

# Cardiac Pacemaker Insertion in the South-South Region of Nigeria: Prospects And Challenges

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## **ABSTRACT**

***With the global increase in the prevalence of cardiovascular diseases, economically less developed countries are faced with the double jeopardy of contending with existing communicable diseases and the new epidemic of non-communicable diseases. The South-South region of Nigeria is a cosmopolitan area with a high prevalence of hypertension and its complications. The disease trends in the region have resulted in increasing demand for invasive cardiac procedures which are largely unavailable in this sub-region. This review examines the prospects and possible challenges of interventional cardiology care in South-South Nigeria, using cardiac pacemaker implantation as a surrogate.***

## **INTRODUCTION**

The developing countries of the world are undergoing epidemiologic transition from communicable to non-communicable diseases<sup>1,2</sup> as hypertension and its cardiovascular complications are on the increase<sup>1,3</sup>. The overall prevalence of hypertension in Nigeria ranges from 8%-46.4% depending on the study target population, type of measurement and cut-off value used for defining hypertension. The prevalence is similar in men and women (7.9%-50.2% vs 3.5%-68.8%, respectively) and in the urban (8.1%-42.0%) and rural setting (13.5%-46.4%). The pooled prevalence increased from 8.6% from the only study during the period from 1970-1979 to 22.5% (2000-2011)<sup>3,4</sup>.

Urbanization and westernization have been widely recognized as the major contributors to the changing trend of non-communicable disease demographic and increase cardiovascular risk<sup>2</sup>. The South-South region is the centre of the oil and gas industry in Nigeria and therefore cosmopolitan in nature. The level of economic activities and social life of the area put the population at great risk for cardiovascular diseases and events. It is no surprise that a change in disease trend from communicable to non-communicable disease has been reported in the region<sup>2</sup>.

The reported and observed demographic and disease transition pattern is expected to influence the demand for healthcare services, as there will be a need for human and material resource to treat patients with cardiovascular risk diseases like arrhythmias, heart block, valvular heart disease and ischaemic heart disease. The management of these disease conditions will require facilities like cardiac catheterization laboratories, electrophysiology procedure units and open heart surgery equipment for Rheumatic and other Valvular Heart Diseases<sup>5</sup>. Sadly, this level of care is grossly lacking in the region of the country.

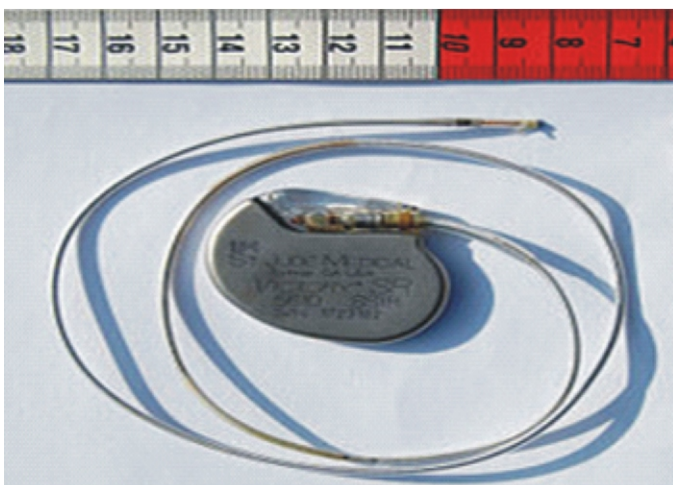
Cardiac arrhythmias have been found to be prevalent in Nigeria and this region<sup>6, 7, 8</sup>. In spite of this the resources for proper management of arrhythmias' are unavailable. It is thus possible that many patients with heart block and other arrhythmias who could have been saved by procedures like cardiac pacemaker insertion die needlessly<sup>6,7,8,9</sup>.

The indications for cardiac pacing are varied and include<sup>6,7,8,10-13</sup> Sinus Node Dysfunction; Acquired Atrioventricular Block in adults; Atrioventricular Block Associated with Acute Myocardial Infarction; Children, Adolescents, and Patients with Congenital Heart Disease; Chronic Bifascicular and Trifascicular Block; Hypersensitive Carotid Sinus Syndrome and Neurocardiogenic Syncope; Prevention or Termination of Tachycardias; Dilated Cardiomyopathy and Hypertrophic Obstructive Cardiomyopathy.

