



**Medical Aid
International**

Supporting Healthcare in Low Resource Environments

GLOBAL BIOMEDICAL ENGINEERING TRAINING: WORLDWIDE ACCESS TO WORLD-CHANGING SKILLS





1. Introduction

All of us who work in the aid sector want to deliver services that are suitable, effective, value for money and relevant for the environment and people we serve. We all know this support can take many forms, but with the varying challenges faced on a daily basis in all of our work, we must often strive to find innovative ways of achieving our objectives.

Most recently, Covid-19, for example, has placed significant additional pressure on this process, and whilst the virus is certainly a major challenge for us all on so many levels, it does also present opportunities for us to explore alternative ways of working that will deliver benefit not only during Covid, but also beyond it.

Take our Biomedical Engineering Training Programme, for example, which is the subject of this document. Having run residential training courses for a wide variety of organisations, we knew that this programme was vital in enabling healthcare institutions in LMICs (Low and Middle Income Countries) to keep their equipment functioning better and more safely for longer.

But such courses were not only relatively expensive and therefore only accessible to a minority – they also became unworkable once the Covid restrictions on travel and social contact hit home.

This is just one more reason why we have realised our vision of providing global access to effective biomedical engineering training, foundational knowledge, and support *online*, with no travel or face-to-face tuition required, in a holistic package that can be used on its own or as part of a wider support strategy.

Medical Aid International: Doing the Right Things, Not Just Good Things

We're all familiar with the moving story of the Good Samaritan, who helped a stranger in need. But at Medical Aid International, we understand that it is not enough for help to be compassionate – it must also be *appropriate to the circumstances*.

In LMIC regions, this means having the courage to take risks in order to supply and develop alternative solutions that are suitable for the often difficult conditions in these countries. It's what Medical Aid International has been doing throughout its 19-year history - and our online Biomedical Engineering Training Programme is a shining example of the innovations on which we have built a reputation for delivering positive, practical and long lasting changes across the LMIC world.

Based on our extensive experience, and feedback from those working in this sector, we rose to the challenge of creating a package that was accessible to all, and cost-effective. We invested heavily and worked for two years in order to make it happen – and now it is having a direct positive impact.

“Thank you to the Medical International team for your efforts and your support in developing biomedical engineers to internationally recognised standards. I am very happy to be part of this team of biomedical technicians. Thank you for the initiative to train technicians online because this helps a lot of people to undertake their training and work at the same time without having to leave the country. I am very grateful for the knowledge you gave to us during the training period. I am going to use all I have learned to improve the quality of maintenance of our hospital's equipment. Thank you again.
Rwanda”



Biomedical Engineers: Motivated, Committed, Upskilled

But this programme is about more than just technical skills, knowledge and tools. It is the people who are at the core of what we deliver, and why.

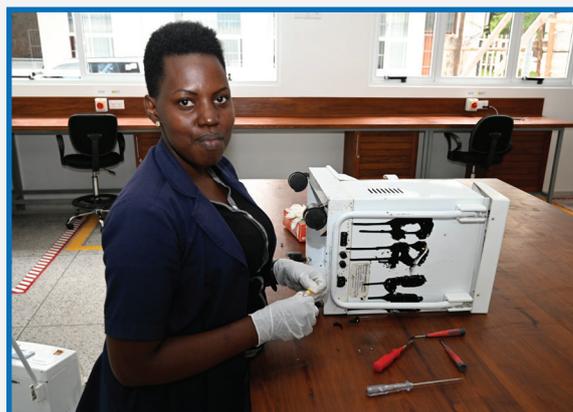
So often in our work, we have met ill-equipped but nonetheless motivated hospital maintenance staff and engineers. When we worked with them, it was wonderful to see them grow in stature as they enthusiastically assisted us and learned from us.

But it was also upsetting to realise that they had sufficient abilities to make a real difference on a sustained basis *if only they were equipped with tools and some basic training*.

Our experience is that the engineers, when trained and equipped appropriately, radiate a confidence that is then reflected in their day-to-day work. This, in turn, inspires the people they support, exerting a significant positive influence on clinical outcomes.

We know from experience that the process of training and supporting engineers, in the way we describe in this document, can create a network of motivated technical personnel across any given country, with transferable skills that can also be applied to general communication and support across other projects.

