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Spring 2016 Class Members:

Healing Environments in Hospitals: More than Just Medicine
John Gabat, Beth Taylor, Emi Schwartz, Jenny Nguyen

First Hill Mobility: Encouraging Sustainability through Walking Loops
Amy Wang, Anna Carney, Calahan Knapp, Cole Laush, Hannah Wright Osborne

Good Mood Food: An Assessment of Food Options in Seattle-area Medical Centers
Sarah Mayberry, Eugenia Park, Andrew Tran, Johanna Ventre

Green vs. Green: Cost Saving and Waste Reduction for Recycle Xylene
Andrea Hatsuikami, Jake Vogt, Julia Bucy, Alan Garvey

Chemical Spill Clean-Up Video: The Making Of
Sam Maylor, Michelle Suga, Andrew Newton, Lan Luo

Healing UW Medicine with Corporate Social Responsibility: A Case Study on Improving CSR Practices
Alexandra Bradley, Danielle Flanagan, Megan Kamerman, Tessa Yip
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Introduction

The UW Medical Center, along with Harborview and Virginia Mason medical centers, are considered national leaders in effective healthcare. With this influence, hospitals in the Seattle area have the opportunity to make a profound impact on what defines the quality of care for their patients and communities. As our medical centers continue to serve more patients, their environmental impact will also increase, and they should be continually looking for ways to limit these impacts.

Healthcare is an enormous field with a hefty goal: to keep people healthy. As we’ve learned this term, being healthy requires living in an environment that we consciously keep healthy as well. Hospitals should serve as a role model for sustainability for both the well-being of their patients and for their communities at large.

Greening healthcare is a wide-reaching topic that includes, but is not limited to, waste diversion, energy use, reducing carbon emissions, access to hospitals, and healthy or sustainable food options. In addition to reading articles and participating in hands-on activities related to these topics, the Sustainability Studio class also learned about sustainable healthcare systems from hospital and healthcare personnel. Among these guest speakers were Brenda Nissley of the Harborview Medical Center and Dr. Lonnie Nelson and Lindsay Mabbutt from the Partnerships for Native Health. As a class, we also took a guided tour of the UW Medicinal Herb Garden led by its current gardener, Keith Possee, as well as a virtual tour of Virginia Mason’s EnviroMason Facilities. These guest speakers and visits provided us with more insight into the current efforts of sustainable healthcare and also helped us identify areas that could still use improvement.

As always, this Sustainability Studio included an in-depth group project with external professional partners. Topics for group projects included an audit of healing environments in hospitals, improving mobility around First Hill, an evaluation of food systems in area hospitals, corporate social responsibility in healthcare, a cost-benefit analysis of xylene distillation opportunities in UW labs, and the development of training materials for chemical spills. All groups conducted their research in different ways to achieve their project and clients’ goals, but all were oriented around the same central objective: encouraging sustainability in healthcare. The following report outlines the work of all student groups from Spring 2016, and may offer some possible solutions for how Seattle-area healthcare facilities can continue to improve their sustainability efforts.
Healing Environments in Hospitals:
More than just Medicine

Report By: Emi Schwartz, John Gabat, Jenny Nguyen,
Bethany Taylor

Client Partner: Sean Schmidt, UW Sustainability
Project overview

Research Questions
For this project, our group was assigned the task of examining what environmental elements help to heal patients in hospitals, and to evaluate whether or not these elements are present enough in UW Medical Centers. In order to complete this project, we began by identifying three main questions that we hoped to answer during our research:

1) How do hospital healing environments relate to the concept of sustainability?
2) What makes an effective healing environment?
3) Has UW Medicine implemented these healing elements into their hospitals?

Objectives
After determining which questions we wanted to answer over the course of the project, we also came up with three objectives that would structure our literature review and research methods:

1) To create a baseline understanding of what makes a successful healing environment in order to be referenced and used for further projects
2) To conduct research on a broad variety of sources and compile into a condensed resource
3) To evaluate medical centers on the current status of their healing environments based on our specified parameters and criteria

Hypotheses
Upon starting this project, our group had not considered the effects of positive healing environments in relation to sustainability, nor had we thought much about what factors help patients heal faster in hospitals. Our project was very exploratory by nature. However, we did hypothesize that natural views and access to outdoor areas or natural light would help patients feel better and heal more quickly. We also assumed that these factors would be strongly present in UW Medicine facilities overall because these hospitals are leaders in medical research and are among the best hospitals in the country.

