

## **Experience working with Nurse Anesthetists' as Non-Physician Anesthesia Providers in a temporary Semi-Urban Niger Delta University Teaching Hospital, Okolobiri and review of the literature.**

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**Abstract: Background:** *In Nigeria, the nurse anesthesia profession is relatively young. Nurse Anesthetists have professional responsibilities including nursing, treatment and medical-technical equipment usage. Task shifting is one approach to overcoming the lack of specialists in resource-limited settings, including surgeons and anesthesiologists.*

**Objective:** *This retrospective descriptive study was undertaken to describe our own experiences in the surgical management of patients in our local environment using Nurse Anesthetists as Non-Physician Anesthesia Providers when Physician Anesthetist were not readily available.*

**Setting:** *Study was carried out at Niger Delta University Teaching Hospital, Okolobiri, Bayelsa State, Nigeria covering the period of January 2007 to December, 2010.*

**PATIENTS and METHOD:** *Data was collated from hospital records of all patients that were anesthetized in the main operating theatre of the hospital, using a study proforma during the study period.*

**Result:** *We reviewed 1,389 patients who were anesthetized in the main operating theatre of the hospital during the period of study, with age range of 4 months to 76 years. There were 1112 (80%) females and 277 (20%) males, a female to male ratio of 4:1. Out of the 1,389 cases anesthetized, 1,228 (88.41%) were by Nurse Anesthetists, 133 by Physician Anesthetists and 28 (2.01%) by Surgeons. There were 6 deaths giving a mortality rate of 0.43% in the study population. Four deaths were anesthetized by Nurse Anesthetists and two by Physician Anesthetists.*

**Conclusion:** *Well supervised use of Certified Registered Nurse Anesthetists (CRNAs is safe and should be used in providing anesthesia for surgical care.*

**Keywords:** *Nurse Anesthetists, Anesthesia, Local experience.*

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### **I. Introduction:**

In Nigeria, the nurse anesthesia profession is relatively young and the educational programs are changing and developing. Nurse anesthesia is one of the advanced practice nursing specialties. Nurse anesthetists have been practicing in the United States for over 125 years and have been providing care to patients at the Cleveland Clinic since its founding in 1921<sup>1-3</sup>. Nurse Anesthetists have professional responsibilities including nursing, treatment and medical-technical equipment usage<sup>1-4</sup>. The availability of health workers in resource limited countries able to deliver safe surgical services remains extremely limited, and this applies acutely in the case of specialist physicians such as anesthesiologists<sup>1-4</sup>. Some African countries have as few as one anesthesiologist per million residents<sup>5-8</sup>. Task shifting is one approach to overcoming the lack of specialists in resource-limited settings, including surgeons and anesthesiologists<sup>9</sup>. In the absence of specialists, non-physician anesthetists have been mobilized to perform anesthesia in many resource-limited settings<sup>10,11</sup>. The delivery of anesthesia care by non-physician anesthetists is not unique to resource-poor settings<sup>5</sup>. In the United States, certified registered nurse anesthetists (CRNAs) have performed anesthesia since the 1800s<sup>5</sup>. At present CRNAs administer anesthesia for approximately two-thirds of the 30 million annual procedures performed in the US, especially in rural hospitals<sup>5</sup>.

A recent study demonstrated that 107 of 200 countries surveyed used non-doctors to administer anesthesia, with or without anesthesiologist supervision<sup>12</sup>. Certified Registered Nurse Anesthetists (CRNAs) administer both general and regional anesthesia under supervision in Nigeria. Niger Delta University Teaching Hospital was established in October 2007 by upgrading the General Hospital Okolobiri (which was built in 1982) to the status of a teaching hospital. Okolobiri is a rural community in Gbarain-Ekpetiama in Yenagoa L.G.A. During the covering period of January 2007 to December, 2010, anesthesia was mainly provided by the

Nurse Anesthetists of this hospital. Based on special patients' requirements, Physician Anesthesia Providers were invited from other hospitals in Bayelsa and Rivers States.

There is paucity of published data on Nurse Anesthetists experiences and clinical works done in our environment. To the best of our knowledge, there is no local study which has been done in any hospital in Bayelsa State of Nigeria. This retrospective descriptive study was undertaken at the 200 beds, Niger Delta University Teaching Hospital, sited temporarily in a Semi-Urban area (Okolobiri), to describe our own experiences in the surgical management of patients in our local environment using nurse anesthetists as non-physician anesthesia providers.