The benefits of upskilling already motivated and committed engineers can therefore not be overestimated!



Biomedical Engineer fixing equipment in North West Tanzania



Our trainee Callixte at Madagascar's CHUT medical facility. Our assessment visit revealed a lack of training, tools, and professional confidence.



Callixte, post-course, with the City & Guilds certificate awarded through our Biomedical Engineering Training Programme. Proud, fully trained, self-confident, he is now part of a motivated team properly equipped with a full comprehensive toolkit to provide long-term support.



How does the Biomedical Engineering Programme work?

The training is designed to be simple to implement and monitor. The programme is delivered entirely online, so can be accessed and completed from anywhere in the world.

There are 13 units, and at the end of each unit there is a series of multiple-choice questions (MCQs), totalling a rigorous 300 over the entire programme. The student must achieve 100% in order to move onto the next unit.

Students can retake as many times as necessary, but each time the questions and answers shuffle, to ensure genuine understanding and robust learning.

Upon completion of the course, the candidates who pass will receive

an Assured Biomedical Engineering certificate from City & Guilds – a globally recognised awarding body.

The programme also includes:

- A comprehensive professional engineering toolkit
- Four textbooks
- A full electronic library of service manuals
- Optional laptop in ruggedised military specification briefcase
- Reporting tools to enable sponsors and team leaders to track their students' progress (watch the Reporting Tools video here: <https://www.medaidacademy.co.uk/biomedical-engineering/>)



Toolkit, textbooks, service manuals, reporting tools – all supplied as part of the training programme, with optional laptop and ruggedised, military-specification briefcase.



The Course Content

The course content covers the many relevant and vital topics that will give students the basic foundations of biomedical engineering knowledge, including:

- Health & Safety
- Electrical Safety
- Electrocardiogram (ECG)
- Defibrillation
- Patient Monitoring
- Infusion Devices
- Premature Baby Incubators (PBIs)
- Ultrasound
- Surgical Diathermy
- Hygiene Guidelines – with Covid-19 updates
- Anaesthetics and the Operating Department – includes oxygen concentrators
- First Aid
- Train the Trainer
- COVID-19 guidance across all subject areas.

Implementing the Programme: Your Six Key Steps

The course implementation and monitoring process is designed to be straightforward, comprising just six key steps, each of which we can help you with

1. Helping you identify the right people

You should identify a cohort of students who will be suitable for the online course, based on their educational profile, performance record, interests and engagement level. Medical Aid International can assist with this process, and any previously trained engineers can also be valuable in identifying suitable candidates.

2. Equipping students appropriately and cost-effectively

We suggest, if funds are available, that students are provided with the optional laptop and ruggedised military-specification briefcase that we can

supply. This combination will enable students to follow the course, research solutions in their role as Biomedical Engineers, and communicate easily with project coordinators both directly and through internal forums (e.g. Microsoft Teams).

3. Monitoring and supporting students' progress

If you have multiple students following the programme, their progress can be monitored via the dashboard and downloaded as CSV-format reports. The reports give data for:

- Course completions
- Enrolled participants
- Not started
- In progress
- Completed
- Average test score
- Percentage completion
- Average time to complete



4. Adding value face-to-face

There is no doubt that the online course, with its associated professional toolkit, textbooks and service manual library, will have an immediate positive impact on students' effectiveness, as many organisations have experienced.

However, it is clear that face-to-face residential training - Covid permitting - will enable healthcare institutions to further consolidate and reinforce students' online learnings. As just one example, residential training enables students to be trained practically in the use of safety testers and patient simulators, which are both referenced in the online training course, and which can potentially be funded from the significant training savings delivered by the online course.

Medical Aid International can provide the venue for this residential component, typically over a period of 1 – 2 weeks.

Success in the online element automatically entitles candidates to consideration for the residential component, and this means that teachers can be confident that all students already have the same foundation of knowledge from the online

course content. (Our experience of running residential courses has shown that there can be tremendous variation in students' capabilities; prior learning via the online programme helps to remove this disparity).

Likewise, every student will know they have earned the right to be there as they have all passed the same training.

5. Managing onsite support and feedback

Depending on Covid-19 restrictions, the in-country coordinator or Medical Aid International partner can visit the students on an ad hoc basis to offer local support, and gather onsite feedback to facilitate continuous course improvement.

