HARMONIZED WACS CURRICULUM FOR CARDIOTHORACIC SURGERY

Professor R.O. OFOEGBU
University of Benin City (NIGERIA)
MD; FRCS.Ed. D; FWACS; FACS; FMCS; FACA; FICS; FICA.
Former Head of Surgery
Former Dean of Medecine
Former Provost, College of Medecine
Former Deputy, Vice-chancellor University of Benin - Benin city

Correspondence: Prof. R.O. Ofoegbu
P. O Box 3496 Benin City
E-mail: ofoegbuor@yahoo.com

Summary
The Author reports a proposal for harmonization of training program for cardiovascular and thoracic surgery in West Africa; Several items are detailed: 1) detailed Generals Objectives; 2) Generals and specific requirements.

Key words: Training – Cardiovascular and thoracic surgery

Résumé
L’auteur rapporte un projet d’harmonisation du programme de formation en chirurgie cardio-vasculaire et thoracique en Afrique de l’Ouest; plusieurs points ont été détaillés à savoir les objectifs généraux, les exigences générales et spécifiques.

Mots clés: Formation chirurgie cardio-vasculaire et thoracique
Introduction

At the meeting which held at Conakry, Guinea, a Committee was set up to fashion and harmonize the Anglophone and Francophone Curricula for the training of Cardiothoracic (Thoracic and Cardiovascular) Surgeons in the West African Subregion under the auspices of the West African College of Surgeons.

The Committee comprised:
Prof. H. Yangni - Cote D'Ivoire
Prof. M. Ndiaye - Senegal
Prof. A.O. Adebo - Nigeria
Prof. R.O. Ofoegbu - Nigeria

By an internal consensus Prof. Ofoegbu was asked to chair the Committee. Documents were made available for the purpose by the Francophone colleagues and the papers presented at the meeting by Professors Adebo, Ndiaye and Ofoegbu were added to the working documents.

The Francophone and Anglophone countries have operated different in emphasis though similar programmes for the training of Cardiothoracic Surgeons in the subregion of West Africa. The aim is to harmonize the two programs in such a way that there will be one regional program for both language groups. The population catered for and those to be treated are the same, a situation made more manifest by the legal free movement of people among the ECOWAS countries.

The Harmonized Curriculum comprises the following Sections:

- General Objectives
- General Requirements
- Specific Requirements; training periods
- The Curriculum:
  - (a) General Thoracic Surgery
  - (b) Cardiac Surgery and Great Vessel Vascular Surgery
  - (c) Miscellaneous Areas
  - (d) Appraisal of the Curriculum and its Objectives

General Objectives

The Specialty of Cardiothoracic Surgery is a field with rapid increase in both knowledge base and operative innovations. Competency is dependent not only on cognition but on acquisition of diagnostic and therapeutic skills for effective patient care. Adequate operative skill is determined by exposure to sufficient number and variety of cases. It is mandatory that the period of training should at the least provide opportunity for exposure that would at the minimum permit participation of the trainee in the care of a wide spectrum of disease patterns. The cardiothoracic surgeon must demonstrate competence and proficiency in the surgical technical skills required to:

i. Understand and interpret all manifestations and investigations towards firm diagnosis of thoracic and cardiovascular diseases.
ii. Treat diseases of the chest wall, mediastinum, lungs, trachea, pleura, esophagus, stomach and diaphragm.
iii. Treat disease of the heart, aortic
and major intra-thoracic vascular structures and major peripheral vascular structures.

**General Requirements:**
Candidates requesting for training leading to Certification in CARDIOTHORACIC SURGERY of the West African College of Surgeons (FWACS;CTS) should seek admission into an accredited hospital for training in this Specialty. The pre-requisites are as follows:

i. Successful completion with a pass grade at the Part I FWACS or Part I FMCS or Part I Diplôme d'Etudes Spéciales in General Surgery (DES) in Francophone countries.  

OR

ii. Successful completion and certification at Part II Final of the FWACS or FMCS or DES in General Surgery in Francophone countries.

