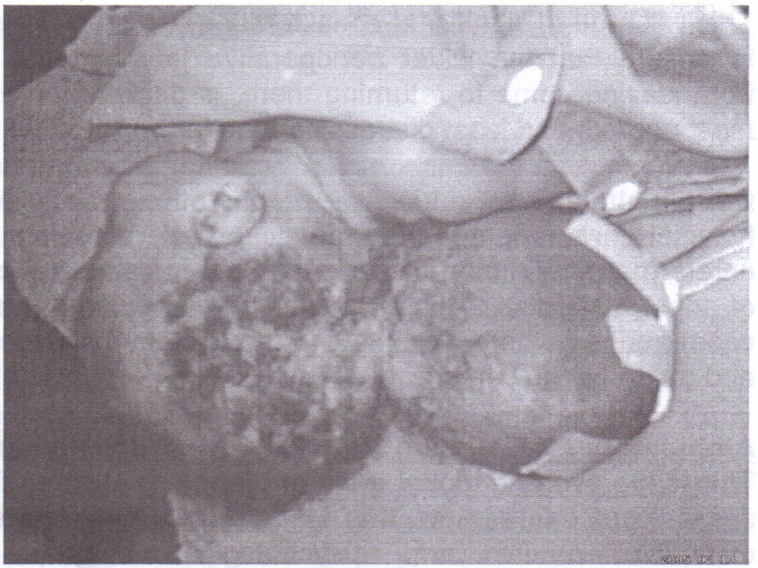

Fig 3 - Neonate with occipital encephalocoele

These patients are now presenting in the hospitals knowing that something can be done unlike before when most of these babies were secretly disposed of. The bigger children present with minor and major surgical procedures too. Paediatric Anaesthesia is thus a subspecialty of variety and challenge!

Children requiring anaesthesia for surgery or diagnostic procedures need a different set of clinical skills for the anaesthetists from those encountered in adult practice.

The Anxious and Agitated Child

Aside from the anatomical and physiological differences which pose inherent problems and challenges, the management of marked anxiety in children with its accompanying behavioural changes in both the children and their parents also provides the anaesthetist with considerable challenge.

This will require significant consideration and preparation to ensure that the wider perioperative journey, that is from leaving home to returning there, is delivered in the most positive and least distressing manner possible.

Current strategies used include preoperative visits to the hospital environment in the preceding week, presence of carers (parents) during the induction of anaesthesia, use of appropriate distraction strategies and ambulatory (day case) surgery where patients come in on day of surgery and go home the same day.

Ambulatory Anaesthesia

This is the evolving global trend of managing children for surgical procedures now. It is a strategy to minimize the disruptive nature and psychological trauma of hospitalisation for the child. In addition are the other advantages of reduction in operation waiting list, nosocomial infection and cost of treatment.

In the United States of America, a survey carried out over a 10 year period (1996 – 2006) showed an increase of 40% in the number of children managed on an out-patient basis.[6] At the Lagos University Teaching Hospital about 40% of our paediatric surgical patients are now carried out as day cases. With the development of new drugs and equipment, modern day anaesthetic techniques are now available to facilitate prompt recovery from anaesthesia so that patients can go home the same day. However, not all patients can benefit from this programme. There are strict selective criteria so as to minimise complications both in the hospital and at home.

Day surgery in a developing country setting like ours has to contend with many social and infrastructural deficiencies. High levels of illiteracy, communication and transportation inadequacies are obstacles to be

surmounted by any centre engaged in such programmes in our sub-region.

We carried out a study on 112 children scheduled for same day surgery at our hospital to investigate the impact of some perioperative criteria on their blood sugar levels[7]. Our study showed that 36 children (32%) assessed were hypoglycaemic (FBS<3mmol/l) at 8am on the day of operation. Mean fasting duration was prolonged (11.3±4hrs) which had not changed much from 14.0hrs obtained in our institution 2 decades earlier by ffoulkes-Crabbe and Johnson[8]even though their study was on in-patients. A recent study from the same centre (Adesida et al, 2014) [9]showed the same trend of prolonged fasting period of 14.3hours in children presenting for outpatient surgery.

Preoperative fasting has been a mandatory requirement since the advent of general anaesthetic techniques. This practice has reduced the occurrence of fatal aspiration pneumonitis that followed regurgitation of stomach contents in patients that underwent general anaesthesia with full stomachs. For children a shorter period of preoperative fasting has been advocated to minimize the risk of hypoglycaemia, hypovolaemia and metabolic acidosis from prolonged fasting. They could be fed with solids 6-4hours before surgery and clear sweet drinks allowed till 2-3hours before surgery. This may not be easily adhered to in outpatients.

Our study revealed that children undergoing day surgery were subjected to harsh conditions on the day of surgery. The average distance travelled on the morning of operation was 14.8km mostly by public transportation. There was also a significant association of longer distance travelled with hypoglycaemia (low blood sugar). The mean distance travelled by the hypoglycaemic group

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was 19.7±13.6km while mean distance travelled by the normoglycaemic group 12.5±12.1km (P=0.018).

