Royal College of Surgeons in Ireland | *College of Medicine Malawi* | *Surgical Society of Zambia* | *Radboud UMC Nijmegen, the Netherlands* | *European Union*

Clinical Officer Surgical Training in Africa

What is COST-Africa?

Clinical Officer Surgical Training in Africa (COST-Africa) is a research project, funded by the European Commission under its *7th Framework Programme for Research and Technological Development* (FP7). COST-Africa is providing surgical training to Clinical Officers (COs) and evaluating the impact and cost-effectiveness of surgery delivered at district hospitals in Malawi and Zambia.

COST-Africa is a collaboration between the Royal College of Surgeons in Ireland, College of Medicine in Malawi, Surgical Society of Zambia, and Radboud University Medical Centre in Nijmegen, the Netherlands. COST-Africa has been endorsed by the College of Surgeons of East, Central and Southern Africa (COSECSA).

Rationale for training non-physician clinicians to do surgery

By developing the capacity at district hospital level to deliver emergency and essential surgical interventions, under supervision, COST-Africa addresses: (i) a critical dimension of the human resource crisis in African countries' health sectors; and (ii) perhaps the largest unmet burden of disease in Africa for which an effective intervention exists – surgery.

COST-Africa is predicated on 3 dimensions of the health sector and human resource crisis:

- The district hospital is the cornerstone of many Africa countries' health systems;
- The need for a sustainable response to address the shortage of clinical staff capable of delivering essential emergency and elective surgical care. Clinical Officers, who are non-physician clinicians, *already* perform the bulk of emergency obstetric operations at district hospitals in many African countries; and
- A high proportion of Disability Adjusted Life Years (DALYs) are lost, especially in rural areas, but could be saved through surgical interventions at the district level.

COST-Africa objectives are to:

1. (a) Work with relevant Ministries, Health Professions Councils and national training colleges to ensure that COST-Africa supports national policy priorities for surgical training of Clinical Officers/Medical Licentiates (COs/MLs) in Malawi and Zambia.[1]

   (b) Conduct a situational analysis to map district level surgical services; measure surgical capacity and identify gaps to be addressed prior to delivering surgery safely and effectively in district hospitals; and establish surgical information systems for measuring surgical outcomes in Zambia and Malawi.
2. Design and implement ethically reviewed surgical training interventions for COs/MLs, which include in-service training, supervision and quality control.
3. Measure the effectiveness and impact of the interventions at the levels of health worker, patient, health facility and district population in a randomised controlled trial (RCT).
4. Establish the cost-effectiveness of the intervention.
5. Support national and regional policy makers in developing career paths and retention strategies aimed at surgically trained COs/MLs and specialist surgeon-trainers.

[1] Medical Licentiates in Zambia are Clinical Officers who have undertaken advanced diploma level training covering medicine, some surgery, paediatrics and obstetrics.

Prof Eric Borgstein eborg@me.com | Prof Nyengo Mkandawire nmkandawire@medcol.mw | Prof Ruairí Brugha rbrugha@rcsi.ie | Dr John Kachimba jskachimba@gmail.com | Dr Leon Bijlmakers leon.bijlmakers@radboudumc.nl

Clinical Officer surgical training – the Malawi model

Much of the first two years of COST-Africa in Malawi (June 2011 to December 2012) was spent negotiating and getting approval and accreditation for a series of national BSc degree programmes for Clinical Officers in Malawi, including a BSc in Surgery. Eighteen COs were selected for COST-Africa sponsorship and enrolled in the BSc in surgery degree programme at the College of Medicine (CoM) in April 2013. The BSc curriculum and training programme, which was developed by the national specialist surgeons and approved by the Malawi Medical Council, provides COs with a theoretical base and builds on their existing experience in a range of common surgical and obstetric emergencies, trauma management, orthopaedic problems, and common elective general surgery.