Background
Hospitals are incredibly resource-intensive organizations in regards to energy, food, raw materials, and waste. A higher number of patients translates to more resources that are being used to help heal people. By healing patients more quickly and effectively so that they don’t have to return for as much or as long of care, hospitals can help to create a more sustainable system with a smaller environmental impact.
Methods

I. Literature Review

The first step of our research involved an extensive literature review to learn what elements in hospitals contribute or detract from patients’ ability to heal. Based on our review of scholarly, peer-reviewed journal articles, we discovered five healing elements that seemed to be the most commonly cited and most important for healing patients in hospitals:

- natural light/windows
- plants
- wall colors
- art
- low/no noise pollution

Natural light and exposure to outdoor views are calming for patients and may help them heal more quickly. A 1984 study showed that patients with access to natural light had fewer analgesic doses and also received “lower scores for minor post-surgical complications.” Additionally, patients with views of trees had shorter hospital stays overall and received better feedback from nurses.¹

Access to indoor plants and flowers has also been found to have positive healing effects on patients in hospitals. In 2016 researchers found that in hospital environments, keeping even ornamental plants around reduces stress and anxiety in patients. The natural aesthetic beauty of greenery creates a soothing effect when people are healing in hospitals or at home.²

The colors of the walls surrounding patients can also have an effect on their mood and emotions while trying to heal. According to a study published in 2008 in the Journal of Environmental Psychology, lighter wall colors can help to reduce stress. Additionally, blue and green shades help to reduce stimuli and therefore allow patients to relax more. White walls were found to have negative effects on the moods of patients.³

There is also evidence that art has positive effects on those trying to heal. Studies have recorded evidence that the aesthetic beauty and appreciation of art can impact the body in addition to the mind. According to a study by Hawthorn et al, these calming and happy effects are magnified when the art contains natural landscapes.⁴

Finally, there is strong evidence that indicates how influential noise can be on a patient’s ability to heal quickly. A study completed by Moudon et al in 2009 explains that low noise pollution can reduce patient annoyance, lead to less aggressive behavior, contribute to overall better health, and cause fewer psychological effects of hospital stays. This noise essentially includes any sound that causes sleep or thinking disturbance.5

II. Hospital Audits: Scoring Criteria
After conducting our literature review, we came up with a specific scoring criteria to evaluate these five healing elements. We tried to be as objective with our scoring as possible. Although we did not specify a minimum number as a threshold for natural light, plants, and artwork, a high total number for each of these elements indicates a good score.

1) Natural Light/Windows:
As natural light is a positive influence on one’s healing environment, we evaluated each hospital on the number of windows in each room.

2) Plants
Since plants have proven to be a valuable aspect of speeding up one’s healing ability, we also evaluated each hospital on the number of plants in each room.

3) Wall Colors
Walls with soothing colors (such as blue and green) are known for reducing stress while white walls are associated with slower healing times in comparison. To evaluate the rooms, we assigned rooms with colored walls one point and zero points if there were only white walls.

4) Art
To evaluate hospitals on their usage of artwork (ranging from landscapes and sculptures), we evaluated each hospital on the number of art pieces in each room.

5) Low/No Noise Pollution
To account for the negative effects a noisy environment can have on a healing environment, we assigned a negative value of 1 for any noise pollution and a value of zero if no noise pollution was present.

III. *Hospital Audits: Locations*

After finalizing our scoring criteria, we split off into pairs with each group either going to UW Medical Center or Harborview. We were unable to evaluate patient rooms because of the medical staff’s concerns regarding patients’ privacy. However, we narrowed down three specific hospital areas to evaluate in our audit: waiting rooms, cafeteria, and the main hallways. We chose these three areas primarily because of the likelihood that patients will interact with these environments.

- **Waiting rooms**
  Waiting rooms are generally the first place each person is exposed to once they enter a hospital. Whether it’s checking in or asking for information on a current patient, there is a lot of waiting time involved with this environment.

- **Cafeteria**
  If not eating in the patient rooms itself, people are most likely eating in the cafeteria. Along with the importance of providing nutritious and sustainable food, an effective healing environment is necessary because of the time needed to order and finish their meal there.

- **Main hallways**
  Although people are not expected to spend extended amounts of time in the hallways, it’s important that main hallways have a good healing environment because patients often have to travel from one wing of the hospital to the next for surgeries and other appointments.