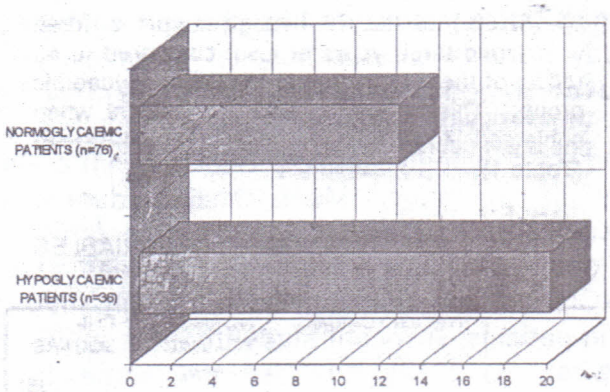


Fig 4 - Mean distance travelled by parents on the operation morning (km)

We therefore call for caution on the selection criteria for day surgery cases in our own setting and advocate more paediatric day surgery centres in order to reduce the distance travelled by these children.

Paediatric Pharmacology

A clear understanding of the pharmacological differences between children and adults is one of the key factors in the provision of safe anaesthesia for children.

The response to drugs is influenced by their body composition, protein binding, functional maturity of the heart, maturity of the blood brain barrier, maturity of the neuromuscular receptors and functional maturity of the liver and kidneys. Doses of drugs and fluids must be precisely calculated and resuscitation facilities readily available to manage any untoward effect.

Induction of Anaesthesia

Inhaled anaesthetics remain the choice for induction of anaesthesia in babies and small children because of the lack of cooperation that is usually encountered.

There are quite a number of sweet smelling, non-irritant and rapidly acting inhalational anaesthetic drugs like sevoflurane, isoflurane and halothane that are now available. Halothane still remains the most popular in our sub-region because of the affordable cost. It however must be used with caution because of myocardial depression and slowing down of the sinoatrial node conduction resulting in hypotension, bradycardia and arrhythmias. This effect may be pronounced in small babies whose cardiac output regulation is predominantly rate-dependent. Extra care therefore needs to be taken in surgical procedures in which surgical stimulation, especially of extra ocular muscles, Ear, Nose and Throat and upper abdominal viscera, may cause or potentiate bradycardia and other arrhythmias when halothane is used.

Since no local study had confirmed this complication of cardiac depression in our children, we therefore carried out a study to assess the magnitude of cardiovascular depression and investigate the frequency of arrhythmias occurring during halothane induction in a population of Nigerian children.[10]

Ninety (90) healthy ASAI children aged 6 months to 12 years were studied. Cardiovascular depression was observed in our study as systolic, diastolic and mean arterial pressures all decreased significantly with halothane induction irrespective of the age of the patient.($P<0.05$).

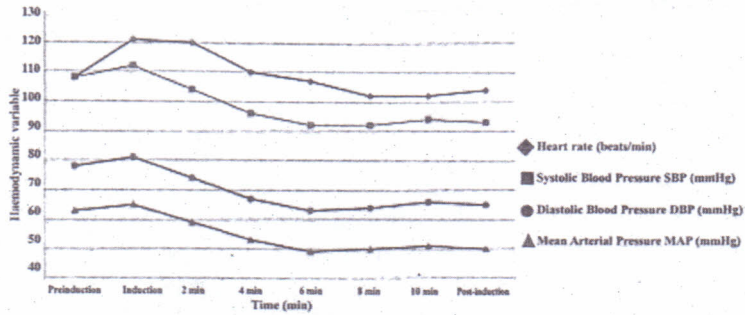


Fig 5 - Mean HR, SBP, DBP and MAP during halothane induction

Other studies have also demonstrated a significant fall in blood pressures of 18% which is very similar to our findings[11]. Only 8.8% of our patients were hypotensive (>30% fall in SBP from preinduction values) probably because they were electives and therefore unlikely to have uncorrected fluid deficits. Caution must therefore be exercised when halothane induction is used in the hypovolaemic or dehydrated child to prevent precipitous fall in blood pressure. The mean heart rate of patients older than one year was significantly lower by the end of induction but there was no episode of bradycardia. This may have been due to the administration of promethazine premedication which possesses anticholinergic properties.

Anticholinergic Drugs

Prophylactic anticholinergic drugs (atropine and glycopyrrolate) are often prescribed to prevent the occurrence of bradycardia following administration of halothane and suxamethonium in children. However, these drugs may result in unwanted tachycardia and tachyarrhythmia. A contribution to research in these drugs was also made. We compared the haemodynamic changes and incidence of cardiac arrhythmias following intravenous atropine and glycopyrrolate (the two

commonly used anticholinergics). 90 children between ages of one month and 12 years were studied.[12]

Our study showed that glycopyrrolate compared to atropine offered better cardiovascular stability in Nigerian children.