The 3 year BSc program is comprised of modular courses at the CoM, central hospitals and on-the-job-training in district hospitals:

- An initial 6 month period of basic science and theory at the CoM in Blantyre, after which the COs were deployed in October 2013 to one of 8 designated randomly selected district hospitals, located in the Southern and Central Regions of Malawi.
- During their subsequent 18 months on-the-job training, the COs work at district hospital level where they receive periodic supervisory field visits by surgeon specialists from central hospitals; in addition, they return to Blantyre for short periods of instruction and training at CoM.
- During this same 18 months period (October 2013 to May 2015) the COs participate in the COST-Africa evaluation, details of which are explained below.
- For the final year, after the COST-Africa evaluation, students will be based in one of the Central hospitals, where they will complete their studies towards a BSc degree.

Medical licentiate surgical training – the Zambia model

In Zambia, COST-Africa is supporting and has built on the Government-funded Medical Licentiate (ML) training programme for clinical officers, run by Chainama College of Health Sciences, which is Zambia's national training college for COs/MLs. The ML programme provides experienced practicing COs with a three year programme – two year training and one year internship – covering the main clinical specialties: surgery, medicine, obstetrics & gynaecology, and paediatrics. The training includes 6 months front-loaded college-based theory, followed by 4 months practical training in each of the four clinical specialties, under the supervision of surgical specialists at provincial or other high volume (mission) hospitals. COST-Africa has also been supporting Chainama College in developing a BSc curriculum for Clinical Officers, which has been submitted to the University of Zambia for accreditation.

In 2012, COST-Africa supported surgical specialists from the University Teaching Hospital who provided 3 months of additional surgical skills-training to 35 Medical Licentiate students from the 2009 and 2010 cohorts. The training was in: (1) *Anaesthesiology, (2) Orthopaedics, (3) Traumatology, (4) Essential Surgical Skills Course, (5) Basic Trauma Care Course, (6) Ultrasonography* and (7) *Advanced Life Support in Obstetrics*. Training also covered *Basic Epidemiology*, *Management, Ethics* and *Professionalism.*

***Policy maker support in a time of change in Zambia*:** The COST-Africa research has the full support of the Permanent Secretaries of (i) the Ministry of Community Development, Mother and Child Health (CD-MCH), which has been given responsibility in 2012-13 for the delivery of health services at the district and provincial levels in Zambia; and (ii) the Ministry of Health (MoH). These ministries welcome the contribution of COST-Africa towards implementing what is a national policy priority of bringing much needed surgical services to the rural areas. The research team has a good relationship with senior ministry directors and directorate staff in the Ministry of Community Development MCH.

Prof Eric Borgstein eborg@me.com Prof Nyengo Mkandawire nmkandawire@medcol.mw Prof Ruairí Brugha rbrugha@rcsi.ie Dr John Kachimba jskachimba@gmail.com Dr Leon Bijlmakers leon.bijlmakers@radboudumc.nl

Study design and evaluation

In early 2013, the COST-Africa researcher in Malawi conducted field visits to all district hospitals in the Southern and Central regions, where he systematically collected retrospective data (three months of data from Operating Theatre registers) and conducted a rapid situation analysis. Based on an analysis of these data, 16 government district hospitals were identified and paired, and one of each was randomly allocated to the intervention arm, with the other to serve as a control arm. The 16 COs who have been awarded a COST-Africa Clinical Officer sponsorship have been purposively allocated – two each to the eight randomly selected intervention hospitals.

The evaluation is multi-dimensional and multi-levelled, including:

(i) a before-and-after evaluation,
(ii) a controlled intervention trial, and
(iii) an economic analysis.

COs participated in a data collection training workshop, circa September 2013, prior to being deployed to the eight COST-Africa intervention hospitals. Data collection tools have been developed for monitoring the numbers of cases of surgery performed, and simple outcomes. Costing data are being collected.

In Zambia, as in Malawi, the district hospital is the unit of analysis. The cluster controlled trial includes a total of 16 hospitals in each arm, of which 11 hospitals were randomly selected and 5 purposively selected to be intervention hospitals. The COST-Arica evaluation involves comparisons of surgical outcomes, impact and cost-effectiveness between intervention district hospitals that receive a COST-Africa trained ML with those that don't receive an additional ML.