**Specific Requirements:**
A minimum of 36 to 48 months (3 – 4 years) of continuous training in an accredited Residency Training Program in Cardiothoracic Surgery.

i. General Thoracic Surgery (1-2 years)
ii. Cardiac Surgery (1 year)
iii. Vascular Surgery (6 months)
iv. Cardiology: Adult and Paediatric (3 months)
v. Cardio-pulmonary Imaging. (3 months)

It is preferable that the General Surgery rotation should precede that of Cardiac Surgery, that is, after completion of Part I or Part II final in General Surgery.
GENERAL THORACIC SURGERY

A. General Principles

History of Thoracic Surgery in General.
- Landmarks in Resective Pulmonary and Major Airway Surgery
- History of Cardiac and Vascular Surgery, in particular, vascular Anastomosis and Cardiopulmonary Bypass.
- History of Oesophageal Surgery, in particular repairs for Benign Disease and Evolution of Oesophagectomy.

Infections
- Hospital Infections
- Pulmonary Infections: Suppurative and non supurative
- Pleural Infections
- Mediastinitis
- Endocarditis
- Major Vasculitis
- Implications of HIV and metabolic disorders.

Heart (Cardiac) Failure
- Definition and Types, including Hypertensive Heart Failure, Volume and Pressure loaded Hearts.
- Pathophysiology of Oedema
- Pathophysiology of Inanition

Respiratory Failure
- Types and Distinction from Cardiac Failure

Tube Thoracostomy
- History, Indications and Pitfalls

Haemoptysis
- Grades and Investigations

Guidelines in Research
- Research Methodology
- Statistical Methods with Clinical Applications

B. Chest Wall including the Sternum
- Normal Anatomy of the chest wall
- Thoracic access incisions
- Surgery of Chest wall anomalies and deformities; Pectus excavatum/carinatum
- Chest wall Neoplasms

B- Chest Wall including the Sternum
- Musculoscutaneous flaps and plastic reconstructions of the chest wall
- Resections and Replacements of the chest wall and sternum
- Rib Resections
- Thoracic outlet (Neurovascular) syndromes

C. Lungs
- Embryology and Normal Anatomy of the Lung.
- Normal Physiology
- Lymphatic Drainage System
- Bronchopulmonary Segments
- Congenital Malformations (Bronchogenic cysts, Sequestrations, cystic fibrosis).
- Acquired Malformations; Bullae and Emphysema
- Degenerative and Storage Diseases (Asbestosis, surgically important pneumoconiosis, scars and fibrosis)
- Primary carcinoma; Types and stagning; Resective surgery, other modalities of treatment (Radiotherapy, Chemotherapy, position Emmission therapy, Hyperbaric oxygen therapy, Immunotherapy etc; Related Paraneoplastic syndromes and their
effects on Treatment.
• Secondary cancers
• Other cancers (Sarcoma, Lymphoma etc)
• Benign Tumours (Solitary Nodules, adenoma, etc)
• Non Neoplastic conditions (Foreign bodies of the airways, Inhalation burns.

D- Pleura
• Normal Anatomy
• Lymphatic Drainage
• Pneumothorax (Spontaneous and Traumatic)
• Surgical Emphysema (Significance)
• Haemothorax: Emphysema thoracis
• Pleural Effusions
• Chylothorax
• Primary Tumours of Pleural (Mesothelioma)
• Secondary Tumours

E- Trachea
• Tracheostomy: Types and Indications and Complications especially long term.
• Tumours of the Trachea
• Tracheomalacia
• Tracheal stenosis (Cicatrical and extrinsic compression)
• Operative resections and plastic reconstructions of the trachea.

F- Diaphragm
• Embryology and Anatomy with emphasis on the Architecture, anatomical relationships, the various foramina, the crura and their contents.
• Paralysis of the Diaphragm and Eventration
• Congenital Herniae
• Acquired Herniae
• Repair of Diaphragmatic Hernia and Eventration
• Diaphragmatic Pacing
• Ruptured Diaphragm and Reconstructions of the Diaphragm
• Boundary Abdominothoracic Pathologies; Diaphragmatic Abscess

