



engineering**worldhealth**

# Summer Institute **Guatemala 2022** Final Report

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## EXECUTIVE SUMMARY

**EWH's 2022 Guatemala Summer Institute was our fifth Institute in Guatemala since 2018, and the first after a two-year hiatus due to the COVID-19 pandemic.**

This Institute hosted 12 participants from 3 different countries, including the U.S., Denmark, and Spain. The international students were joined by 5 Guatemalan students from the Universidad del Valle de Guatemala, for a total of 17 participants. After one month of intensive language and technical training, they served as volunteer biomedical equipment technicians in hospitals around Guatemala for five weeks.



*The group at an equipment graveyard during first month training*

Participants stayed at a hotel during the first month, and in private apartments for the second month. During the first four weeks of the program, the group underwent intensive technical and Spanish language training in Quetzaltenango, also known as Xela, Guatemala's second-largest city. Their technical training included both lab and lecture, with weekly visits to a local hospital to provide the participants with hands-on experience before beginning their hospital placements. After training, participants were assigned to one of our partner hospitals, located throughout Guatemala, to work in small groups.

**During their five weeks of hospital work, participants completed an estimated \$418,000 worth of service and repairs. A total of 209 pieces of equipment were returned to service** across five different partner hospitals, including Hospital Nacional Pedro de Bethancourt in Antigua, Hospital Nacional de Mazatenango, Hospital Nacional de Retalhuleu, Hospital Nacional Jose Felipe Flores in Totonicapán, Hospital Regional de Occidente in Xela.

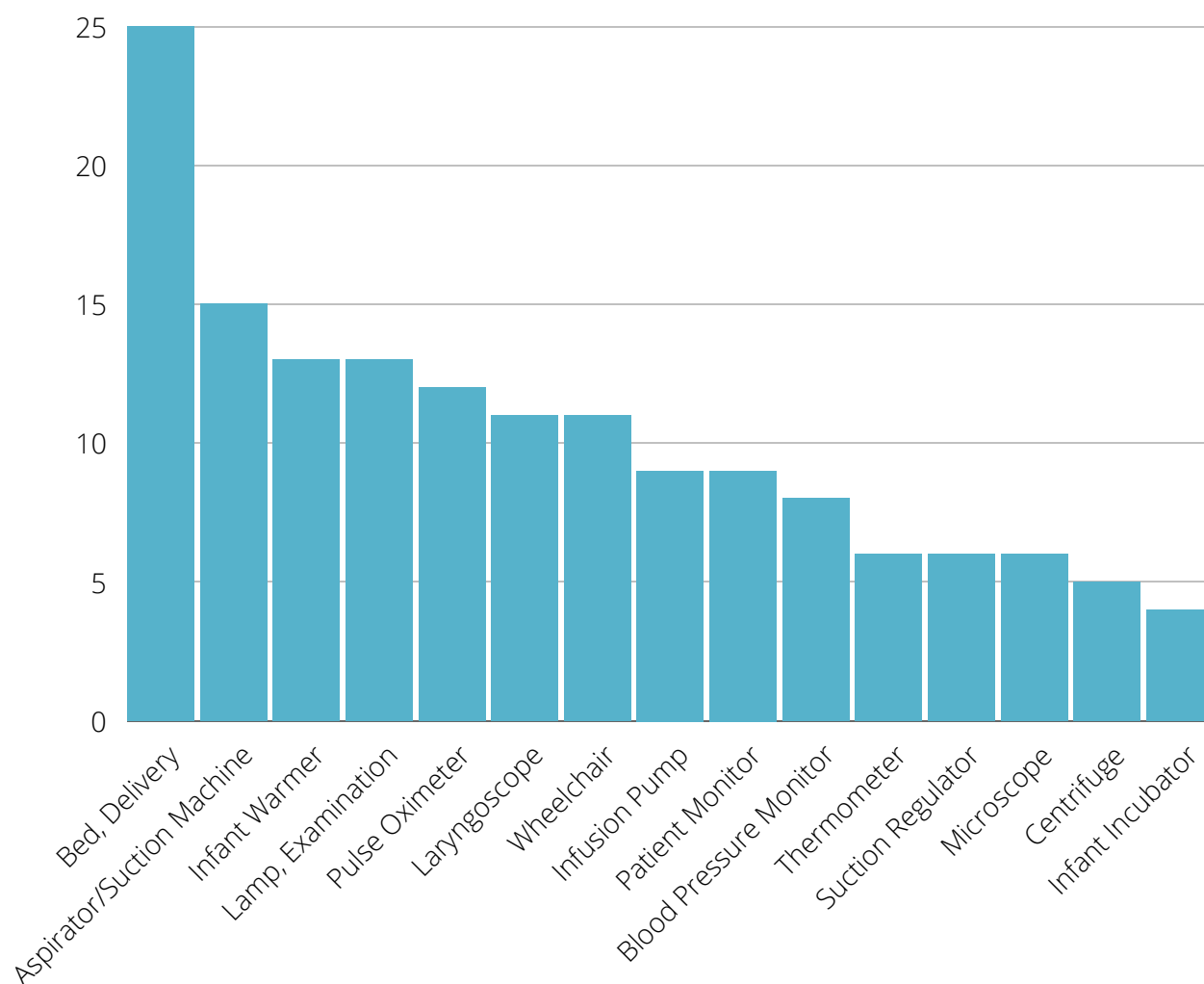
In addition to medical equipment repairs, participants completed a total of five secondary projects and participated in group excursions, including a trip to Santiaguito, an active volcano, and an indigenous village to learn more about native Guatemalan culture.

