



**Engineering World Health Summer Institute
Uganda 2018
Final Report**

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Program Partners:

Duke University

Makerere University

Executive Summary

This year was Engineering World Health's second summer running the Summer Institute in Uganda with Duke Engage. We had 11 participants from Duke University and 6 participants from Uganda whose participation was enabled by Dr. Monty Reichert of Duke University and by EWH financial aid.

All program participants stayed together in a guest house in Kampala for the duration of the program, which allowed the Duke and the Ugandan students to fully share the program experience. During the first four weeks of the program, the group underwent intensive language, cultural, and technical training conducted at Makerere University by Dr. Robert Ssekitoleko and his team. After their training, participants began to rotate through hospitals in groups of 2 to 4. Unlike our other Institute programs, where participants have only one hospital placement, these participants rotated through seven hospitals, staying at each for about two weeks. In these hospitals, **the participants repaired 205 pieces of equipment worth approximately US \$410,000^[1]**. In addition, the participants completed two secondary projects for their hospitals, working with a budget of \$100 per person, to address a hospital need outside of equipment repair.

Our participant feedback was a mixed bag of positive and constructive, and gave us a good sense of how to improve the program for future Summer Institute groups. A few participants expressed a desire to work in hospitals outside of Kampala and spend a longer amount of time at each hospital. Many of our Duke University participants were grateful they were able to live with the Ugandan participants and create a more immersive experience.

Medical Equipment Repair

The 17 participants repaired or completed preventative maintenance on **205 pieces** of medical and hospital equipment, totaling approximately USD \$410,000^[1] of equipment repair service. Their work is summarized in the following charts:

Repairs/Maintenance by Type of Equipment

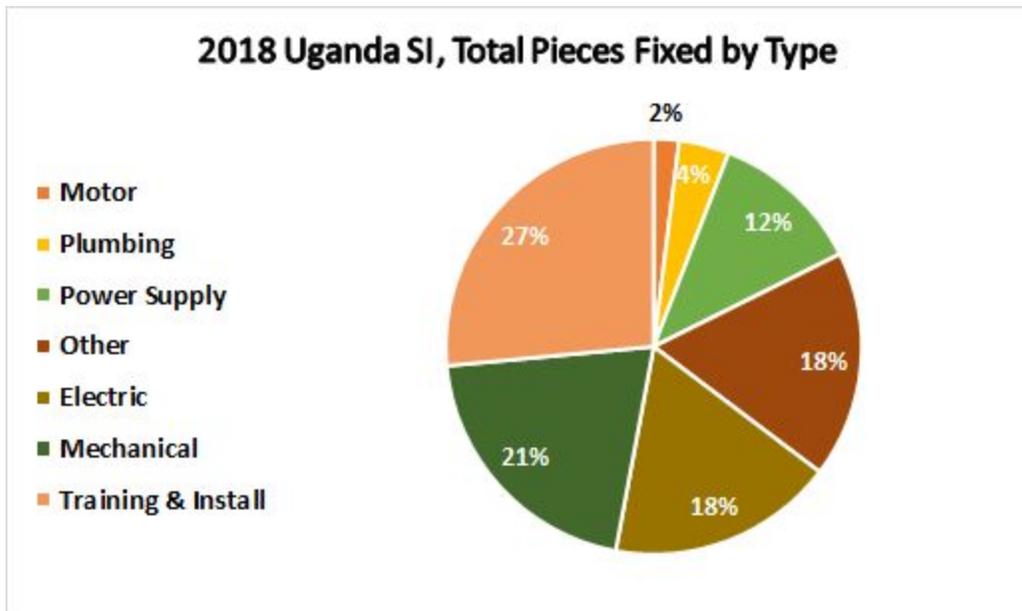
Type of Equipment	Total Pieces	Type of Equipment	Total Pieces
Air Compressor	1	Microscope	15
Anesthesia Machine	2	Nebulizer	5
Aspirator/Suction Machine	13	Operating Table	1
Autoclave	8	Ophthalmoscope	1
Bed, delivery	1	Octoscopes	1
Blood Bank Refrigerator	2	Oven, Lab	3
Blood Pressure Device, Automatic	11	Oxygen Concentrator	10
Blood Pressure Device, Manual	11	Patient Monitor	14
Centrifuge (electric or hand operated)	4	Phototherapy Device	4
Dialysis Equipment	1	Pulse Oximeter	10
Distiller	1	Scale (laboratory and in wards)	7
ECCG	1	Shaker Machine	2
Electrosurgery Machine*	3	Transformer	4
Fetal Stethoscope	1	Vacuum Extractor (for delivery)	4
Incubator (infant)	5	Ventilator	1
Infant Warmer (Radiant or other)	3	Washing Machine	1
Infusion Pumps	4	Water Bath (laboratory)	2
Lamp, examination	1	X-Ray Film View Box	1
Lamp, surgical	7	X-Ray Machine*	2
Laryngoscope	1	Other	36

*User training and/or low voltage and peripherals repairs only

Repairs by Hospital

Hospital	Items Touched	Repaired	Abandoned	Repair Percentage
Hospital 1	28	23	5	82%
Hospital 2	29	21	8	72%
Hospital 3	56	38	18	68%
Hospital 4	22	13	9	56%
Hospital 5	30	26	4	87%
Hospital 6	11	7	4	64%
Hospital 7	2	1	1	50%
Hospital 8	5	1	4	20%
Hospital 9	5	4	1	80%
Hospital 10	40	29	11	73%
Hospital 11	55	42	13	76%
Total	283	205	78	72% avg

Repairs by Type of Fix



Secondary Projects

Each team is encouraged to complete a secondary project for their hospital during their placement. Through interviews with hospital staff, the participants identify a need in the hospital, then are given a budget of \$100 per person to use in a creative way to provide for that need.

Group 1

Group 1's secondary project was to create equipment operation procedure guides for the staff at one of our partner hospitals. The project took about a week to complete. The group created a list of the most used and problematic equipment using data gathered from their inventory list. They were able to draft equipment operation procedures from a combination of their experience with the equipment and from user manuals found online. They took photos of the equipment to supplement the instructions in the guides. The group recommends this project to future participants due to the long lasting impact the guides can have on the upkeep of equipment.

Group 2

Group 2's secondary project was designing and building a prototype for a device that assists children with pelvic and lower limb disabilities to walk and stand. The design was a metal frame and a bar which moved across the frame on bearings. A harness was attached to the bar to support the patient's pelvis and lower back. The prototype was constructed with the assistance of welders, technicians, and hospital staff. The group said the process of completing this project was very rewarding and they enjoyed working closely with hospital staff.



Participant Debriefs and Hospital Feedback

Engineering World Health seeks not only to assist the hospitals in which our participant volunteers work, but also to influence the volunteers' own development as engineers and as global citizens. The participants were proud of the work they completed in the hospitals and the number of repairs they achieved as a group. We found we should work to improve the organization and structure of the lecture and lab portion of the program to make the instruction more consistent across the entire month. The hospitals were very pleased with the work of EWH's participants.

Acknowledgements

The On the Ground Coordinator was Peter Dobbs. The engineering courses were taught by Professor Robert Ssekitoleko and his team at Makerere University. Language and cultural training were provided by Makerere University. Special thanks to Dr. Monty Reichert, who was instrumental in the establishment and continuation of this program. We extend our best wishes as he retires this year and we welcome Dr. Libby Bucholz, a professor of biomedical engineering at Duke University, as DukeEngage-EWH Uganda Program's new faculty fellow. Thank you to all who helped make this program possible.

[1] EWH estimates the mean value of each repair at USD\$2000