Pacemakers are 'structures' which generate and transmit electrical signals in the heart. Artificial ones are implantable electronic devices used to manage arrhythmias. These devices have been in use globally for over 50 years and were only introduced into Nigeria in 1979<sup>8</sup>. The devices may be permanent (Figure 1 and 2) or temporary.



**Figure 1:** St. Jude's Permanent Pacemaker



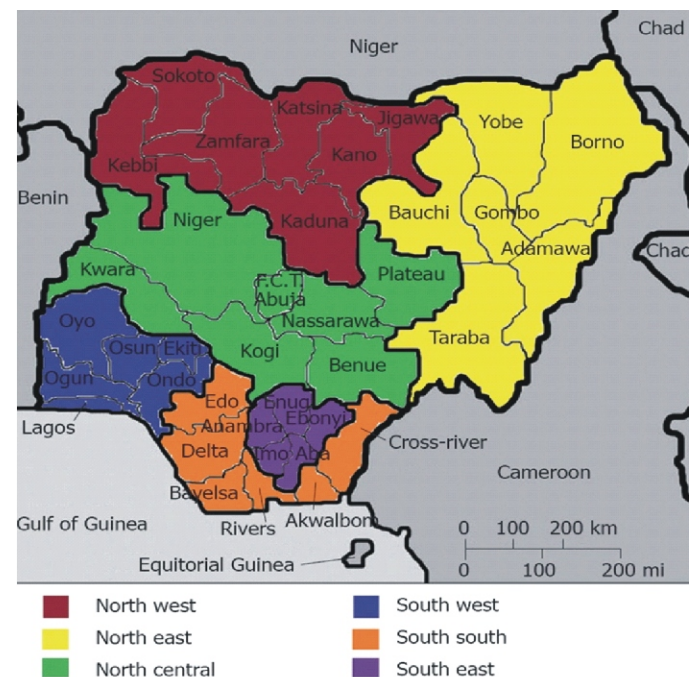
**Figure 2:** St. Jude's Permanent Pacemaker indicating the average size of the device.

The decision on what type of pacemaker to use depends on the type of arrhythmia and intercurrent medical conditions. Temporary pacemakers are used in periods of crisis for transient and reversible conditions such as; ventricular asystole, symptomatic bradycardia, drug toxicity, 2<sup>nd</sup> degree AV block following cardiac surgery or myocardial ischemia. The temporary pacemakers are also used as stop gap measures before permanent pacemaker is deployed<sup>14,15</sup>.

Over 612 per million populations in 2002 had implanted pacemakers, with most of these in the western world and relatively rarely in Nigeria. The evolution of ICD and CRT have led to dramatic increase in device use and expanded indications. Beyond the implantation of the device, the management of the patient with a device requires the involvement of many care providers such as the radiologists, the physiotherapists and the primary care clinicians.

It is against these conditions that this review attempts to explore the current situation of cardiac pacemaker insertion in the South-South region of Nigeria with a view to analyzing the prospects and the challenges.

The Map of Nigeria showing the South-South region also referred to as the Niger delta region is shown in Figure 3 below<sup>3</sup>.



**Figure 3** – Map of Nigeria showing the South-South Region in orange

### Situational Analysis of Pace Maker Insertion in the South-South Region of Nigeria.

There are currently 10 centres in Nigeria known to implant pacemakers. Of this number, 6 are located in the south west region of Nigeria, 2 in North central, 1 in the South east and only recently 1 in the south south/ Niger delta region.<sup>8</sup> Table 1 shows the available centers and their human resource capacity.