## MEDICAL EQUIPMENT REPAIR

**Participants were able to repair 209 of the 261 pieces of equipment that they encountered, for an impressive success rate of 80%.** 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 lack of parts and those which require more advanced knowledge. Their work, as taken from the Work Summary Forms, is summarized below.



Repairs/Maintenance by Type of Equipment - Top 15



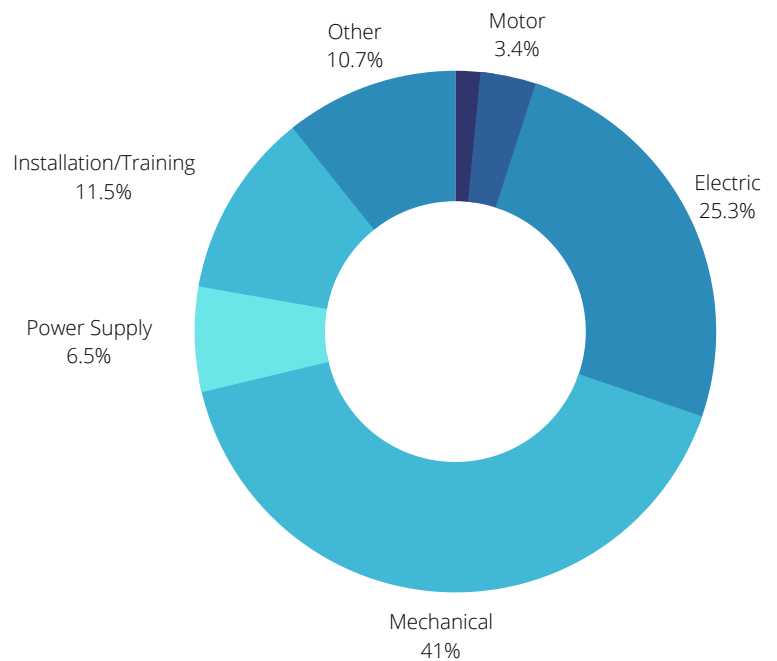


## MEDICAL EQUIPMENT REPAIR

Hospital beds, suction machines, infant warmers, examination lamps, and pulse oximeters were among the most common repairs made during the 2022 Guatemala Summer Institute. Electric and mechanical problems were the primary issues identified among broken equipment.

Notable high-impact repairs included an industrial dryer in need of rewiring which had posed a significant problem for hospital staff.

### Repairs/Maintenance by Type of Repair



2022 Guatemala SI Participants

*I've grown as an engineer because I have more confidence in my work and in my decision-making process.*

## 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 2022 Guatemala participants completed a total of 5 secondary projects, detailed below.

### Hospital 1

This team was asked by the doctor in charge of the pediatric department to paint a mural and make the ward more beautiful for the children. They painted the solar system on a wall and placed children's stickers all over the department's walls. All the doctors were very impressed, and they hid aliens around the mural which was a lot of fun for both the kids and the doctors to try and find. The stickers went into use immediately with the kids running around the halls to find the different animals.