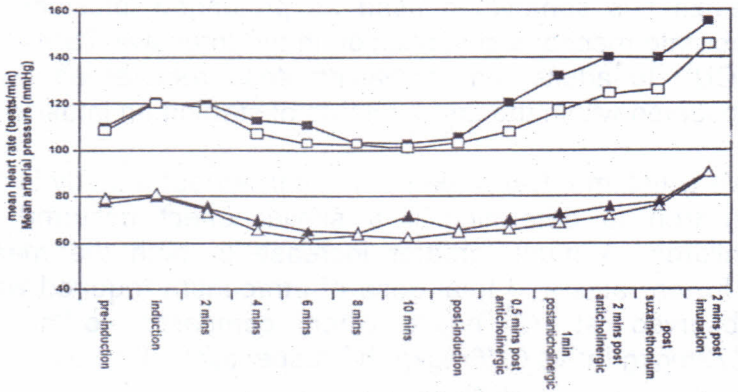


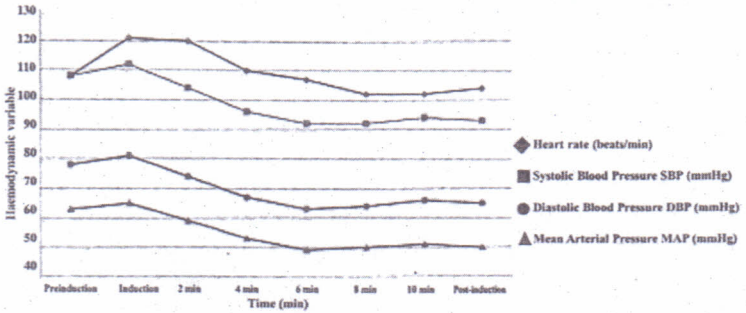
Fig 6 - Comparison of mean heart rate and mean arterial pressure trends between atropine and glycopyrrolate groups

Arrhythmias occurred more in patients who had atropine. We were able to conclude that glycopyrrolate is a safer drug and its use should be encouraged as prophylaxis in children especially in those with pre-existing cardiac disease.

Muscle Relaxants

Muscle relaxants or neuromuscular blockers are commonly used in anaesthesia to facilitate muscle relaxation which is a major component of balanced anaesthesia.

Children, especially neonates and infants, exhibit a modest difference to these drugs because of their different distribution of body fluids and immaturity of the



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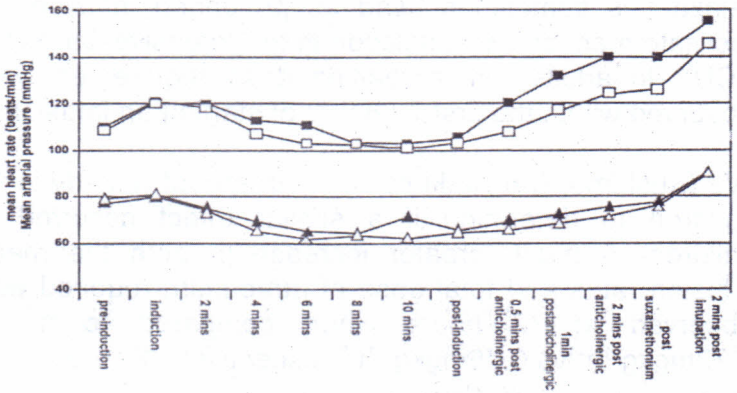

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Children, especially neonates and infants, exhibit a modest difference to these drugs because of their different distribution of body fluids and immaturity of the

neuromuscular receptors. Hence, there is a seeming resistance to the depolarizers (suxamethonium) and sensitivity to the non-depolarizers e.g.atracurium, vecuronium, pancuronium and vecuronium.

Atracurium which is an intermediate acting muscle relaxant is sometimes used as prolonged infusions to facilitate mechanical ventilation in the Intensive Care Unit (ICU). In adults, an increasing dose requirement was observed within the first 72 hours of starting an infusion.[13]

We (Kushimo, Darowski et al)[14] carried out a study in 12 children to determine if a similar effect occurred in children. A much greater increase in both the mean infusion rates and total dose of atracurium required was observed at 72 hours when compared to adults 1.72mgkg^{-1}h^{-1}vs 0.76mgkg^{-1}h^{-1} respectively ($P<0.001$).

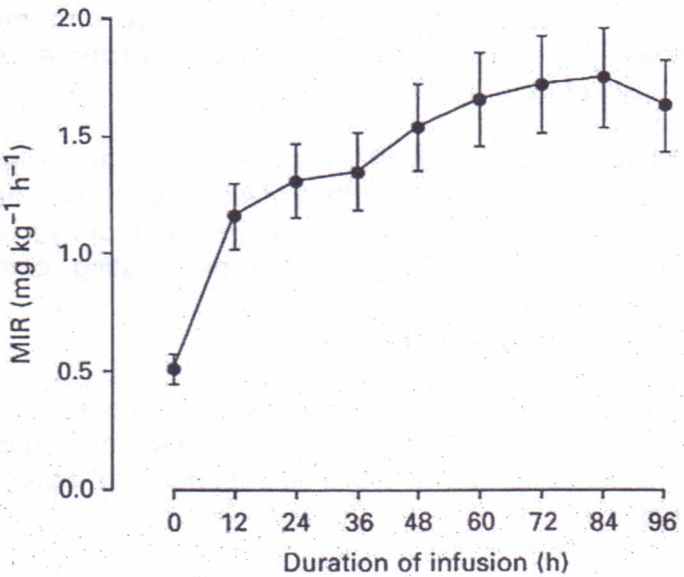

Fig 7 - Mean infusion rates (MIR) of atracurium at various times after commencing infusion