**Findings:**

Based on our data collection we are able to note differences found in UW Medical Center and Harborview. Our team created 2 graphs to visually display our data. Overall, UW Medical Center was lacking indoor plants, having a total of 2 in the main hallway and cafeteria. However, there are many outdoor views with lots of trees and shrubs. UW Medical Center also had a total window count of 16 vs. 10 at Harborview, providing more chances for patients to view plants and greenery. UW Medical Center also had more colorful walls in its cafeteria and waiting room. During our data collection, we found that Harborview had more indoor plants than UW Medical Center with a total of 5. Harborview also had 35 total healing elements, which was 5 more than
UW Medical Center. By looking at the graph below, it is clear that Harborview also has the most art pieces with a total of 22 vs. UW Medical Center with 16.

Noise pollution was one implication that potentially affected our results. Both UW Medical Center and Harborview had a total of negative 3 for noise pollution. It is important to note that noise pollution is subjective, so our results for this criteria should not be used without further research. This limits our data set and graph to only be used for comparative purposes. Another limitation is sampling bias. Both teams chose which rooms and areas to sample based on ease of accessibility and time constraints. The UW Medical Center and Harborview have multiple waiting rooms and hallways, and looking at the buildings’ floor plans and assigning random waiting rooms, hallways, and cafeterias for auditing would provide more accurate results.

Time was also a huge limiting factor for our team, so we decided to keep our data collection simple. Our team also only sampled hospitals close to the University of Washington as funds for travel were not provided. One of the biggest limitations, however, was having no access to patient rooms. Due to privacy concerns and busy staff our group was not able to collect data from these areas. Patient rooms are arguably the location where patients spend the most time and therefore healing elements will likely have the largest impacts.

Our team would conduct this project differently if given more time and funds to collect data. One change would be to pick a randomized sample of hospitals from Washington, as Harborview and UW Medical Center are known for addressing patient concerns and providing the best care possible. Looking at our data, the general public may think that it could also represent all hospitals in general, which is not the case. Having the time to create a randomized sample of hospitals and funds to travel would help provide data that better represents all hospitals in Washington state. More time would also enable our team to create a ranking scale to properly compare all hospitals sampled, not simply providing totals with the viewer left to decide for themselves which hospital provides a better healing environment. Lastly, filling out
any paperwork or requirements in order to collect data from patient rooms would have allowed us to audit that area, which would have contributed greatly to our data collection.

**Recommendations for UW facilities**

Both Harborview and UW Medical Center received varying scores for each of the criteria and hospital areas that we audited. However, from our result, we can conclude that the locations in each hospital that need the most improvement in their healing elements are the cafeterias and hallways. These areas received the lowest overall scores or were missing important healing elements altogether. From our audit results, we also determined that the healing elements that were lacking the most between the two hospitals included low noise, indoor plants, and calming wall colors. As these are areas that patients visit daily and these healing elements are supported by research considered important to the healing process, UW Medicine should focus on improving these components across their facilities.

After compiling and analyzing our results, we reviewed case studies of other leading hospitals that are actively and publicly working to improve these particular healing elements within their buildings. UW Medicine can reference the following hospitals’ practices for guidelines to improving their healing environments:

- **John Hopkins University Hospital** focuses on creating avenues for natural light by making sure their facilities include many windows. They have built sound-absorbing materials into the walls and ceilings of patient rooms, and have also installed a low-noise calling system so that this frequent sound won’t disturb patients.\(^6\)

- **William P. Clements Jr. University Hospital** has dedicated specific elevators in their facilities for moving supplies around hospitals. These elevators are distant from patient rooms as to not cause noise from moving materials on carts. They have also identified private meeting spaces for staff to use for conversation and collaborative work so that they’re not talking outside of patient rooms.\(^7\)

- **Crouse Hospital** is one of many locations that has implemented the “Shhh (Silent Hospitals Help Healing)” campaign. This campaign was created to educate staff and visitors to the hospital of the impact that their noise level can have on patients.\(^8\)

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Seattle Children’s Hospital has incorporated nature scenes across the hospital that are inspired by Pacific Northwest landscapes. This helps to connect children with their outside environment, much like plants in hospitals do.9

Next Steps

In the future, UW Medicine should audit their other facilities to determine which locations and healing elements need improvement in those hospitals as well. Ensuring that hospital environments are constructed with the healing process in mind will help UW Medicine to better serve their patients and to achieve greater sustainability, as making healing environments a priority in their system is crucial. UW Medicine may also consider collaborating with other healthcare providers to learn about their healing environment efforts, and to find options that may work well in their own facilities.

