Senior Project Proposal
Delaney F.
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I. A Deep Dive Into The Blue Wrap Project: Sustainability and Human Connection in Medicine.

II. Advisors:

- BASIS Advisor: Rachel J.
- Internship Location: Northern Arizona Healthcare, Flagstaff, Arizona
- External advisor: Paula M. Research and Sponsored Programs Aministrator

III. Thesis

Medical waste is no joke. Not only can costs of waste disposal and single use materials be passed on to patients in the dreaded hospital bill, but the environmental impacts are formidable. One of the most prevalent materials in hospitals is a plastic based fabric called blue wrap. It is estimated that 225,000,000(NAH) pounds of blue wrap are discarded yearly in the medical industry. In 2019, Northern Arizona Healthcare initiated The Blue Wrap Project, in which they collect used blue wrap and repurpose it to make things like patient belonging bags, thus saving it from the landfill. For my project, I intend to analyze existing data concerning impacts of The Blue Wrap Project on community mindset as well as gather more data (such as interviews) as requested by NAH. I will be answering several questions: How did volunteers feel about working with the project? Did it change the mindset of operating room staff members? Were those who received recycled blue wrap products positively impacted? If so, how?

IV. Background

Unfortunately, I do not have tons of experience with the blue cloth used in operating rooms. In fact, prior to this year, I was not even aware of the use of blue wrap, or how extreme the environmental impact of this use is. But my interests in art, recycling, and medicine make me a perfect fit for this project. Throughout my life, and to the horror of my mother, my room has had piles of boxes and packaging and anything I thought could be repurposed. I've made miniature stained glass windows from takeout container lids and cardboard cacti from Amazon boxes.

While I have always loved repurposing materials and making things with them, my goal has always been to work in medicine. When I was little, I wanted to be a biomedical engineer. A few years later, I decided I would become a PA.

This project gives me the opportunity to get to work in a medical setting. I didn't really have connections in the medical world, and stepping into that realm is a daunting task. Having the help of a research center to support me in working with patient surveys and analyzing hospital waste is going to be a great way to prepare for the future by making connections in the medical field, building skills and gaining experience.

V. Central Issue

The ultimate goal of this internship will be to aid the hospital in compiling results from the Blue Wrap Project. I will be helping to create an article for the Arizona State Board of Nursing and potentially one for The Daily Sun as well. In writing these articles I will be aiming to both spread awareness about NAH's Blue Wrap Project in a way that may convince other hospitals to create similar projects and to convince NAH to continue funding and support for the project, as well as invest in broader future sustainability efforts.

One step of this process will be to create aesthetically pleasing and organized compilations of data and related information.

The awareness part of this project is what I started first. I have learned a lot about how little is known about the waste of blue wrap. Though I have not officially started work on the project, I have gotten to work with it a bit. Not only did I initially get very excited and tell everyone I saw about the project, I was also presented with an opportunity to reach a wider audience. I was invited to an art show and instructed to bring wares of my own. I sewed about a dozen blue wrap tote bags and screen printed a hand drawn design on them. With this, I also created a flier explaining the project, and what made each bag special.

Another step is to help convince NAH (and ideally the medical world at large) that The Blue Wrap Project and others like it should be supported.

VI. Performance factors and measures of success

One metric of success is the compilation of data and materials. This will be in both a physical paper format and digital formats. The current components of this "database" include several things. The first is a blue three ring binder with annotated copies of prior research, the data collected by the hospital, and other related documents such as the tag typically stapled to the blue wrap bags.

The main digital aspect is the digital records provided by the hospital, such as the donation records and numbers on blue wrap costs.

Another metric of success is my personal knowledge of the topic. I hope to be able to spectate the blue wrap collection process and learn more about the material and the people involved with the program.

The other representations of success will likely come in final products, like the totebags I have sewn or interviews with volunteers and nurses. These will be handed out at a final presentation. Ideally, the presentation will be well formulated to educate the audience about all aspects of The Blue Wrap Project, from collection to final bags. These ideas will also ideally be published in an article in The Arizona Daily Sun.