This may be explained by differences in the pharmacokinetics and clinical methods used. The clinical implication of this finding is the concern that has been expressed about the possible toxic effects of laudanosine, a metabolite of atracurium which has a longer half-life than the parent compound and which may therefore accumulate during prolonged atracurium administration. We were the first to report this finding which has been widely cited by various workers. It has also led to the modification of ventilation practice in the ICU.

Airway Management

The anatomical features in a normal neonate make accessing the airway difficult. Anomalies in the head and neck region increase the magnitude of this problem and may task even the most experienced anaesthetist. The management of difficult airway remains one of the most relevant and challenging tasks for anaesthetists.

Perioperative identification of clinical factors that predict difficult airway is fundamental to the practice of safe anaesthesia

Fig 8 - Infant with bilateral cleft lip and alveolus

Fig 9 - Neonate with cystic teratoma

This is an area where the dexterity and competence of the paediatric anaesthetist must be demonstrated as safe anaesthesia cannot be provided without a secured airway. The Laryngeal Mask airway designed some few years ago has become a welcomed addition to the armamentarium of supraglottic airway devices especially in some cases where endotracheal intubation has proved

impossible. We demonstrated its use in the case of an 11 year old boy who presented with severe post-burns contracture of the neck (Kushimo et al).[15]

Fig 10 - Appearance of the patient before surgery

Fig 11 - The laryngeal mask airway in place before surgery

MONITORING

One of the most frequent questions asked of a paediatric anaesthetist is "what are the risks of anaesthesia for my child?" The answer most of the time is "little" as most children presenting for surgery are fit and healthy. Documented mortality rate is about 1:200,000[16]

However, these risks are greater for children undergoing major cardiac, vascular or complex procedures especially the ones that may be accompanied by significant blood loss. The reason is that small babies have very limited ability to compensate for these major haemodynamic changes during surgery. However, with the development

of modern monitoring devices, early detection of changes and prompt management can be effected. As our own contribution to research in this area, we studied the appropriateness of intraoperative blood transfusion in a sample of 25 children aged 3 months to 11 years undergoing elective and emergency procedures.[17] Appropriate blood transfusion occurred in 16.7-48% depending on criteria used. The 48% appropriate transfusion using maximum allowable blood loss to a target Packed Cell Volume of 27% was achieved by using physiological changes and visual estimate. This can be improved with appropriate sized monitoring devices which give a more accurate estimate of the physiological variables.

Criteria	Appropriate BT No. (%)
Allowable Blood Loss to PCV 27%	12 (48%)
Blood Loss > 15% of Estimated Blood volume··	9 (36%)
Haemoglobin < 8g/dl··· (n = 12)	2 (16.7%)

Fig 12 - Appropriateness of blood transfusion according to various criteria

The use of new patient monitoring devices to estimate the haemoglobin will also give an accurate indication for transfusion. The minimum standard of monitoring that has been agreed upon by the World Federation of Societies of Anaesthesia (WFSA) and endorsed by the Nigerian Society of Anaesthesia (NSA) for children include:

For Routine Monitoring	(1)	Precordial/Oesophageal Stethoscope
	(2)	Electrocardiogram
	(3)	Temperature Probe
	(4)	Pulse Oximeter
	(5)	End Tidal Carbon Dioxide Monitor
(6)		Constant Presence of the Anaesthetist
Others include:		Blood loss assessment
		Urinary output
Invasive monitoring:		Arterial Catheter
		Central Venous Catheter

The complexity of monitoring applied to children must be consistent with the severity of the underlying medical condition and the planned surgical procedure. The challenges often faced by most practitioners are the procurement of the appropriate sized consumables like blood pressure cuffs, probes and catheters.

PAIN MANAGEMENT

Treatment of post operative pain following surgery in children is still often neglected especially following minor procedures. This is due to the previously held notion that small children do not feel pain. This cannot be true as the yelling noise of babies undergoing circumcision is a true attestation that this is wrong! Recent studies which elucidated pain pathways and stress response to pain in children have scientifically proven this wrong.[18,19] This has now led to the widespread acceptance that for moral, ethical, humanitarian and physiological reasons, pain should be anticipated and effectively controlled in children.[20]

The challenges of providing effective analgesia in children often negate this policy. Firstly, pain assessment

is not easy in children. The pain assessment tools used in adults e.g. the visual Analogue Scale (VAS), the Numerical Rating Scale (NRS) and the Verbal Rating Scale (VRS) can only be used by children who are verbal i.e. can communicate and make appropriate responses. For the smaller children, there are some pictorial scales like the Oucher, Faces Scale and for the neonates and infants only behavioural or physiological parameters are used. These parameters, like crying and heart rate, are subjective as they can be as a result of other things apart from pain. Quantifying the severity of pain is therefore subjective in children.