Further research should also evaluate the effectiveness of different healing elements by measuring patient stays and patient progress in comparison with the quality of their healing environments. Researchers may also want to look at more elements of hospital environments, potentially those that are less obvious, to find more opportunities to effectively heal patients. This research should also lead to recommendations that hospitals can easily implement to work toward better healing environments and ultimately, a more sustainable healthcare system. This continued research can save hospitals money while setting examples and goals for the healthcare system.

Main Point

Sustainability in healthcare requires more than diverting waste and reducing energy usage: it must reach all the way to the patients, whose well-being is ultimately the purpose of hospitals and the reason for their resource consumption. Hospitals should be environments in which patients can feel calm, heal more quickly, and spend as little time in the system as possible. Ensuring that hospital environments achieve these goals will reduce resource usage in healthcare and will also contribute to a healthier and happier community.

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First Hill Mobility:
Encouraging Sustainability through Walking Loops

Team Members: Amy Wang, Anna Carney, Calahan Knapp, Cole Laush, Hannah Wright Osborn

Client Partners: Lisa Herriott and Ted Klainer of Harborview Medical Center, First Hill Improvement Association
Overview
Our team initially partnered with Lisa Herriott of Harborview Medical Center to create walking loops for patients, visitors, and staff of Harborview Medical Center. By creating these walking loops, we would encourage sustainable practices by speeding up the recovery time of patients and thus decreasing hospital waste, and by supplying hospital visitors and employees a green opportunity to explore the nearby area.

Project Timeline Synopsis
During our first meeting with Lisa, we were introduced to our second client partner, Ted Klainer. Ted works for both Harborview Medical Center and the First Hill improvement Association (FHIA), and explained that there was a $20,000 grant that had just been awarded to the FHIA to use on this mobility project. With the budget established, Ted wanted our group to conduct research to develop potential walking loops for the First Hill neighborhood as well as to brainstorm ways we could visually present our data. The FHIA did not have a clear vision of how to allocate the money, and so Ted informed us that we would be working side by side with the FHIA as they established their plan.

At our second meeting, and first with the FHIA, we were informed that, rather than creating new loops, the association wanted us to encourage the use of pre-planned, but un-marketeted walking loops that already existed. Additionally, in order to promote these loops, FHIA wanted to identify and paint traffic control signal boxes with the assistance of Urban Artworks. Signal boxes hold the electric controls for traffic lights and pedestrian walkways. Although these boxes are usually large and gray, when painted, these signal boxes can be forms of public street art. For our group’s purposes, the painted boxes act as waypoints along the loops in order to bring attention to them and beautify the neighborhood. Each signal box would cost $1,000 to paint, and at least three need to be painted for Urban Artworks to come out and paint. With our newly defined scope from our client partners, our responsibilities consisted of assembling and organizing information about the signal boxes on First Hill, and making informed recommendations to the FHIA.

Main Questions and Hypotheses
Specific project characteristics guided our research and data collection. Of a larger $80,000 Seattle city grant, FHIA planned to allocate $20,000 towards the mobility project. Though there is a good chance that the committee will allocate some, or all of this budget toward signal
boxes, there are other neighborhood implementation ideas still under debate that would encourage walkability. This uncertainty was due to planning deadlines - FHIA is presenting final decisions in late June 2016.

From the FHIA identified scope, our team developed two overarching research questions to guide our project goals:

1. How do walking routes and painted signal boxes increase sustainability for the First Hill community?
2. Which signal boxes would be most effective in promoting the walking loops and the goals that the FHIA identified?

Through our research, and recommendations, we were able to assist the FHIA, promote walkability on First Hill, and as a result, reach our sustainability goals. We had two hypotheses that guided our research and later recommendations:

- Signal boxes along high-traffic streets would be most effective to all First Hill users as they have the highest visibility.
- Painted signal boxes will increase walkability and guide pedestrian exploration by drawing walkers from amenity-dense streets to greener, quiet, relaxing streets.

The main goals of our project were to promote sustainability by increasing walkability, connecting people with the natural environment, and stimulating local business through the beautification of the First Hill neighborhood through painted signal boxes. From our knowledge of sustainability and healthcare from this course, we determined that this particular project could correlate by decreasing an individual's stay at a hospital, subsequently minimizing the waste the patient produces, encouraging walking decreases CO2 alternative methods of transportation, walking itself encourages healthier lifestyles, and green Seattle streets connect people to the natural environment promoting environmental consciousness.