## **II. Patients And Method:**

This retrospective study, after Ethical approval, was conducted in the Niger Delta University Teaching Hospital (NDUTH), Okolobiri, a 200 Bed tertiary hospital that cares for most of the populations of Bayelsa, parts of Rivers and Delta States of Nigeria.

Five Nurse Anesthetists with four Technicians in Anesthesia Department were the main anesthesia providers in the theatre during the period of study. Data were extracted using a study proforma from hospital records to include age, sex, type of surgical procedure, type of anesthesia and number of deaths occurring on the operating table or within 24 hours post-anesthesia administration. All cases that anesthesia was administered, of all ages and sex, between January 2007 and December 2010 were included in the study.

The American Society of Anesthesiologists (ASA) grading was used in all patients. All necessary routine and specific investigations, based on patients needs, were done. The patients were anaesthetized under General Anesthesia (relaxant technique) and Regional Anesthesia (sub-arachnoids block),

Induction of anesthesia was with halothane, intravenous ketamine hydrochloride (1-2mg/kg) and tracheal intubation facilitated by suxamethonium chloride (1mg/kg) during muscle relaxant technique. Size 3.5mm plane endo-tracheal tube (ETT) was used for the 4 months old baby; 6.5mm plane ETT for the 14 years old and 7.5mm cuffed-tube for the  $\geq 34$  years old. Transparent face-mask was used via breathing system for cases in which total intravenous anesthesia was utilized. A preload of 1litre normal saline infusion was administered before the sub-arachnoid block was instituted. Anesthesia was maintained with halothane, ketamine, diazepam, pentazocine, bupivacaine (heavy) as required.

A minimum of two anesthetists (Nurses or Doctor/Nurse) were in attendance in most of the cases. Monitoring was with mercury sphygmomanometer, chest auscultation with stethoscope, percussion and visual observation by the anesthetist. There was rarely a functional pulse oxymetre in the operating theatre or post-anesthesia recovery room during the study period. Local Infiltration with Xylocaine was done in some cases. Statistical data analysis was by Epi Info version 3.5.4 and manually.

## **III. Results:**

A total of 1,389 patients that were anesthetized during the period of study, with age range of 4 months to 76 years. There were 1112 (80%) females and 277 (20%) males, a female to male ratio of 4:1. Out of the 1,389 cases anesthetized, 1,228 (88.41%) were by Nurse Anesthetists, 133 by Physician Anesthetists and 28 (2.01%) by Surgeons. Table 1 show the age distributions of patients who were anesthetized between 2007 and 2010. The middle age range of 36- 55 years, were 463 (33.33%) accounted for the highest number of persons and age range  $\leq 15$  of 173 (9.94%) cases were the least that had anesthesia within the review period. Tables 2 and 3, show that females were more anesthetized, 1112 (88.41%) cases, with Caesarian Section accounting for 840 (60.48%) of cases were the most anesthetized and Thyroidectomy, 7 cases (0.5%) were the least. Regional Anesthesia was more utilized, 693 (49.9%) cases, followed by General Anesthesia 668 (48.1%) cases and Local Anesthesia 28 (2%) cases, Table 4.

There were 6 (Mortality of 0.43%) deaths either on the operating table or within 24 hours taking as Anesthetic deaths during the study. There were no other adverse incidences recorded during the study. Analysis of the involved death cases is shown on Table 5.

## **IV. Discussion:**

The significant global burden of surgical disease and the effectiveness of surgical treatment are increasingly recognized as public health priorities. Task-shifting is a response to the gap between needs and capacity. Training non-physician anesthetists in a resource limited setting is a feasible and important way to scale up delivery of safe surgical services. All the five Nurse Anesthetists during the study period are trained and Certified Registered Nurse Anesthetists (CRNAs).

The number of 1389 cases and the varieties of types of surgeries done, immensely enhanced the effective care and take-off of surgical care in this hospital. Regional Anesthesia that was more utilized, 693 (49.9%) cases, seems to be safer and easily supervised by the Surgeon in our locality when there is no Physician Anesthetist present. The mortality rate of 0.43% in 1,389 cases anesthetized is acceptable. This is similar to

other findings from developed and developing settings, suggesting that the work of Nurse Anesthetists can be safe and effective<sup>5</sup>. There remains a dire shortage of anesthesia providers in Nigeria and Nurse Anesthetists training needs to be expanded. Another important limitation is the lack of ownership and acceptance by professional societies<sup>13</sup>. This was the situation initially as some Surgeons refused to accept them anesthetizing their patients. The lack of recognition of Nurse Anesthetists by anesthesiologists has been reported elsewhere<sup>14</sup>. In the United States and Europe, Nurse Anesthetists are recognized and accepted by their physician colleagues<sup>5</sup>. Too often, working conditions are suboptimal, with frequent shortages of equipment, oxygen, anesthetics, and other medications. Finally, while task shifting should be seen as a necessary part of scaling up essential surgical services, this does not remove the need for specialists<sup>15</sup>, and efforts must also be made to increase the number of anesthesiologists working in resource-limited settings.