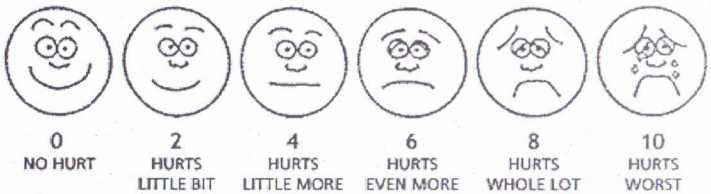

Fig 13 – Wong-Baker FACES Pain rating scale

Secondly, some of the drugs used in adults for severe pain like opioids cannot be tolerated in small babies who may develop some side effects following their administration. A multimodal approach whereby non-steroidal anti-inflammatory drugs/paracetamol with or without opioids used as adjunct to good local and regional anaesthesia has been advocated in children.

We (Kushimo et al)[21] therefore carried out a study in 50 children under 12 years of age undergoing day case herniotomy. We evaluated the effect of incisional infiltration of the wounds with bupivacaine 0.25% for post operative analgesia. 56% of the control group had significant pain immediately post-operative as opposed to the infiltration group where all the patients (100%) were found to be pain free.

	Control	Bupivacaine
Time to 1st analgesia (hr.)	N = 18	N = 10
mean ± S.E	1.7±0.48*	16.4 ± 4.6
Time to discharge (hr.)	N = 25	N = 24
mean ± S.E	3.0 ± 0.13	3.5 ± 0.29
Post-op sequelae	Nil	1 (Fever)
Wound infection	1	Nil

*P< 005

Table I - Clinical data in control and incisional infiltration groups

The demand for additional analgesia occurred earlier in the control group 1.7 hrs than in the infiltration group 16.4hrs (P<0.05). No post-operative sequelae were observed in both groups. We therefore concluded that local infiltration of incisional wounds with bupivacaine is a simple, safe and effective method of post operative pain relief in children which has now become the practice in most centres in the country. It should also be noted that caudal analgesia is a welcome addition to anaesthetists' repertoire of anaesthetic techniques which is also becoming popular for post-operative analgesia in children but requires more skills.

Critical Care Management

Critical care is an essential component of improved health care delivery in any country.

The latest Guideline of the Royal College of Anaesthetists(2014)[22] states that neonatal and paediatric high dependency and intensive care services should be available as appropriate for the type of planned surgery within the hospital. This has been informed by the increasing number of complex surgical procedures now being performed over the past 3 decades – gastroschisis,

conjoined twins, congenital diaphragmatic hernia, cardiac, e.t.c.

Fig 14 - neonate with omphalocoele major

Fig 15 - Conjoined twins

This has been a major challenge for paediatric surgeons and anaesthetists in our sub-region because of poor available resources.

Certainly, the demand is rising. We (Kushimo et al)[23] looked at the pattern of paediatric admission into our Intensive Care Unit (ICU) of the Lagos University Teaching Hospital over a 4-year period between 1990 – 1994.

Our results showed that paediatric admission constituted 28% of all admissions into our purpose-built 8-bedded ICU which was commissioned in 1990. 57% of these admissions were post-anaesthetic, out of which 37% were booked and 63% were unbooked. This was due to the increasing number of cardiothoracic operations carried out at that time and the observation of improved survival rate if these patients were nursed in the ICU post-operatively.

59% of the patients were admitted for respiratory support because of respiratory insufficiency as well as neurological derangement. The overall mortality rate was 52.4%:

Mortality Rates by Age

Age	Total No. of Patients	No. WithRespi-ratory Disease	No With Neurolo-gical Derangements	Others	No Died	Death Rate
0–4 yrs	35	18	9	8	13	37%
5–9 yrs	18	5	9	4	13	72%
10–12 yrs	8	1	6	1	6	75%

Table II - Mortality rates of paediatric admissions into ICU by age

Inadequacy of paediatric equipments and facilities were the major factors responsible for the poor outcome.

We (Kushimo et al)[24] also reported a 2-day old baby who ingested a corrosive substance in unknown circumstances. He developed severe respiratory problems necessitating endotracheal intubation but could not be given intensive respiratory support due to lack of facilities. There was no paediatric ventilator available and the patient could only be manually ventilated till he succumbed 4 hours later. Critical care when required in children is often urgent and must be prompt and adequate. Even though efforts to improve the care of the critically ill are belatedly starting to occur with the President Obasanjo's presidential special assistance (VAMED) to teaching hospitals, not much provision was made for paediatric patients. Even as I speak, there is still no functional neonatal ventilator in LUTH.

There is no doubt that improving critical care services saves lives and the facilities must be available no matter the cost.

