



engineeringworldhealth

Summer Institute
Nepal 2023
Final Report

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EXECUTIVE SUMMARY

EWH's 2023 Nepal Summer Institute, a Campus to Country program in partnership with Denmark Technical University (DTU), was our sixth Institute in Nepal.

After completing a training course at DTU, nine undergraduate students and recent graduates traveled to Nepal for a 6-week Institute. They were joined by two Institute alumni, for a total of 11 students. After a brief orientation and language training, they move to their placement hospitals to serve as volunteer biomedical equipment technicians in small groups around the country.



Working on an electrosurgical unit

During their five weeks of hospital work, participants completed an estimated \$172,000 worth of service and repairs. A total of 86 pieces of equipment were returned to service across four different partner hospitals, including Parbat District Hospital, Dhading District Hospital, Baglung District Hospital, and Bharatpur District Hospital.

In addition to medical equipment repairs, participants completed a number of secondary projects ranging from building hand sanitizer stands to painting a mural and securing oxygen tanks

They participated in group excursions, including sightseeing in and around Kathmandu as well as a weekend trip to Pokhara.

The Institute concluded with a Final Conference in Kathmandu, during which each team gave a presentation about what they encountered in their placement hospitals, notable repairs, and the overall experience.

MEDICAL EQUIPMENT REPAIR

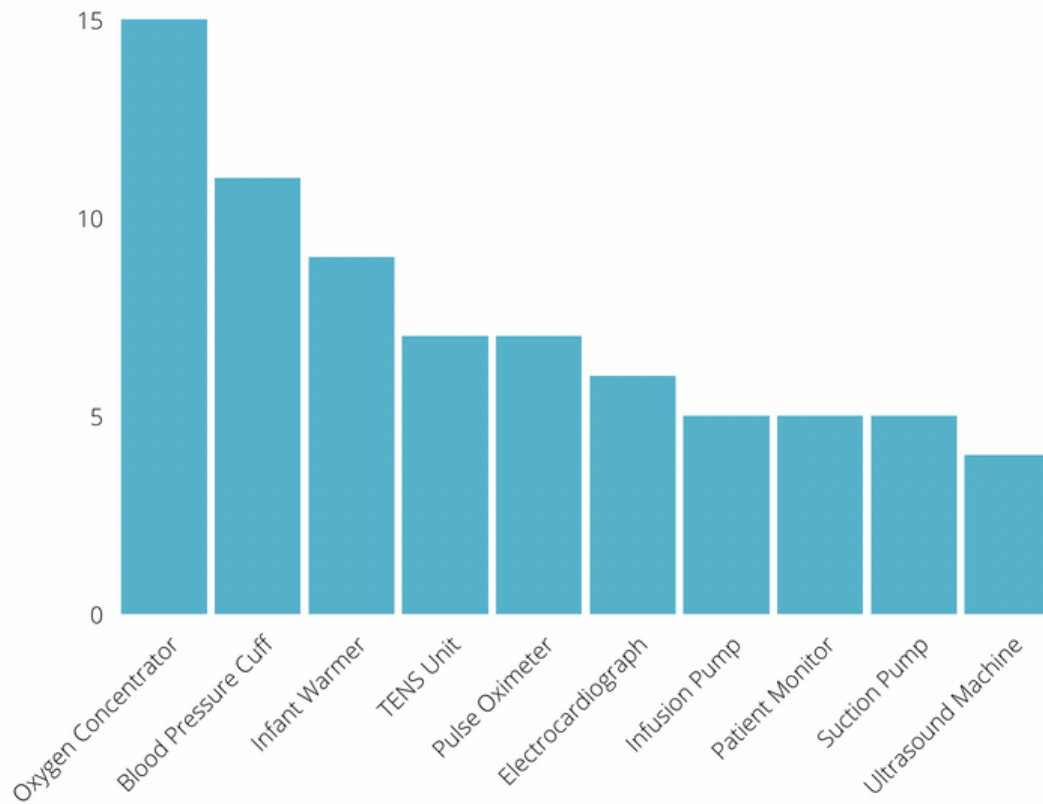
Participants were able to repair 86 of the 115 pieces of equipment that they encountered, for a success rate of 75%.

Each team completes a Work Summary Form during their time in the hospital to document the pieces of equipment they encounter, the reason the piece of equipment is broken (e.g. power supply issue, blown fuse, etc), and if the repair is successful. The most common barriers to repair are typically lack of necessary parts and those which require more advanced knowledge. Their work, as taken from the Work Summary Forms, is summarized below.