G- The Oesophagus
• Embryology, Anatomy and Physiology
• Surgical Accesses; Merits and Disadvantages
• Congenital Abnormalities; Atresia Tracheo-oesophageal fistula,
Duplication of the Foregut
• Acquired pathologies: Functional and Motility Disorders including Achalasia, Oesophageal Reflux Disease with or without hiatal hernia, Epiphrenic and other Diverticula;
Paraoesophageal herniations
• Chemical Injuries and Trauma
• Perforations
• Surgery for Oesophageal Varices: Porto-systemic shunts; Disconnections
• Benign Neoplasms; Leiomyoma, etc
• Malignant Neoplasms: Carcinoma, staging, pathology and Modalities of treatment.
• Oesophageal Resections: Oesophagectomies (limited and Extensive), Transhiatal, Oesophagogastricomy, Jejunum and Colon Transplants, By-pass surgery.

H- The Mediastinum
• Anatomical and Surgical Divisions: Relevance to placement of organs and structures.
• The Thymus and its pathologies
• Mediastinal Masses (Ectopic thyroid, etc)
• Mediastinal Adenopathies and Lymphatic drainage
• Ganglionic neoplasms
• Mediastinal Compression Syndromes
• Mediastinoscopy
• Mediastinotomy
• Scalene lymph node biopsy
• Cervical and Thoracic sympathectomy

I- Thoracic Trauma (Traumatic Injuries)
• General Principles: Blunt and Penetrating Injuries; low and High velocity missile injuries; contusions as they affect different thoracic organs and systems.

Trauma of Chest wall:
• Isolated soft tissue injuries
• Fracture of Ribs and their complications; pneumothorax, haemothorax, methods of treatment.

Tracheobronchial and Pulmonary Trauma:
• Pathophysiology and Presentation
• Major airway injury (Trachea and Major Bronchi)
• Distal Bronchopulmonary Injuries
• Airway control: Early and Late complications and their Management.
• Pulmonary contusion
• Pulmonary Laceration
• Pulmonary Vascular Injuries

Oesophageal Trauma:
• Modalities and Extent of Injury including chemical burns and Instrumental tears and perforations.
• Methods of Repair and Complications
• Isolation of the Oesophagus

Diaphragmatic Trauma
• Blunt Trauma
• Penetrating Injuries
• Damage of structures associated with the diaphragm, e.g. phrenic nerve, thoracic duct, crural fibres with herniations
• Methods of repair

J- Heart and Great Vessel Trauma
• Blunt and Penetrating trauma.
• Cardiac contusion and Laceration. Tamponade
• Traumatic valve disfunctions
• Rupture of the Aorta
• Tear/Avulsion of Major blood vessels

K- Polytraumatized Thoracic Patient.
• Assessment, Diagnosis, Damage control and Options and Priority in Management.

CARDIAC SURGERY AND GREAT VESSEL VASCULAR SURGERY

A- Congenital Heart Disease
• Embryology and Developmental Anatomy of the Heart and Great Vessels
• Foetal Circulation and Pathophysiology of shunts and abnormal cardiac and vascular connections before and after birth.
• Surgical Anatomy of Heart Valves, Conduction System, Coronary Circulation.
• Classification of Major (Fundamental) Congenital Abnormalities and the associated physiological derangement,
• Cyanosis
• Pulmonary Arterial Hypertension
• Anomalies with left to right shunt:
  • Patent Ductus Arteriosus
  • Atrial Septal Defect
  • Ventricular Septal Defect
  • Atrioventricular Septal Defect
  • Double Outlet Right Ventricle
  • Aortopulmonary Window
Cyanotic Anomalies
• Tetralogy of Fallot (Triology, Pentalogy)
• Ebstein’s Anomaly, Tricuspid Atresia,
• Transposition of the Great Vessels
• Truncus Arteriosus
• Total Anomalous Pulmonary Venous Connection

B- Obstructive Anomalies
• Coarctation of the Aorta
• Interrupted Aortic Arch Variations, Associated lesions
• Pulmonary stenosis; complications and right heart failure.
• Aortic Stenosis

C- Particular Problems
• Fontan Circulation
• Congenital Heart Valve Diseases (Aortic and Mitral Valves)
• Bacterial Endocarditis: Epidemiology, Pathology and Target sites.