Manpower and Training in Anaesthesia – The Way Forward

Mr. Vice Chancellor sir, the goal of provision of anaesthesia is to ensure a comprehensive and quality service dedicated to the care of patients and to the education and professional development of staff. Training of anaesthetists and most especially sub-specialisation is very pertinent if the patient is to receive the best care. This is the global trend and in the developed world, it has become mandatory that only trained paediatric anaesthetists should manage children undergoing surgery, particularly for complex procedures. This has been clearly demonstrated also at our centre where the outcome of surgery in children has improved significantly since the paediatric surgical team comprising paediatric surgeons and anaesthetists came on board.

The shortage of physician anaesthetists in our sub-region is well known with ratios 2 and 2.5/million population in Ghana and Nigeria respectively.

The Postgraduate Medical Colleges in the sub-region namely the National Postgraduate Medical College of Nigeria (NPMCN) and the West African College of Surgeons (WACS) have tried to address this gap even though at a rather slow rate.

Since the inception of the NPMCN in 1980, only about 140 Fellows in anaesthesia have been produced. This lecturer standing before you is the first Fellow in anaesthesia by examination obtained in 1984. The WACS has about 400 Fellows in its record including both Anglophone and Francophone countries. These are very low numbers compared to other specialties like Obstetrics and Gynaecology, Internal Medicine and Surgery. Previous surveys in the last 3 decades have all shown the unpopularity of anaesthesia among young graduates.[25,26,27] The reasons being lack of knowledge of anaesthesia as a career, poor remuneration and even lack of knowledge of the functions of an anaesthetist.

Anaesthesia, though not a glamorous specialty and often referred to as "Back Stage Actors", it is most important because without the "action", surgery cannot take place. However, with the diversity of functions of anaesthetists now, notably in critical care, acute and chronic pain, emergency medicine including trauma and disaster management, resuscitation and palliative care, anaesthetists are becoming more noticeable. I also believe that with this lecture, I have been able to educate and promote anaesthesia in a way to encourage the young graduates here who are yet to make up their mind as to their area of specialisation. We are actually beginning to witness an improvement in the number of

trainees entering the specialty. We are now oversubscribed with the number of applicants for the residency training programme at my centre. My department has been at the forefront in the training of anaesthetists. It was the first department in the country to offer the University Postgraduate Diploma in Anaesthesia and has produced about 150 diplomates to cater for the middle-level manpower in the country and about 50 Fellows, the largest from any training centre in Nigeria.

I have personally supervised over 45 dissertations of residents for the fellowship examination in anaesthesia. These are now all qualified Fellows holding consultant posts all over the country. All but 1 of the 9 consultants in my department were trained by me out of which one is an Associate Professor, two are Senior Lecturer and others Lecturer I.

Also, about 75% of physician Anaesthetists in Lagos State Government trained under me in LUTH. This I consider as one of my humble contributions to my country because despite the tremendous pressure of seeking greener pastures in those days of brain drain, I decided to stay back to develop the specialty.

Subspecialisation in Anaesthesia

What of subspecialisation? Is it feasible in Nigeria where there is still a dearth of anaesthetists? This is a major challenge but it is a task that must be done. Our patients deserve the best of care, and to do this, specialists must be trained. Many of our clients are now demanding for specialist care providers.

My interest in children dates back to my undergraduate years when paediatrics became my best subject. Having won the Glaxo Prize for best graduating student in Paediatrics at the final examination, I had no doubt in my

mind as to my area of specialisation. However, this changed during my internship in the Northern part of Nigeria where I saw many children dying from preventable diseases like diarrhoea, malaria, pneumonia and kwashiorkor. I became too emotionally involved with the whole scenario and so I changed my mind. On coming into anaesthesia, I once again found myself leaning more towards children. This was a period when most of the consultants would not touch children because they found their anaesthetic management too stressful. These were days when monitoring devices were not existent. Fortunately, there was one consultant – Prof. ffoulkes-Crabbe who made anaesthetising children so attractive and interesting that I made up my mind to be a paediatric anaesthetist. A clinical fellowship award by the Association of Commonwealth Universities in 1990 to do Paediatric anaesthesia at the Royal Manchester Children Hospital in Salford, United Kingdom finally gave me the opportunity to train as one. So for the past 2 decades, I have spent more than 70% of my time engaged in Paediatric Anaesthesia practice. It has also given me the opportunity to train others, one of whom is Dr. Ronke Desalu, now a paediatric anaesthetist. She also has had the opportunity to travel to The Royal London Hospital, London for further training. The two of us have been able to build and sustain a formidable paediatric anaesthesia subspecialty in the department.

CONCLUSION

Mr Vice Chancellor Sir, our children are our future and deserve the best of medical care at all levels: primary, secondary and tertiary. In the past one hour, I have tried to give an insight into some of the challenges often encountered by anaesthetists when they have to provide anaesthesia for children and discussed some of the strategies employed. I have also highlighted a few of my research contributions to this field. The place of the paediatric anaesthetist cannot be over-emphasised and the future lies in subspecialisation.