**Methods and Findings**

Before visiting First Hill, we assembled a Google map, using ‘My Maps’. We tagged amenities including food, drink, cultural sites, places of worship, various landmarks, sites of development, sites of signal boxes, using the ‘layers’ feature on My Maps feature. This helped us become acquainted with First Hill before visiting the neighborhood and collecting data on foot.
From our preliminary research, we narrowed our hypotheses to finding effective locations to paint signal boxes. Essentially, we considered signal boxes near significant landmarks such as City Hall, Frye Art Museum, retail-dense intersections, and those along walking routes as the most impactful sites to paint. Impactful can be defined as having high visibility, a high pedestrian appreciation value, and being easily navigable. Another interactive map was created using My Maps which allowed us to compile the three already proposed walking loops by FHIA, and all the signal boxes in First Hill, to see if there was any correlation with the two. We then highlighted signal boxes as locations of interest.
We noticed that 13 signal boxes out of the total 45 in First Hill coincided with the pre-existing walking routes: Swedish First Mile, Potential Active Zone, and Yesler Terrace Green Loop. The breakdown of these 13 signal boxes were:

- 6 on Swedish First Mile Loop,
- 7 on the Potential Active Zone Loop, and
- 1 on the Yesler Green Loop (see Fig. 2).

We thought that choosing these 13 signal boxes to paint would be the most beneficial to the community, but we wanted to collect data on all 45 boxes in order to confirm our recommendation and to offer additional data to the FHIA in case they decided to use different walking loops.

After creating the visual with the Google map, our team visited First Hill to investigate, make observations, and photograph all 45 signal boxes. (See Fig. 3). Each member took a section of First Hill and recorded site details such as: signal box visibility, the walkability of each intersection using questions like “how well is it paved?” “is it traffic-heavy?” and “is it pedestrian-heavy?”, as well as slope, aspect, viewpoints, and amenities in the nearby vicinity. We also took photographs of the signal boxes and a panorama of the entire intersection to provide visuals along with our observations.

After obtaining field data, we went back to our new interactive signal box map on My Maps to input the data we collected on all 45 signal boxes, which provided us with a spatial component.
for our research. This helpful visual also allowed us to illustrate the recommended signal boxes as geographical points of influence, using the amenity points and proximity to other landmarks to show how painted boxes could benefit specific parts of the neighborhood.

Discussion

There were some shortcomings in our research. Firstly, standards for photographs and note taking techniques were not established, so the visuals and data obtained by each member of our team are slightly different. This lack of uniformity inhibited our research presentation and map database user ease. Additionally, we identified 13 signal boxes to paint, but we did not rank these boxes by their attributes which will make choosing signal boxes to paint more difficult for the FHIA. If our team had more time and further planning, additional research and data collection should be done to determine a ranking system of signal box site impact and subsequent effectiveness for painting.

Conclusion and Recommendations

Based on the field research our team gathered in First Hill, we conclude that the 13 signal boxes aligned with the 3 proposed walking loops by the First Hill Improvement Association will be the most impactful to this neighborhood. Our research shows that these 13 signal boxes had the best amenities, and easiest walkability for hospital guests and visitors. In addition to these signal boxes that corresponded with the pre-existing loops, our team found a fourth loop or link that also met our sustainability goals as well as neighborhood enhancement (see figure 4). The ease of access at all these waypoints, would effectively encourage higher community
involvement from recovering hospital patients, residents, and visitors leading to healthier lifestyles and that will also stimulate the local businesses in the area.

From our conclusion, our team’s recommendation for the University of Washington to improve healthcare options for the First Hill community in particular, would be to paint signal boxes that fall along the 3 loops in First Hill--Swedish First Mile, Potential Active Zone, Yesler Terrace Green Loop, as well as our own proposed route. Together these painted signal boxes could be a first active step in creating a more sustainable environment in First Hill. Specifically, this enhancement to the neighborhood would positively impact the economic, ecological, and social environment.

![Map showing potential signal box waypoints](image)

*Figure 4. Potential Link with numerous signal box waypoints*

**Economic benefits**

The economic stability of First Hill would directly benefit from increased use of walking loops. The artistic designs on the signal boxes adds a rich flavor to the community, attracting more pedestrians. Since the signal boxes’ main purpose is to be waypoints for each walking loop,
they will directly help guide pedestrians along the anticipated loop. These loops hit major businesses in the neighborhood, especially the proposed link which covers the length of Madison Street and Broadway, the commercial corridor. These streets have the highest density of retail, food, and other businesses.