**Table 1** - Centres, Facilities and Personnel Providing Specialised Cardiac Care in the South-South Region.

The Tertiary Health Facilities and the Number of Cardiology Specialists in the Region are as Depicted in Table 1

SOUTH-SOUTH STATES	FEDERAL HOSPITALS	NO. OF CARDIOLOGISTS	STATE HOSPITALS	NO. OF CARDIOLOGISTS	TOTAL NO. OF CARDIOLOGISTS
AKWA IBOM STATE	UNIVERSITY OF UYO TEACHING HOSPITAL	4	IBOM SPECIALIST HOSPITAL	2	6
BAYELSA STATE	FEDERAL MEDICAL CENTRE YENAGOA	1	NIGER DELTA UNIVERSITY TEACHING HOSPITAL	1	2
CROSS RIVER STATE	UNIVERSITY OF CALABAR TEACHING HOSPITAL	3			3
DELTA STATE	FEDERAL MEDICAL CENTRE ASABA	3	DELTA STATE UNIVERSITY TEACHING HOSPITAL	3	7
			IRRUA SPECIALIST HOSPITAL	1	
EDO STATE	UNIVERSITY OF BENIN TEACHING HOSPITAL	3	CENTRAL SPECIALIST HOSPITAL BENIN.	2	5
RIVERS STATE	UNIVERSITY OF PORTHARCOURT TEACHING HOSPITAL	6	BRAITHWAITE MEMORIAL SPECIALIST HOSPITAL (BMSH)	5	11

### The Challenges To Pacemaker Insertion In South-South Nigeria

The challenges based on the current state are that medical tourism booms to the detriment of capacity and infrastructural development in the sub region. In addition many tertiary facilities in the sub region offering cardiac care have cardiologist without appropriate infrastructural support and exposure for interventional cardiology services. The lack of infrastructure and ancillary support for effective intervention cardiology and pace making is exemplified by the absence cardiac catheterization laboratories, non availability of pacemaker devices and interrogators. The shortage of requisite personnel such as catheterization laboratory nurses, perfusionists, interventional radiologist and biomedical engineers in the sub region is a major obstacle to effective performance of cardiac pace making and interventions.

### The Prospects for Pacemaker Insertion

#### Availability and Demand:

The demand for cardiac pace making and intervention is increasing as many more centers are now capable of carrying out non invasive cardiac evaluation such as electrocardiography and echocardiography which reveal these condition that require pace making and other invasive cardiac procedures.

The demands for these services are also driven by many patients who travel overseas for the procedure and require follow up back home on return.

It is anticipated that the increase in demand for these services will serve as a push for accelerating the development of facilities in the region.

#### Cost Implication:

The cost of pacemaker implantation overseas cannot be accurately determined, however it is expected that performing these procedures locally will be cheaper. The cost of procuring travelling visa, flight arrangement, hotel

reservations and other logistic issues far exceed the cost of the pacemaker implantation itself. It is anticipated this cost factor will drive the need for performance of the procedure within the region. It is known that some state governments and politicians in the South-South region have established relationships with some hospitals outside Nigeria for the purpose of providing pacemaker implantation usually at a cost higher than the actual procedure and much as 15,000 US dollars per patient. This scenario indicates that if these resources are harnessed and deployed in the sub region for the development of cardiac intervention services many more patients will benefit and the capacity will improve.

There is a growing trend for private public partnership in healthcare delivery in the country and the sub region. The application of this model in cardiac intervention and pace making has the prospect of improving the overall cardiovascular health of the populace and making the services more available and affordable.

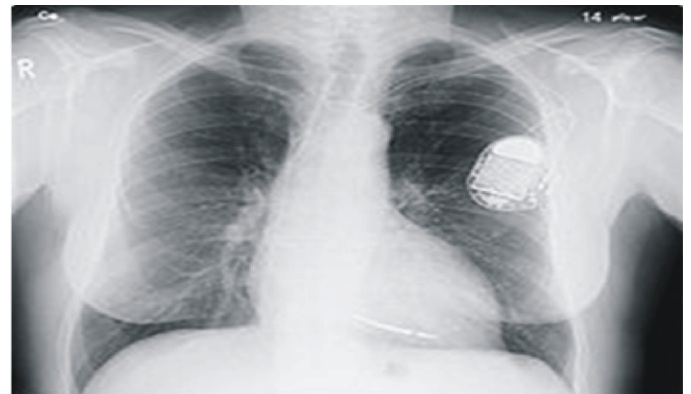
### Physician role:

