

Undergraduate Thesis Prospectus

Improving Patient Flow in the University of Virginia Emergency Department

(technical research project in Systems Engineering)

Crippling Environmental Justice: Disabled Opposition to Plastic Bans

(sociotechnical research project)

by

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On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

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General Research Problem

How can disabled people's health and quality of life be improved?

There are many different approaches to how to view and understand disability. The most prevalent conceptual model has varied throughout history and in different social groups. While there are many models, including the charity, religious, and economic models, the medical and social models of disability are currently the most prominent. In the medical model, disability is viewed as a failing of the body and/or mind. There is an emphasis on treatment and 'fixing' or 'curing' the individual. It "conflates individuals with disabilities with the sick role and discusses disability in a deficit model orientation" (Haegele & Hodge, 2016). The social model, by contrast, views disability as being caused by a society that does not properly accommodate impairments. Political action and social change is required, "constructing solutions should not be directed at the individual but rather at society" (Haegele & Hodge, 2016). The two models disagree as to the problem that must be solved to improve disabled people's lives.

Improving patient flow in the University of Virginia emergency department

How can the efficiency, throughput, and quality of the patient experience be improved in the UVA emergency department?

Emergency departments (EDs) are vital but complicated systems. It is important that they run as smoothly and efficiently as possible to ensure the best possible patient outcomes. However, over 90% of emergency departments are regularly crowded (EMPC, 2016). Sun et al. (2013) found that when patients are admitted during periods of ED crowding, the odds of a longer hospital stay increase by 0.8% and the chance of inpatient death increases by 5%. Crowding can also result in "increased patient waiting times, decreased ability to protect patient

privacy and confidentiality, impaired evaluation and treatment, and difficulties in delivering person-centered care” (Moskop et al., 2009a). This project focuses on increasing patient throughput in the UVA ED to decrease crowding and improve patient outcomes.

This project is sponsored by the Operations and Systems Engineering Department at UVA Medical Center. The capstone advisors are Seokhyun Chung and Robert Riggs in the UVA Systems Engineering department. This capstone project is associated with SYS 4053 and SYS 4054. Student collaborators include Eunice Lee, Adalyn Mall, Noah Park, and Charlotte Sulger.

The goals of this project are to improve patient flow, increase patient satisfaction, and create new procedures for the updated ED space. This project has some unusual constraints. We are limited to making changes in the emergency department and cannot influence change in the rest of the hospital. There are also constraints inherent to working in a medical space. We cannot collect private health information and there are regulations that affect how an ED operates.

Emergency departments have researched and implemented different strategies to try to reduce crowding and improve patient flow. Easter et al. (2019) found that creating internal waiting areas for patients who have started the treatment process but do not need a bed allows resources to be used more efficiently. Separating patients into multiple parallel streams after being triaged by an attending physician improved both operational and patient-centered metrics. Point of care testing, rapid assessment, and staffing a primary care physician have also been shown to improve patient flow (Jarvis, 2016). The UVA ED has implemented physician-based triage, rapid assessment, and point of care testing.

Research has found, however, that the “cause of ED crowding does not intrinsically reside in the ED; it is a patient-flow problem in need of a hospital-wide solution” (EMPC, 2016). During our observations at the UVA ED, multiple physicians told us that patient flow greatly

improved while all elective surgeries were canceled, forcing patients to reschedule for a later date, because of the current IV shortage. To truly improve crowding, hospital-wide solutions are necessary. Moskop et al. (2009b) suggested coordinating bed management across departments, establishing inpatient units to hold patients waiting for admission, and creating standardized protocols for periods of hospital crowding. UVA currently has a unit dedicated to boarders (patients waiting for admission) staffed by inpatient staff and they are in the process of creating a similar observation unit that will be staffed by emergency personnel.

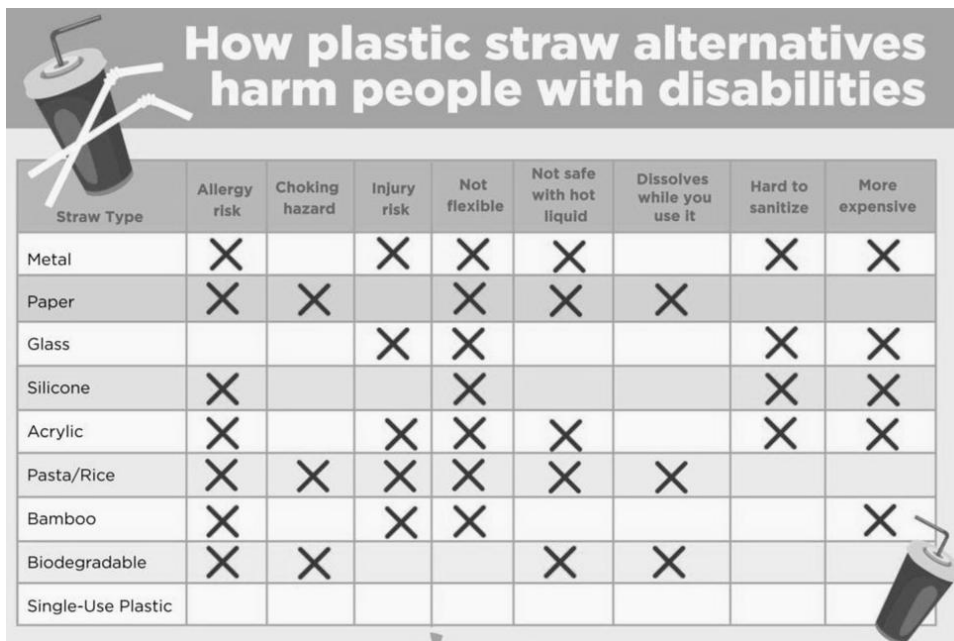
We have conducted observations in the ED to learn how the system works and understand the inefficiencies. During our observations, we have shadowed and interviewed providers. In addition to our direct observations, we have received most of our data from the Operations and Systems Engineering Department. They have provided us with the data collected and generated by Epic (with any identifying information removed). We have not finalized how we will test our solutions; we may have the hospital implement the solutions and measure the effects, or we may create simulations to test multiple possible solutions.