VII. Internship Ties

As with many kids, especially at this school, when asked about future careers, my answer has always been "I want to be a doctor." The more niche aspect of this answer is that I want to be a physician's assistant. The program is in essence a masters degree version of the typical training to become a physician. It offers less specialization but a wider scope and would allow me to practice in medicine in the way that works best for me. The prerequisites for this degree include a lot of biology classes, along with some statistics and chemistry. This is exciting to me because I have loved biology every time I have taken it, and am excited to learn more about medicine. Though many things are not listed as prerequisites to become a physician, I believe that even more important than a knowledge of anatomy is an awareness of human kindness and an ability to actively improve the medical industry as a whole. This is what is provided by The Blue Wrap Project. It has already been so enlightening to learn about all the aspects of medical sustainability involved in this project, and I know that going forward, I will only learn more about not only the project, but also how to push for positive change within a hospital.

VIII. Review of Literature

In recent years, hospital waste has increased due to replacing reusable materials with single use ones as they became cheaper. While this is sometimes to improve sterilization and thus patient safety, it is frequently driven by financial and other motivations (Mcgain et al, 2014). With these single use materials, hospitals in the USA generate an average of 5500 tons of waste per day. (Mcgain et al, 2014) Most of this waste comes from operating rooms. A whopping 33% more waste is generated in the OR than in other departments of the hospital (Harding et al, 2021). Several studies have been done on OR waste, typically focusing on specific areas, like hand surgery or military operations.

Healthcare in the U.S. is also responsible for 8% of the country's total CO2 emissions (Mcgain et al, 2014). Though waste is unavoidable, that in the U.S. is extraordinarily high, 5% higher than England's 3% (Mcgain et al, 2014). These high carbon emissions emerge from several aspects, one of which is energy. It is estimated that around 20% of public sector energy usage is due to healthcare. (Mcgain et al, 2014).

In one study, C. C. Zygourakis et al. defined waste as "any disposable surgical supply that was left at the end of the case that was not used in the surgery." One improvement they suggested was improving education about waste, which is a major goal with the Blue Wrap Project.

One common concern about this waste is the potential for it to be hazardous, creating issues with recycling and handling. To help with this concern and improve education, in 1992, Rutala et al categorized waste based on hazard potential and suggested methods of disposal.. "Hospital waste" (or solid waste) refers to all waste, biological or nonbiological, that is discarded and not intended for further use. "Medical waste" refers to materials generated as a result of patient diagnosis, treatment, or immunization of human beings or animals. "Infectious waste" refers to that portion of medical waste that could transmit an infectious disease. (Rutala et al, 1992).

Blue wrap makes up an estimated 19% of surgical system waste (EPA, 2002) When discussing blue wrap as waste, it is important to discuss the material itself. It is made of polypropylene (van Straten et. al, 2021) One way of repurposing is through melting and reforming into needed products (van Straten et. al, 2021) This process is done in Ireland (Rooney et al, 2023) and at the Legacy Health System in Oregon and Dominican Hospital in California (EPA, 2002) However, this is not feasible for Flagstaff, as we do not have appropriate recycling facilities.

There have been several projects created on a similar scale to that of NAH. One such project was in the Minnesota Medical Center, where in a process very similar to Flagstaff, blue wrap was collected before patients entered the room and distributed to nonprofits to be turned into new things (Albert et al, 2015).

Going forward, the ideal solution would be to replace blue wrap with reusable aluminum sterilization cases. A life cycle assessment of blue wrap as opposed to reusable cases found that even in the first year, disposable blue wrap had roughly twice the environmental impact of reusable cases. (Babcock). Though disposal of blue wrap may seem the most harmful, this study also found that energy consumption while sterilizing reusable cases was way lower than its disposable counterpart (Babcock). Not only are environmental impact and associated electricity costs of reusable cases lower, they can also improve patients' wellbeing and decrease labor cost. Reusable kits require far less time to unpack and are less prone to failure, meaning less last minute canceled operations due to sterile field issues (Bradley et. al, 2021).

IX. Bibliography

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