6. Making smart use of data

From the very beginning of the course, and after training, we aim to enable the engineers to use our specially developed data collection app, so that they and we can monitor activity and outcomes and take action to enhance engineering planning, maintenance, and future training delivery. Additionally, this data is useful to healthcare institutions for engaging potential sponsors and securing their backing.



First of all I thank you, The Medical International team for your effort and commitment towards developing well trained biomedical engineers especially for rural hospitals of underdeveloped and developing nations. I am indeed very happy and fortunate to be the part of this team now. I find Unit 1 about frequency spectrum, and Unit 11 about anaesthetics and the operating room helped me enhance my knowledge in these areas. Unit 13 is very crisp and sharp on communication, which helped me to imagine various scenarios, and how to be a more effective communicator, Trainer/Teacher etc. Overall, this course is an asset not only for biomedical engineers but also other healthcare workers, especially nurses like me. Once again I thank you, the team, and hats off for your support. THANK YOU.....India





Graduation of Guinea Biomedical Engineering Students in 2019.

Programme Budget

The programme fee without a laptop is £1,950. The programme with a laptop supplied in a ruggedised military specification briefcase is £2,750.



Summary

At Medical Aid International, we are passionate about delivering efficient, value-for-money training that empowers LMIC healthcare communities and enables them to proudly and confidently take ownership of their patients' current and future treatment and wellbeing.

Our online Biomedical Engineering Training Programme model is effective, simple, quick to implement, and proven to benefit patients rapidly. **It means equipment keeps working, treatment keeps going, and patients keep recovering.**

In fact, every Biomedical Engineer we train is a Good Samaritan in the making.



Medical Aid international

More About Us

Medical Aid International is a long-established, UK based, successful Social Enterprise with a culture of delivering effective aid solutions, as well as constantly reflecting on past experiences and events in order to learn and become still more effective in the future.

Tim Beacon, CEO



Tim, the CEO of Medical Aid International, has a clinical and commercial background in orthopaedic trauma and is also a qualified teacher who taught for several

years in the UK NHS and university-based nursing schools.

He has directed Primary Trauma Care courses in Uganda and advised on them in Zimbabwe. He was also a part-time instructor on the UK military special forces medical training course for five years and has completed the Oxford University Anaesthesia in Developing Countries course.

Alongside our work of equipping healthcare facilities in LMICs, we have always had an underlying belief in the value of education that is truly relevant to the environment and people it is delivered to – hence our development of the online Biomedical Engineering Training Programme.

He ran an adventure training-based personal development company for healthcare staff for 20 years, in addition to a church leadership role.

It was Tim's extensive training and education background that led him to consider more innovative ways of teaching, and it was this reflective process that inspired the team at Medical Aid International to put together a Biomedical Engineering Training Programme that could be followed online by anyone, anywhere in the LMIC regions and, indeed, the wider world.

Engineering Innovation for LMIC Regions

We are innovative and lateral-thinking in our approach, to the point where we have even designed and built our own LMIC-appropriate medical solutions where none previously existed. These include the EcoClave™ wood-fuelled autoclave, and, in partnership with a major UK university, an LMIC-friendly CPAP device that is currently undergoing clinical trials.

We have also designed and produced, in partnership with a major Western orthopaedic manufacturer, a CE/FDA marked external fracture fixator package designed specifically for LMIC use.



What You Can Do Next

Thanks so much for taking the time to read this brochure. We hope it explains how our online Biomedical Engineering Training Programme is helping to create real change for the better in hospitals and healthcare facilities in LMIC regions, and why we're proud of it.

Why not take the next step and find out more?

- **Visit our online training web page: find out more detail -** www.medaidacademy.co.uk/biomedical-engineering/
- **See what engineers help maintain:** the healthcare solutions that change and save lives. <https://www.medaid.co.uk/healthcare-solutions/>
- **Get in touch:** ask us how our online Biomedical Engineering Training can help your work. www.medaid.co.uk/contact/
- **Want to go ahead with training?** Enrol yourself or your students here: www.medaidacademy.co.uk/product/biomedical-engineering-theory-course/



Lameck and Kondwani, the Biomedical Engineers at Cure Orthopaedic Hospital in Blantyre, Malawi, proudly receive their City & Guilds Certificates from Elly, the Director of the hospital.

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