If this project is successful, improved patient flow in the UVA ED will allow more patients to be seen more efficiently. Improving patient throughput will improve patient outcomes and allow more patients to be seen. Our solutions may also be used by other hospital systems, expanding the impact of our project beyond just the UVA emergency department. The next phase of this project would be to work with other departments in the hospital, especially the General Medical department. Many of the bottlenecks in the emergency department are created or exasperated by long lead-times to admit patients and move them out of the ED to a bed in the main hospital. Improving patient flow throughout the hospital will improve operations and patient outcomes in the ED.

Crippling Environmental Justice: Disabled Opposition to Plastic Bans

How are disability advocates in the United States pushing back against single-use plastic bans?

Waste from single-use plastics is escalating worldwide; yet restrictions of single-use plastics leave some groups more disadvantaged than others. Many disabled people are more vulnerable to the effects of climate change, but they are often left out of conversations about environmental justice (King & Gregg, 2022). Some disability advocates say they have been excluded from conversations about single-use plastic bans. Many disabled people rely on single-use products made of plastic, such as plastic straws and sterile medical equipment. There are not always eco-friendly alternatives available; as a disability rights advocate points out, plastic straws are the only universally accessible straw type (fig 1). Single-use plastic bans often do not consider them, creating unnecessary barriers and diminishing their quality of life (Jenks & Obringer, 2020).



Straw Type	Allergy risk	Choking hazard	Injury risk	Not flexible	Not safe with hot liquid	Dissolves while you use it	Hard to sanitize	More expensive
Metal	X		X	X	X		X	X
Paper	X	X		X	X	X		
Glass			X	X			X	X
Silicone	X			X			X	X
Acrylic	X		X	X	X		X	X
Pasta/Rice	X	X	X	X	X	X		
Bamboo	X		X	X				X
Biodegradable	X	X			X	X		
Single-Use Plastic								

Figure 1. Accessibility of plastic straw alternatives (Schultz, 2019)

Researchers have investigated the social and environmental impacts of plastic bans. They question the efficacy of a plastic ban since it “only leads to a small reduction of global plastic marine pollution and thus provides only a partial solution to the problem it intends to solve” (Herberz et al., 2020). Scholars have begun to investigate eco-ableism, the “discrimination and silencing toward disabled and neurodivergent people ... arising in environmental spaces,” in the movement to promote environmentally friendly architecture and natural building materials (Schleck & Ben-Alon, 2024). Hemsley et al. (2023) assert that “plastic straws are an assistive technology critical for the social inclusion of people with disability.” Legal scholars argue businesses must provide plastic straws in order to comply with the ADA (Caverly, 2019). Campos (2021) explores how environmental attorneys have invoked and increased “disability panic – an outsized fear ... that chronic illness and disability are worst-case scenarios to be avoided at all costs.”

Disability advocates want to be included in single-use plastic ban conversations. Valley (n.d.) argues that “disabled people who rely on straws must be included in the conversation, listened to and respected.” These advocates are often at odds with the environmental nonprofits who champion bans. These organizations “are building momentum around a worldwide movement, so plastic straws become a relic of the past” through social change and local regulations (PPC, n.d.). The United Nations is an important participant in both environmental conservation and the protections of the rights of disabled people. They recognize “the importance for persons with disabilities of their individual autonomy and independence, including the freedom to make their own choices” (UN, 2006).

Participants on both sides of this debate include companies and trade groups that are primarily motivated by profit and other material interests. One such group is restaurants who

stopped offering plastic straws. They have portrayed themselves as environmentally focused to gain positive PR. In a press-release, Starbucks quoted the director of Ocean Conservancy's Trash Free Seas program saying that their "decision to phase out single-use plastic straws is a shining example of the important role that companies can play in stemming the tide of ocean plastic" (Starbucks, 2018). The Plastics Industry Association (PLASTICS) is against plastic bans, since it would hurt their material interests, and recommend recycling instead. According to the PLASTICS CEO, "Our industry will continue to grow as part of the circular economy, finding innovative ways to make plastic better and more sustainable" (PLASTICS, 2024). The plastics industry established multiple astroturf groups. The Alliance to End Plastic Waste was formed in part by a group of petrochemical companies and plastics manufacturers, though many of the alliance members are still building new plastic plants (Root, 2019). The Alliance to End Plastic Waste states that they "develop, de-risk and demonstrate solutions to address the plastic waste challenge" in order to create a circular plastic economy (AEPW, n.d.).

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