Patients with heart block have diverse clinical presentation. Dizzy spells and giddiness, Seizures; extreme fatigue, breathlessness and even loss of consciousness are among the common complains of patients with heart block who may also be in heart failure. It is the duty of the physician to promptly identify the abnormality in heart rate and rhythm by simple palpation of the peripheral pulse and request for electrocardiograph for confirmation of the irregularity. The physician is also important in allaying the fear, anxiety and severe apprehension associated with such patients. He/she is expected to provide counseling and educate the patient on the possible identified cause of the conditions and the care that is available. The physician will also be necessary during the post-operation follow-up reviews and re-enforcement of the instructions concerning the care of the implanted device. Discharge planning, patient education concerning bleeding, infection and

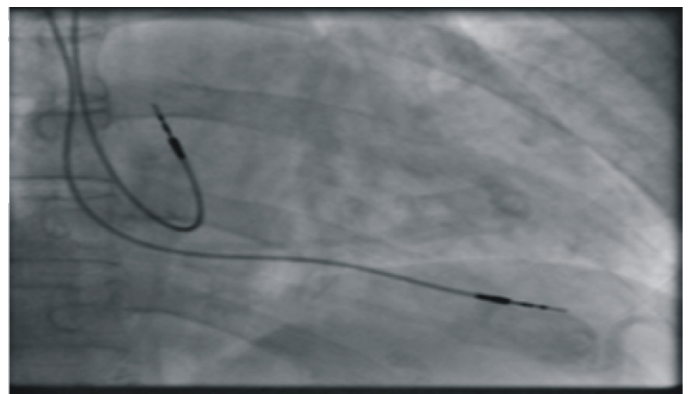
hematoma are also among the responsibilities of the physician. The training and retraining of physicians through CME and other forms medical education can enhance the knowledge and capacity of practitioners to recognize refer and follow up patient who need and had pace maker implantation.

### Radiologists Role:

A successful pace making and interventional cardiology service requires the input of radiologist. The radiologist is required to accurately evaluate and interpret the chest radiograph before the procedure. Post-operative complications such as pneumothorax, hemothorax, subcutaneous emphysema and lead dislocation are best identified through prompt performance of chest radiograph and accurate interpretation of features and structures as depicted in figures 4 and 5 below. The available radiologist can easily be trained and retrained in providing support to the cardiologist before, during and after the pace making procedures.



**Fig 4:** Plain PA chest radiograph showing pacemaker generator and single RV chamber lead in-situ



**Fig 5:** Dual chamber RA and RV leads in-situ

### Patients Role

Patients play a vital role in the advocacy for healthcare policy and service reform. It is expected that with the growing demand for cardiac intervention, pace making and other cardiovascular risk management services, advocacy and pressure from patient support groups will promote the development of these services. Furthermore these patient support and advocacy groups could enhance confidence and promote patient adherence to post implantation instructions. These instructions which are usually contained in the patients are manual from the manufacturers of the device include information on the avoidance of strong environmental electromagnetic interference and cell phones in shirt pocket overlying the device.

### CONCLUSION

Pacemaker implantation is a life saving cardiac interventional procedure that has been in existence for about 50 years. Heart block as a complication of hypertension is often mis-diagnosed. Since its introduction in Nigeria in 1979, few centres exist in the country for this procedure. The South-South region of Nigeria has a high prevalence of hypertension and cardiovascular disease but is underserved with respect to availability of advanced cardiology care. In spite of this there is a paucity of personnel and infrastructure for cardiac and pace making in the region. It is anticipated that the increase in demand for these services; the cost benefit of performing the procedures locally and the growing trend of private public partnership in healthcare amongst other highlighted factors will promote the capacity for cardiac pace making in the region.

The establishment of interventional cardiology services has become inevitable. Pacemaker implantation presents a good way to start and gradually develop the capacity for more.

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