## V. Conclusions:

Worldwide, the shortage of anesthesia providers in resource-limited countries remains massive, and the likelihood this gap will be closed by physician anesthesiologists in the near future is low. Well supervised use of Certified Registered Nurse Anesthetists (CRNAs) is safe and should be used in providing surgical care. The training of non-physician anesthesia providers is known as an essential component in the provision of safe surgical care.

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Table 1: Distribution of age of patients anesthetized between 2007 and 2010.

Age range of patients	No of Patients	Percentage age distribution
0 – 15 years	178	9.94%
16 – 35 years	246	17.71%
36 – 55 years	463	33.33%
56 – 69 years	278	20.01%
70 years above	264	19.01%
<b>TOTAL</b>	<b>1389</b>	<b>100%</b>

Table 2: Sex distribution of patients anesthetized against surgeries performed between 2007 -2010.

Type of surgical procedure	Male (M) Patients (%)	Female (F) Patients (%)
Exploratory Laporotomy	42 (3.02%)	22 (1.58%)
Appendicectomy	40 (2.88%)	30 (2.16%)
Herniorrhaphy	130 (9.36%)	14 (1.01%)
Amputation/Open Reduction & Internal Fixation	27 (1.94%)	13 (0.94%)
Prostatectomy	16 (1.15%)	-
Myomectomy	-	168 (12.1%)
Caesarian Section	-	840 (60.48%)
Thyroidectomy	-	7 (0.5%)
Other surgical procedures	22 (1.58%)	18 (1.3%)
<b>TOTAL</b>	<b>277 (20%)</b>	<b>1112 (80%)</b>

Table 3: Type of Surgery / no. of Cases within review period.

Type of surgical procedure	No. of surgeries done	Percentage
Exploratory Laporotomy	64	4.61%
Appendicectomy	70	5.04%
Herniorrhaphy	144	10.39%
Amputation/Open Reduction & Internal Fixation	40	2.88%
Prostatectomy	16	1.15%
Myomectomy	168	12.09%
Caesarian Section	840	60.48%
Thyroidectomy	7	0.5%
Other surgical procedures eg Biopsies	40	2.88%
<b>TOTAL</b>	<b>1,389</b>	<b>100%</b>

Table 4: Type of Anaesthesia administered on surgeries performed.

Type of surgical procedure	General Anaesthesia (%) GA	Regional Anaesthesia (Sub-arachnoid block %) RA	Local Infiltration (%)	No. of cases Anaesthetized
Exploratory Laporotomy	63 (4.5%)	1 (0.007%)	-	64
Appendicectomy	70 (5.03%)	-	-	70
Herniorrhaphy	135 (10%)	7 (0.5%)	2 (0.14%)	144
Amputation/Open Reduction & Internal Fixation	21 (1.54%)	16 (0.0115%)	3 (0.21%)	40
Prostatectomy	7 (0.5%)	9 (0.64%)	-	16

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Myomectomy	73 (5.3%)	95 (6.68%)	-	168
Caesarian Section C/S	280 (20.162%)	560 (40.32%)	-	840
Thyroidectomy	7 (0.05%)	-	-	7
Other surgical procedures	12 (0.86%)	5 (0.36%)	23 (1.66%)	40
<b>TOTAL</b>	<b>668 (48.1%)</b>	<b>693 (49.9%)</b>	<b>28 (2.0%)</b>	<b>1,389</b>

Table 5: Number of deaths recorded during surgery/24 hours post-anesthesia from 2007-2010.

S. No.	Age of Pt.	Sex of Pt.	Type of Surgery	Type of Anesthesia	ASA Grade
I	4 months	F	Excision of anterior neck tumour	GA	3
ii	34 years	F	Thyroidectomy for bilateral enlarged goiter	GA	2
iii	14 years	M	Resuturing of burst abdomen	GA	4E
iv	17 years	M	Laparotomy for ruptured Appendicitis	GA	1
V	30 years	F	Emergency caesarian section for big baby	RA (Sub-acrachnoid block)	2E
Vi	28 years	M	Exploratory laporotomy for intestinal obstruction	GA (Face mask-TIVA)	3