Recommendations

1. Appropriate funding of Tertiary institutions by Government to enable professional development of staff both in terms of training and retraining so that competencies can be maintained.
2. The curriculum of our undergraduate training in Anaesthesia should be expanded to include the new evolving frontiers in anaesthesia like emergency medicine, intensive care, pain management and palliative care. Teaching methods with simulators should be used more frequently as our students find this more interesting [27]. This may make anaesthesia more attractive as their choice of career.
3. Subspecialisation in anaesthesia must be encouraged by the Postgraduate Colleges. Consideration must be given to offering subspecialisation in the last year of residency. This may increase the number of years spent just as is being practiced in some faculties like Internal Medicine and Surgery.
4. While it is recognisably important to promote primary health care in developing countries like Nigeria, tertiary care provided by teaching hospitals should equally be well funded to provide necessary facilities in terms of equipment and drugs.
5. Appropriate equipment, especially for children's needs, should be available for patient care and research with constant and regular supply of consumables. Training for the users and maintenance contracts must be available on procurement of these equipments.
6. Establishment of specialised paediatric surgical centres with appropriate facilities to manage complex cases. These will also become centres of training and research.

7. Establishment of and equipment of secondary level hospitals by Federal and State governments, such as the Lagos State Maternal and Child Hospitals, to manage simple paediatric procedures which can easily be accessed by ordinary people.

ACKNOWLEDGEMENTS

My Vice Chancellor sir, before concluding this lecture, permit me to make the following acknowledgments.

My first appreciation is to the Almighty God who has graciously allowed me to be in a position to deliver this lecture today. To Him be all the glory.

Mr. V.C. sir, I am very grateful to you for approving and allowing me to deliver this lecture today. My provost, Prof. Sade Ogunsola, the first female Provost of the College of Medicine of the University of first choice and the Nation's pride – I am so proud of you. You have continued to show that what a man can do, a woman can do better. I congratulate you and wish you a successful second term in office. My Dean (Faculty of Clinical Sciences) Prof. Afolabi Lesi: you are also highly appreciated.

Next, I wish to pay tribute to my Anaesthesia family, all over the country especially my teachers, senior and junior colleagues and the administrative staff in the department. Because we are small, we know each other and operate like a family unit. I salute all my teachers who have contributed to my becoming an anaesthestist – Prof. V.M. Fowler, Prof. Shodipo, Late Prof. Dorothy ffoulkes-Crabbe, Prof. Oyegunle, Late Prof. Ene and Prof. Sylvia Akpan (my sister).

I want to recognise my uncle, Prof. Adegbola Olatunbosun not an anaesthetist but an obstetrician/gynaecologist presently practicing in Saskatoon, Saskatchewan, Canada. It was he who lured me into doing Anaesthesia. He was a resident in O & G at LUTH then when he enticed me into coming to do the one year postgraduate Diploma in Anaesthesia with the prospect of becoming a Consultant within 3 years which

was possible then. The warm reception and offer of automatic employment from the then head of department, Prof. Fowler was too good to refuse. On completion of the PGDA, all the consultants encouraged me to proceed to the residency training programme which had just commenced. Prof. Fowler was not just a teacher, but more of a father. May God continue to bless and strengthen him in these his twilight years. He turned 90 last year.

One person who looked forward to this day but God in His wisdom did not permit, is Prof. Dorothy ffoulkes-Crabbe – my professional mother, mentor and boss. Her role in my professional and career development cannot be quantified. She was the only senior anaesthetist in the whole country who did not emigrate during the brain drain era of the 80s. This was just about the time I was appointed Lecturer I in the department. So it was just the two of us. The burden was heavy but we were determined to build a formidable department that will be the envy of other anaesthesia units in the country. She pushed me hard to accept responsibilities that I felt I was not ready for like the headship of the department, Secretary of the Faculty of Anaesthesia NPMCN, examiner in both Postgraduate Colleges etc. Her reason was for me to acquire "capacity building". I am really indebted to her, that all her efforts were not in vain. My only regret is that she is not here physically to see the fruit of the seed she sowed but I am sure she is with us in spirit. The department has continued to thrive and build on the legacy she left. The legacy of hard work, forthrightness, honesty, justice and integrity is usually imbibed by anyone who passes through the department. This is often noticeable by our other colleagues so much so that we are labelled "ffoulkes-Crabbe girls and boys" which we are always proud of. May her soul continue to rest in peace.

To my other colleagues in the department, I say thank you all for your support and cooperation. One of them deserves special recognition - Dr. Ibironke Desalu has been a source of pride and joy to me. Her support and loyalty is unparalleled. I regard her as my professional daughter and I know I have reproduced myself in her which is the height of achievement of any leader. So, she represents the 3rd generation of anaesthetists in the department. Very soon, I am sure, she will be on this podium doing what I am doing today.

