



# MEDICAL EQUIPMENT MAINTENANCE

**A well-functioning and effective health service relies on the availability of operational and appropriate medical equipment at all levels of delivery. To achieve this, staff with appropriate skills must be available. Working with partners, THET focuses on investment in human resources to ensure effective management and maintenance of medical equipment.**

## Training Biomedical Engineering Technologists (BMETs)

40% of medical equipment in developing countries is out of service due to break down, inadequate maintenance, the availability of spare parts and consumables, and lack of operational knowledge among end-users. This represents a huge risk to the quality of health services. Out of service equipment affects the level of care health workers are able to provide, accurate diagnosis, the safety of patients, and the ability of health workers to save lives.

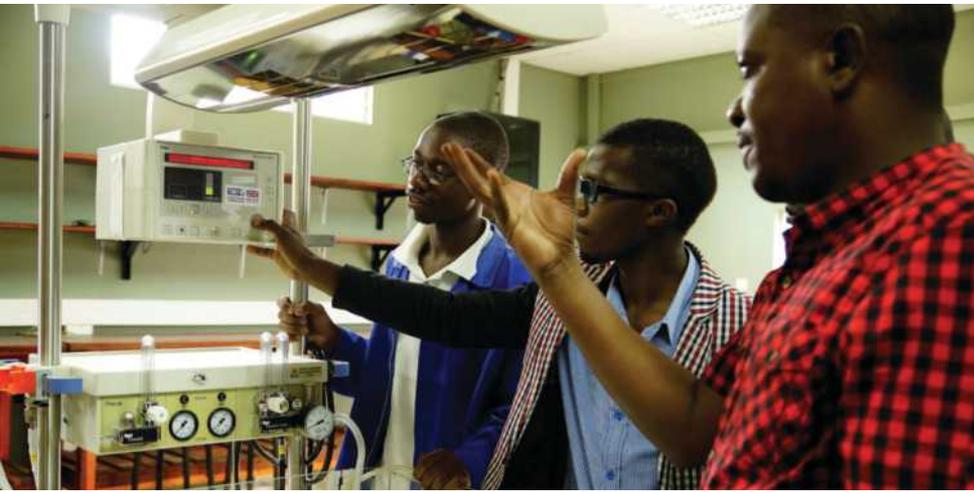
Biomedical Engineering Technologists (BMETs) fix, maintain and manage medical equipment within a hospital or health centre setting. BMETs are crucial to the medical equipment life cycle, advising on procurement, initial inspection and installation, data collection, instruction on use and maintenance, development of preventive maintenance plans, corrective maintenance and repair, end of use, and decommissioning.

The deployment of trained BMETs is therefore a big step towards the proper management of medical equipment, ensuring that hospitals and health centres get the most out of their equipment. Yet in Zambia, there are no medical equipment technicians or technologists in district hospitals. As a result, cold chain specialists tend to be responsible for medical equipment. In health centres, it is often electricians, mechanics and plumbers who are charged with equipment repairs.

## Medical Equipment in Zambia

Zambia, a landlocked country in southern Africa with a population of around 13 million people, faces many of the challenges related to medical equipment that are typical of developing countries, especially those in sub-Saharan Africa.

- It is estimated that between 35 and 50% of medical equipment in Zambia is currently out of service.
- Very little data is available on the state of medical equipment across the country, and there is no nationwide inventory.
- Zambia is operating with about 35% of recommended maintenance staff.
- Health posts have, on average, about 40% of their required equipment based on standard lists.
- Over 60% of medical equipment in Zambia is over 10 years old.
- Much of the equipment not in use can be repaired very easily.
- Very few current maintenance staff possess relevant qualifications.
- There are 20 total biomedical engineering workshops across the country, and only at level 2 and 3 hospitals. At district level, cold chain specialists are relied on to provide equipment maintenance services.



## THET's Response

Since 2011, THET with support from the UK Government's Department for International Development (DFID) has been working with the Northern Technical College (NORTEC) to develop the first pre-service training course for BMETs. It is a three-year diploma which incorporates electrical engineering, anatomy and physiology, medical instrumentation, and medical equipment management and maintenance. It involves a mixture of theoretical learning, hands on workshop practice, and hospital based experiential learning. The BMET course began in September 2013 with its first cohort of students, and has an annual intake of 30 students.

THET support has included an initial needs assessment, leading the curriculum development process, providing trainers, refurbishing the skills workshop, and the procurement of medical and test equipment and textbooks.

## Country Led Initiative

The Ministry of Health and the Ministry of Community Development Mother and Child Health have supported the course since its inception, with assistance given to the curriculum development process, and planning for the hospital based attachments which occur in the second and third years of the course. The graduated BMETs will possess an important skillset for the Ministries to draw upon in the improvement and modernisation of health services in Zambia.

The Northern Technical College (NORTEC) in Ndola, Zambia is a training institution under Ministry of Education, Science, Vocational Training and Early Education. Given its reputation as the prime technical vocational training centre for engineering trades and business studies in Zambia, NORTEC was selected as the most appropriate host institution for the BMET course.

## Next Steps

THET support to the BMET course at NORTEC will continue. Further purchases of medical and test equipment are scheduled, as well as technical support to the training, and the development of hospital and health centre based attachments.

NORTEC and THET will collaborate on ensuring the sustainability of the course through the development of a comprehensive train-the-trainer programme, incorporating workshop skills and hospital based management training.

THET is planning to expand the scope of the programme to take in more specific work with hospitals and relevant Ministries on medical equipment management, policies and guidelines, procurement and user training. BMET's in training and entering the workforce provide a unique opportunity to make medical equipment maintenance a much more integral part of hospital, provincial and central planning.

## Timeline

- **May-June 2011** – Needs assessment conducted alongside Ministry of Health at a range of hospitals covering 4 provinces (Southern, Western, Lusaka and Copperbelt).
- **June - December 2011** – Curriculum development alongside the Technical, Entrepreneurial, and Vocational Education Training Authority (TEVETA) and Ministry of Health. Creation of job profile.
- **Early 2013** – Agreement with Ndola College of Biomedical Sciences to run Anatomy and Physiology module, and secondment of trainer for Biomedical Engineering foundational course.
- **September 2013** – First cohort of students accepted on to the course.
- **June – September 2014** – Procurement of medical and test equipment.
- **September 2014** – Second cohort of students accepted on to the course.
- **September 2014** – Secondment of THET sponsored trainers begins for students in the second year.
- **September – November 2014** – Refurbishment of skills workshop.
- **May 2015** – Official opening of skills workshop.
- **June 2015** – Beginning of train-the-trainers programme.
- **August 2015** – Procurement of further medical and test equipment.
- **September 2015** – Beginning of first hospital based attachments.
- **January 2016** – In-depth needs assessment of hospital procedures, procurement procedures, and levels of data collection.
- **April 2016** – Beginning of pilot project to assess the cost effectiveness of carrying out robust preventive maintenance in an enabling environment.
- **April 2017** – Graduation of first BMETs.

THET would welcome contact from potential partners interested in making a difference to the availability, use and maintenance of medical equipment in Zambia and globally. For more information, please contact:

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