Data collection in Malawi and Zambia is ongoing, including measurements of resource inputs (human resources, theatre equipment and supplies, finance) at baseline and at certain intervals; assessments of processes (e.g. division of labour in theatre, task shifting) and changes therein; service outputs over time (volume of surgery by type) for a broad spectrum of conditions amenable to surgery; and surgical outcomes, firstly at the district intervention hospitals. In Malawi, data collection has already been introduced to the eight comparator (control) district hospitals, through the involvement of designated information officers trained in the use of tools that are similar to the ones used in intervention hospitals; and to referral hospitals, where data collection centres around the appropriateness of surgical cases referred by district hospitals (both intervention and control hospitals) and health outcomes. The economic evaluation, for which data collection is currently being pilot tested, involves estimates and modelling of the cost to deliver district level surgery, as well as follow-up of selected categories of patients to assess qualify of life and calculate household cost.

In-service training, supervision and quality assurance

In-service training and supervision in Malawi are being provided through regular district hospital visits by surgeon trainers from Blantyre and Lilongwe, who are overseeing the training of the COs in the different modules of the BSc curriculum. In Zambia, supervisory visits are organised from the provincial referral hospitals. Special data collection forms allow the collection of information on *critical events* (which lead to reductions or increases in surgery) and *adverse events* (such as intra- and post-operative mortality or near-miss). The latter may become the focus of regular hospital audits.

Prof Eric Borgstein eborg@me.com | Prof Nyengo Mkandawire nmkandawire@medcol.mw | Prof Ruairí Brugha rbrugha@rcsi.ie | Dr John Kachimba jskachimba@gmail.com | Dr Leon Bijlmakers leon.bijlmakers@radboudumc.nl

Ethics and Data safety

Ethics approval for the study has been obtained in Malawi, Zambia and Dublin, and Data Safety Monitoring Boards (DSMB) have been established in Malawi and Zambia, to which the provincial surgeons and researchers report at 6 monthly intervals. Regular reports are also being made to the respective national ethics committees. Hospital audit committees are considered to review all adverse events that are being reported to the provincial surgeons and the COST-Africa team (researchers & surgeons), who are responsible for taking any necessary action.

How Africa will benefit

COST-Africa will firstly bring benefits to the district and rural populations of Malawi and Zambia who lack easy access to urban centres and whose only hope of life-saving emergency surgery is if it can be delivered at the nearest district hospital. The expected outcome is a fully tested model that will:

a) Make a major and sustainable impact on Africa's burden of disease;
b) Provide African countries with surgically trained, sustainable and retainable clinicians;
c) Demonstrate the potential of a 3-fold role for Africa's highly trained but scarce surgeons, helping to retain specialist surgeons in Africa:
   - as specialists
   - as trainers (of doctors and clinical officers)
   - as supervisors and quality assurers of surgical services.

Contacts

For further information on the Malawi country study and surgical curriculum, contact the lead investigators: eborg@me.com or nmkandawire@medcol.mw. For further information on the country study and/or the surgical curriculum in Zambia, contact the lead investigator: jskachimba@gmail.com.

Enquiries about data collection tools and plans for global dissemination to the European coordinator in Dublin, Ireland, rbrugha@rcsi.ie ; or the Netherlands lead researcher in Nijmegen, leon.bijlmakers@radboudumc.nl

Please Note: given the importance of success of the COST-Africa RCT to the future of surgical services in Africa, we request that anyone planning surgical interventions and/or research in Malawi and Zambia first contact us.

Update November 2014

Prof Eric Borgstein eborg@me.com | Prof Nyengo Mkandawire nmkandawire@medcol.mw | Prof Ruairí Brugha rbrugha@rcsi.ie | Dr John Kachimba jskachimba@gmail.com | Dr Leon Bijlmakers leon.bijlmakers@radboudumc.nl