I also wish to acknowledge my surgical colleagues in the Paediatric surgical team. For me, paediatric surgeons are the finest both in skills and attitude probably because of the small size of their patients. They are ever so patient waiting for us to carry out that art of anaesthetizing those 2.5-3kg weight newborns which is often delicate and tasking. This is unlike other surgeons. They have helped to sustain my interest in paediatric anaesthesia. I pay tribute to Late Prof. Omodare, late Dr Mrs Adeoba, Prof. Debo Adeyemi (my brother from the same Ijesha Clan) and Prof. Chris Bode (my brother) who I have worked mostly with during my career as a paediatric anaesthetist. We have also collaborated in some research projects. He contributed to the preparation of this lecture by offering some pictures from his archives.

I also recognise Dr. Peter Morris and Dr. George Meakin of the Department of Anaesthesia, Royal Children Manchester Hospital, Salford, UK who impacted the skills of paediatric anaesthesia on me during my one year training there. I appreciate my anaesthesia undergraduate and postgraduate students both here and in other parts of the country that I supervise or have supervised: LASUTH, University of Ilorin Teaching Hospital, Jos University Teaching Hospital, Ahmadu Bello University Teaching Hospital, University of Port Harcourt

Teaching Hospital, National Hospital Abuja, etc. You have all been a stimulant for my passion of teaching which I love so much.

Mr. Vice Chancellor sir, I wish finally to thank my family and friends who have supported me in my journey in life to the present day.

Firstly, I remain indebted to my late parents – my father Chief Joseph Adebayo and my mother Mrs Oyinade Adebayo. I thank my father for insisting that I should study medicine rather than other disciplines because he felt I had the capacity which should not be wasted; my mother, a teacher par excellence and very strict disciplinarian whose passion in life was to see her seven children well educated. To the Glory of God, her prayers were answered.

To my siblings represented here by Mrs. Bolanle Malomo and her loving husband, Dr. Olu Malomo, I say thank you all for your constant, unfailing support and love.

To all my other extended family and in-laws of the Adebayo and formidable Olatunbosun clan, I say thank you. My uncle, Mr. Ore Adeyinka, I say thank you sir for always believing in me that I will reach the peak of my career.

Now to my in-laws who have remained solidly behind me all these years – my late husband's siblings, Chief John Kushimo, the Adewoles, Georges, Lawals, Senator Femi and Mrs. Sumbo Okunronmu and their friends, I say God bless you all. My other in-laws notably, the Ajalas, Da Silvas, Paynes, Oyegunles, I appreciate you all. I must pay special tribute to late Pa Joachim Ajala who during his life time provided a solid support for my children and

me. May he continue to enjoy in the presence of his creator.

Finally my nuclear family: my late husband DR. JOSEPH BANKOLE KUSHIMO was not only a husband to me but was my brother, mentor and friend. It was he and my father who encouraged me to read medicine. I met him just as I was about to enter the university and he had just graduated then. He waited patiently for 7 years to allow me graduate before we got married.

He was an astute academician and was a Senior Lecturer in the Department of Biochemistry College of Medicine, University of Lagos at the time of his transition. It was in pursuit of academic excellence that he met his creator. A loving and very supportive man, he was actually proofreading my Part II fellowship dissertation when he answered the call 3 decades ago. There are still a few people here in the College who still remember him especially his students and tutees – Prof. (Mrs.) Magbagbeola is one of them. I wish to thank all his friends and colleagues – Prof. Tolu Odugbemi, Prof Akinwande, Prof. Bode Gbenle, Prof Okotore, Prof. Steve Elesa, Prof. Soga Sofola etc. for not abandoning us since his departure. When I indicated that I wanted to deliver my Inaugural Lecture in March 2015 never did I know that 4th of March (2 days to his birthday) will be the date offered to me. I therefore dedicate this lecture to his memory.

Even though we were married for only 9 years, God blessed us with 3 adorable children who were very young then but to the glory of God have now become accomplished woman and men.

The eldest, our daughter Yeside, an Akokite inherited my genes of love for children and has chosen Paediatrics for

her profession. She is happily married to Mr. Muyiwa Akinbolagbe and they have given me 3 lovely grandchildren, Akinwale, Oyinkansola and Arike-Olasubomi.

The second, Adegboyega also an Akokite, an engineer, is a solution manager with Eriksson in Dallas, Texas, USA. He is married to Adebola and are both blessed with a son Bankole Joseph (Jr) and another one on the way.

Lastly, Oyewole, who decided he had had enough of UNILAG – from Mrs. Ofonagoro's class to staff school to ISL, proceeded to his parents' alma mater, University of Ibadan to study medicine. He is however back to Lagos and currently specialising in Cardiology at the Lagos University Teaching Hospital where he is a Senior Registrar. They have been my constant source of joy and motivation to move on when tragedy struck us. I thank them all for not making all the sacrifice go in vain.

My Vice Chancellor Sir, principal officers of the university, distinguished ladies and gentlemen, if I have succeeded in doing what I know best that is putting children to sleep, or if there is any adult who has sniffed some of the gas, I believe I have also succeeded in waking you all up.

Thank you all for your presence and attention.

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