*Jesper, Paola, and Jared with their solar system mural*

In addition to the mural, the team at Hospital 1 retrieved broken benches from the hospital graveyard to repair and add to the waiting area in front of the hospital, and used their leftover funds to purchase new tools for the maintenance department.

### Hospital 2



*Teresa and Maja on a bench that they built*

The nurses at Hospital 2 requested that Teresa and Maja spruce up the waiting area outside the clinic for their secondary project. They built benches, planted flowers, and restored a playground made by previous EWH volunteers that had been removed during the pandemic.

## SECONDARY PROJECTS

### Hospital 3

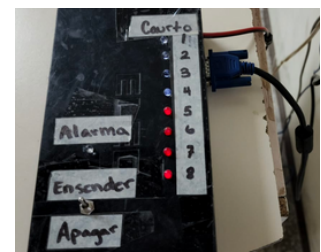
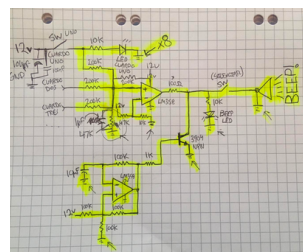
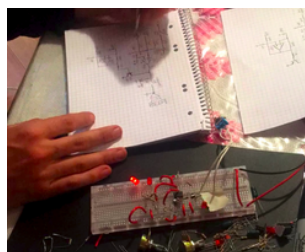
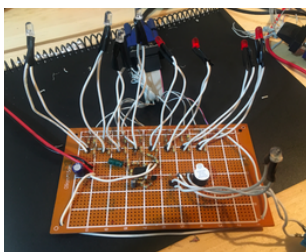


*Zach and Jessica showing the new call bell system to hospital staff*

Zach and Jessica created a call bell system for the men's surgery/remission section of their hospital in just four days. A call bell system had been installed around 25 years before and had stopped working about 20 years ago, according to some of the staff they had spoken with. The department consists of 8 rooms with 3-4 beds in each room.

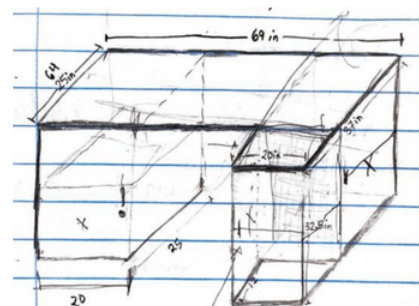
First, they took advantage of the cabling left behind from 20 years ago and got to work figuring out where each wire went and how it connected to the front desk.

Once they had the cabling figured out, they went into town to buy some parts from the electronics shop in order to begin making the call bell circuit. They spent the night designing a circuit on a breadboard, coming up with a schematic, and then soldering it, making use of parts scavenged from the hospital graveyard. They spent several hours troubleshooting the circuit, closed it up, and presented the new call system to staff.



### Hospital 4

Nehali, Julie, and Anders built a work station for the nurses in the Neonatal Intensive Care Unit. All the other departments at the hospital had a working station where they could do paperwork except the neonatal department. They built an L-shaped desk of black melamine with three lockable cabinets and plenty of room for nurses to work on both sides of it and navigate the small room.





## PARTICIPANT DEBRIEFS AND FEEDBACK

Participants thoroughly enjoyed the 2022 Guatemala Summer Institute, with 100% indicating that they would recommend the program to a friend.

Participants particularly loved working with and learning from their Instructor, Dr. Fryda, and On-the-Ground-Coordinator, Chris.

Primary challenges cited among feedback were the language barrier and, thus, communication with hospital staff.



*Spanish lessons in Xela*

One common theme among the feedback was that participants were surprised at what they were able to accomplish and the impact they had on their placement hospitals. One student remarked, "My goal when I came here was to just fix at least one important machine, and we ended up repairing 45 devices." Another student shared how he saw the impact of his work firsthand - **"My favorite fix was for an infant warmer which the nurses said got too hot for the babies... The very next day I saw them using it on a baby on a ventilator, so that moment was extremely real for me."**

When asked to describe the program, students said it was "unforgettable" and "intense." One said, "The overall experience was very eye-opening and unlike any other experience I've ever had."

Several students remarked on the challenges - and rewards - of navigating a new culture. One participant remarked, "Outside of the hospital, I think my biggest accomplishment was embracing a new environment, language, and people. **These past two months have been unreal and truly life-changing for me.** I was shocked at how quickly I was able to adjust and remain present throughout the entire program and overcome many challenges along the way."

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