

Thesis Project Portfolio

Life Cycle Assessment of Medical Product Plastic Packaging at UVA Hospital

(Technical Report)

Waste Labor Infrastructure and Visibility in UVA Hospital

(STS Research Paper)

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Introduction

Both the technical portion of my Capstone project and my STS research project focus on medical waste. The bulk of my technical project was spent analyzing the environmental impact of a specific waste stream at UVA hospital: plastic packaging. This research situates the institution's packaging waste generation within the entirety of its waste generation, as well as its economic and environmental expenditure — the physical aspect of medical waste. My STS research focused on the social and ethical aspects of this medical waste: how the visibility of waste laborers in the hospital reflects a greater power dynamic of (im)purity, though their work is essential to the function of the hospital system. Sustainable practices are incredibly important in the intervention of increasing climate change and pollution but are futile without the consideration of how this waste is managed and cared for by whom. Who we are is how we waste, reflected directly in how we consider those who deal with our waste. In the creation of new hospital systems for dealing with waste, it is imperative to consider both those who waste and those who labor.

Technical Project

UVA hospital alone generates over 8 million pounds of waste each year, a large portion of which comes from plastic packaging. Because of the nature of maintaining sterility and the danger of contamination, most medical products in the hospital are single use and packaged in unknown, non-recyclable plastic packaging. My teammates and I focused on about 15 specific products' packaging and determined their environmental impact as a subset of the larger impact of UVA hospital. We completed a life cycle assessment (LCA) where we gathered data on

packaging weight, material composition, number of units purchased, cost per unit over three years (2021-2023). After determining that the majority of the plastic packaging we were interested in was low density polyethylene (LDPE), we calculated the environmental impact of this portion of hospital waste using values of global warming potential (GWP), electricity, and water for LDPE. The overall impact of these specific products' packages over three years totals 96,000 kg CO₂ equivalent, over 2.7 million MJ of electricity consumed, and 2.2 million liters of water used. To reduce their environmental footprint, UVA hospital should focus on bolstering their in-house recycling program and reducing the amount of products that are opened, but unused. To produce more sustainable packaging (in that it is easier to recycle), manufacturers should switch to homogenous and/or biodegradable packaging materials. We propose these suggestions to staff at UVA hospital in hopes that our research and LCA will encourage change in system-wide wasting habits.

STS Research Project

Waste labor is both intimate and affective. Many scholars in the field of waste studies explore how waste is created and understood through anthropological, sociological, ethical, and ethnographic means. The guiding principle of this work is from Mary Douglas (1966) who connects the body and waste through the idea of transmittable impurity, or contamination. This perspective is furthered through research centered around domestic waste labor by Butt (2020), who conceptualized waste intimacy — those who work with waste have a unique relationship with themselves, the world, and the waste itself. Although the field of waste studies explores in-depth the relations we have with waste in its creation, management, and disposal, there is an absence of work that extends this knowledge into the medical system. Medical waste has a direct, and intimate, relationship with healthcare providers, patients, and waste laborers because

it is so often visceral, including bodily fluids, tissues, or parts. In my STS research, I strove to evaluate how this system of waste labor is created and exists within the UVA hospital, specifically in the general operation room (OR). I amended Susan Leigh Star's categorization of infrastructure with Brighenti's sociological concept of visibility to observe and evaluate the relationships that exist in the structure of the hospital, specifically in the management of waste. I shadowed a Surgical Support Technician (SST) to provide an ethnographic study to the research I had done regarding the field of waste studies. Waste labor in the hospital is incredibly intimate and largely invisible through the distinction of different positions that deal with waste, the physical separation within the hospital, and the relationship between waste laborers and other hospital workers (like surgeons and nurses). The personhood of waste laborers in the hospital is indeed permeated by their interactions with waste, making their work physically and socially invisible.

Reflection

Working on these two projects in tandem offered me a great deal of insight into the entirety of waste and waste management. The work of my STS research was supplemented by the experiences I had within the hospital; shadowing an anesthesiologist and a sustainable industry representative showed me for the first time how separate waste work is at UVA hospital. In the OR, there is a separate room for OR housekeeping to take the waste from a room post-surgery, which includes an elevator used solely for transporting this waste. The physical line that was drawn between the "regular" functioning of the hospital (providing medical care) and waste (and, consequently, waste workers) was bewildering. Being able to connect my research into waste studies with the proposed sustainable practices in the hospital aided me in constructing a very detailed overarching truth about waste systems: nothing will change, or be able to be

changed, if there is no consideration for the people within the system. To make a better recycling workflow in the OR, you must train all the staff, especially those who are sorting and transporting the waste. Even more so, the focus must be on how these systems affect those who sit at its lowest socially, but its highest essentiality. By working on these projects side by side, I was able to gain a deeper understanding of how these systems work, which allows me to understand how these systems can change. Though my work is not a years-long ethnographic study, both my technical and sociotechnical research can inform a new and larger conversation about medical waste.

Works Cited

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