Thesis Project Portfolio

Life Cycle Assessment of Medical Plastic Packaging of UVA Hospital

(Technical Report)

Examining Sociotechnical Relationships between Hospital Staff and Plasrtic Waste

(STS Research Paper)

An Undergraduate Thesis

Presented to the Faculty of the School of Engineering and Applied Science

University of Virginia • Charlottesville, Virginia

In Fulfillment of the Requirements for the Degree

Bachelor of Science, School of Engineering

Margaret Weber

Spring, 2024

Department of Biomedical Engineering

Table of Contents

Sociotechnical Synthesis

The University of Virginia (UVA) Hospital landfills about 4 thousand tons of waste each year. There is currently no recycling system in place in the UVA Hospital. In an effort to reduce the UVA Hospital's negative environmental impacts from landfilling plastic, this project focused on identifying a single hospital waste stream, quantifying its environmental impact, and informing hospital staff of this impact. Plastic packaging is used for almost all hospital instruments, and is infrequently contaminated by hazardous substances. Therefore, we identified plastic packaging as the waste of interest. To address the amount of plastic packaging waste entering the landfill, we conducted a life cycle assessment (LCA) to determine the environmental impact created from plastic packaging. The team issued a memo for the hospital to explain the findings of the LCA, and helped the hospital create a plan to implement a medical plastic recycling program.

It is important to consider the human and social dimensions of a medical waste recycling program because hospital staff will use the recycling program, and their needs must be met for the program to be successful. I used the Actor Network Theory framework as described by Bruno Latour in Where Are the Missing Masses? The Sociology of a Few Mundane Artifacts to analyze the human and social dimensions of a hospital waste recycling program. The Actor Network Theory framework states that the individual interactions between actors and technology must be considered as the actors determine the use of the technology. The relationships between hospital staff and waste helped to shape the recycling program, and thus, the interactions of hospital staff and waste must be examined to create a successful recycling program.

I collected data through reviewing case studies of successful hospital waste recycling programs in addition to interviewing current hospital staff. I conducted interviews with staff in several different departments and at different levels of their careers to get a comprehensive view of hospital staff's opinions.

Through my STS research, I learned hospital staff perspectives on hospital waste and the necessary characteristics a recycling program must possess to maximize efficiency in waste collection and participation. I found that most hospital staff are willing to partake in sustainable hospital recycling programs assuming the recycling program is accessible and convenient to use, staff are trained to use the program, and there is proper staffing and storage to maintain the system.

Altogether, this thesis created a blueprint for recycling medical waste and promoting sustainability at the UVA Hospital. The combined thesis offers lessons about a recycling program that can be scaled to include different waste streams in addition to plastic packaging.