D- Acquired Heart Disease:
Valvular Heart Disease
• Mitral valve: stenosis/Incompetence
• Aortic Valve:stenosis/Incompetence
• Tricuspid valve:stenosis/Incompetence
• Valve Replacement Surgery
• Stented and stentless Prosthesis
• Biological and Mechanical Prosthesis
• Surgery of the Aortic Root
• Surgery of the Aortic Arch

E- Diseases of the Great Vessels
• Aortic Aneurysms. Types and Variations
• Prosthetic Replacement
• Aortic Dissection
• Segmental Aortic Replacements

F- Surgery For Arrhythmia
• Aetiology and Pathology of Arrhythmia
• Electrophysiological Mapping
• Electrophysiology of Cardiac Pacing
• Pace-Makers (Transvenous, Epicardial, Temporary, Permanent).
• Cardioveters and Defibrillators
• Left Ventricular Assist Devices
• Non Operative Management of Arrhythmia
• Surgery For Atrial Fibrillation

G- Surgery For Pericardial Disease
- Anatomy of the Pericardium
- Aetiology, Diagnosis and Treatment

H. Coronary Artery Disease
- Coronary circulation
- Imaging in Ischaemic Heart Disease and coronary obstructions
- Arterial Grafting Technique
- Harvesting and Types of Conduits
- Off Pump Revascularization
- Minimally Invasive Techniques
- Other Interventions (Angioplasties, etc)
- Post Infarction Septal Rupture
- Post Infarction Ventricular Aneurysm
- Ischaemic Mitral Regurgitation

I- Transplantation: Heart Lung Transplantation
- Indications
- Orthotopic and Heterotopic Transplantation
- Immunosuppression therapy
- Outcome and Graft Rejection Diagnosis

J- Cardiopulmonary Bypass (Extracorporeal circulation).
- The Circuit
- The component Parts and Compartments
- Perfusion solutions and Fluids
- Cardioplegia and Related Solutions
- Acid-Base Balance
- Anticoagulation
- De-airing, Weaning
- Conduct of a standard Bypass process
- Pharmacological Requirements
- Blood Products and Blood Conservation Techniques
- Post Cardiotomy Syndrome

- End Organ Injury and Inflammatory Response to Bypass
- Methods of Hypothermia (Uses and Disadvantages)
- Various Monitoring Devices and Filters.

MISCELLANEOUS SUBJECTS
- Anaesthesia in Cardiac Surgery
- Controlled Hypotension
- Haemostasis in Cardiac Surgery
- Pharmacology of Major Cardiotropic Drugs
- Post-Operative Complications in cardiothoracic Surgery
- Surgery of Endomyocardial Fibrosis

BASIC DIAGNOSTIC PROCEDURES
(a) Cardiac
Appreciation and Competence in Interpretations of Results and Application are expected in the following:
- Plain Radiological Imaging (X-rays)
- Computed Tomography
- Doppler Flow
- Cardiac Catherization; Pressure/Volume Studies
- Electrocardiography
- Echocardiography
- Cardiovascular Monitoring (Invasive and Non invasive)
- Radioactive Imaging.

(b) Pulmonary
- Plain Radiology (x-rays)
- Computed Tomography
- Radioactive Imaging
- Lung Function Tests
- Blood Gas Analysis
- Bronchoscopy
- Mediastinoscopy
- Thoracoscopy
(c) **Oesophageal**
- Barium and Contrast studies
- Manometry
- pH Monitoring
- Oesophagoscopy

(d) **Vascular**
- Arteriography
- Aortography
- Venography

**APPRAISAL**

In each case it is expected on completion by a trainee (Resident) to have understood:

(a) The Anatomy, Physiology, Pathophysiology and Natural History of Diseases Entities, Disorders and Conditions in their proper contexts.
(b) Advantages, Disadvantages and Outcome of Investigation and Treatment Methods
(c) Critically evaluate any procedure in all aspects of its application
(d) Be proficient enough to pass on the skills acquired to others
(e) An Appropriate Log Book based on the Curriculum will be provided to reflect the minimum number of operations/procedures and the level of responsibility expected from a trainee, making allowance for the volume of the procedures and experience in the subregion.