Alberte and Ábel desoldering

Repairs/Maintenance by Type of Equipment - Top 10

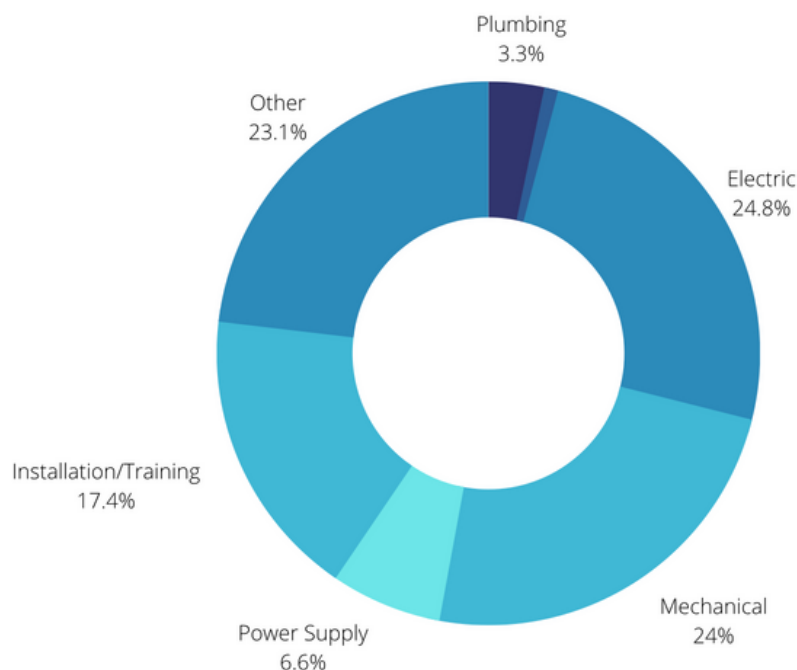


MEDICAL EQUIPMENT REPAIR

Oxygen concentrators, blood pressure cuffs, and infant warmers were among the most common types of equipment repaired during the 2023 Nepal Summer Institute.

Electric and mechanical problems were the primary issues identified among broken equipment.

Repairs/Maintenance by Type of Repair



Kristine working on an oxygen in Parbat

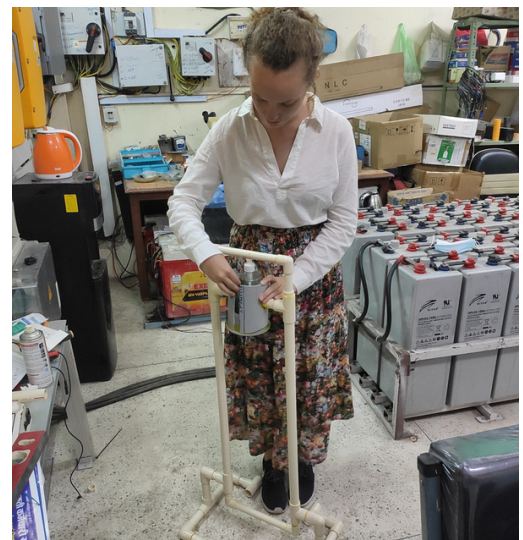
“It's been eye-opening seeing how a hospital works with fewer resources and to see which areas they prioritized and which they didn't.”

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 and are given a budget of \$100 per person to use in a creative way to provide for that need. The 2023 Nepal participants completed a number of secondary projects, detailed below.

Group 1

For their secondary project, Group 1 built hand sanitizer stands for their placement hospital using PVC pipes. This was a low-cost project that will enable hospital staff to clean their hands regularly, as hand washing facilities are not readily available throughout the hospital. In addition to building the stands, Group 1 bought a soldering iron and toolboxes for their hospital technician, and collaborated with Group 4 to paint a mural in the children's play area of their hospital.



Alberte with a hand sanitizer stand

Group 2



The prototype sensor handed over to the hospital BMETs

After talking with technicians about the hospital's need for calibration equipment, Group 2 decided to prototype an arduino flow and pressure sensor, which included coding, building a circuit and building a casing. They first built the circuit on a breadboard to make sure that everything worked as it should. Then, they soldered the components to a stripboard that fits in the casing, which was made from a pre-existing STL file. They wanted the OLED-screen, buttons, flow sensor and pressure sensor to be accessible from the outside, so they used solidworks to modify the lid of the casing so our components fit. They hope that in the future, the sensor can be used when calibrating devices such as ventilators and syringe pumps.

SECONDARY PROJECTS

Group 3



Brackets keeping oxygen cylinders in place

Group 3 noticed that there were a large number of unsecured oxygen tanks throughout their hospital, which can explode and pose a significant safety risk if tipped over. With help from the hospital technician and administrator, they worked with a local fabrication shop to order 30 metal cylinder brackets to hold the tanks in place.

Group 4

Group 4 completed three “mini” secondary projects for their placement hospital during the first few weeks of the program, including:

- Testing and creating an inventory of equipment in an abandoned isolation ward so that the hospital can move forward with turning it into a hemodialysis department
- Creating informational posters on equipment maintenance for hospital staff
- Cleaning and organizing shelves in the biomedical department workshop



The group posing with their finished mural

For their main project, Group 4 worked with the nutrition rehabilitation department in their placement hospital. The head nurse there requested educational paintings for the children in the play area, so they decided to paint a mural of the English alphabet with nutritional foods and their Nepali translations.

PARTICIPANT DEBRIEFS AND FEEDBACK

Participants on the 2023 Nepal Summer Institute described the experience as *eye-opening, insightful, wonderful, and challenging*.

When asked about the most valuable part of the program, students indicated that they were grateful for the knowledge and hands-on troubleshooting skills they gained, as well as the personal connections they made.

Primary challenges included working around the language barrier and in the heat.



Kristine and Matilde saying goodbye to the head of hospital and technician



About her greatest accomplishment on the program, one student said, **“I loved our projects and I mostly value the fixes where I could feel that it made a difference. Especially those where we taught the staff so they could do it next time.”**

Several students indicated that they enjoyed learning about Nepali culture and trying the local cuisine.

About the homestay experience, one student said, “We really appreciated our family. We did a lot of things with them, played with the kids and even helped them with some homework.”

EWH would like to thank all of the students, coordinators, instructors, partners, and donors who helped make this program possible!