**Ecological benefits**

The ecological environment would also gain much attention from painted signal boxes. It is difficult for urban folk to find ways to connect with nature. But even small improvements like painting signal boxes can beautify a neighborhood to the point where people want to go outside to experience life beyond the indoors. Besides commercial endeavors through painted signal boxes, there is one signal box that falls on the Yesler Terrace Green Loop which is the green space that the First Hill Improvement Association wants to highlight for hospital patients and visitors alike. These quieter accommodations will help foster connection with the natural environment outdoors.

**Social benefits**

Finally, painting signal boxes in First Hill can help improve the social environment. Increasing the amount of people walking in First Hill, whether it be hospital guests, visitors, or residents of the neighborhood will give the opportunity for them to be more involved with the community. Guided exploration of First Hill’s less visited areas will help foster greater connection and appreciation for this place.

An additional recommendation was for a potential Commercial Link (see Fig. 3). This link follows the Madison commercial corridor and links all three walking routes together. The link functions as “spine” or First Hill neighborhood with the highest density of retail, food, and business. It can thus be used to steer pedestrians off of high-trafficked Madison and Boren to less-visited, quieter, greener streets where lack of amenities or familiarity may have prevented exploration/visiting previously. Potential economic and environmental impacts from the commercial link include: increased walkability and consequential increase business for retail/food in the area, as well as steering and encouraging pedestrians to visit greener, quieter streets, which could foster more connection with the natural environment.
Next Steps
For the scope of this project, we focused mainly on potential signal boxes that we can paint to encourage walkability in the community. In order to develop the community even further, we believe things like benches would allow residents and visitors to enjoy the nearby scenery more. Padding pedestrian-friendly crosswalks would further encourage mobility in First Hill, and complement the painted signal boxes’ well.

Main Point
By determining the optimal places to paint signal boxes in the First Hill Community, we are one step closer to establishing a more thriving community. Painted signal boxes add more character, personality, and liveliness to a community, which can increase the number of people who choose to walk around the area. Our ultimate goal is to make residents and visitors feel like the First Hill neighborhood is a safe and inviting place to be in.

First Hill Mobility Map. UW First Hill Mobility Team. 6 May 2016. Available from: https://www.google.com/maps/d/edit?mid=1Aw4gJ14QBveg0pZ8XqoxlYzd5v4
GOOD MOOD FOOD

ENVIR 480 Sustainability Studio, Spring 2016

Project Team Members:
Sarah Mayberry
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Andrew Tran
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Client Partner:
Sean Schmidt
Assistant Director of Communications & Programs, UW Sustainability
Overview:
The main question for our project was: *How does the University of Washington Medical Center’s (UWMC) food system compare to other hospitals in the area?*

We compared the UWMC to Harborview Medical Center, Swedish Medical Center, Virginia Mason Medical Center, and Seattle Children’s Hospital.

The second main question for the project was: *How does staff respond to the available food in the medical center?*

Our objectives as a group were as follows:

1. Find out how faculty members respond to the food availability and food infrastructure at the UW Medical Center (e.g. sustainability awareness, UWMC food program awareness, food preferences)
2. Research and analyze the food program at the UWMC
3. Research other medical centers at the forefront of sustainability and propose realistic solutions to how UWMC could improve their food sustainability program.

Hypothesis

Our hypothesis was that most faculty would agree that the food at the UWMC would be sustainable and healthy, as Seattle medical facilities have made large efforts to improve the sustainability of their food systems. However, we believe that completely changing the food system would be difficult, as there are many preferences and factors in place that pose a considerable challenge.

Background

**UWMC**

The University of Washington Medical Center is a leading hospital in healthcare sustainability. It has been recognized as the No. 1 hospital in Washington and Seattle Metro Area by the U.S. News and World’s Best Hospitals Report\(^\text{10}\). In addition, it is routinely ranked in Practice Greenhealth’s 2016 “Top 25 Environmental Excellence Awards”, and has been on the

list for 10 years in a row\textsuperscript{11}. The hospital has special recognitions with “Healthy Food Circle” and “Climate Circle”. The UWMC facility organized an internal group of top healthcare professionals throughout the hospital called the “Healthy Committee”\textsuperscript{12}. In 2012 the group implemented a Wellness Initiative where they partnered up with the Northwest Agricultural Business Center and the Puget Sound’s Food Network to bring healthy, local, organic, and sustainable foods into the hospital food program\textsuperscript{13}.

The UWMC also participates in various programs, such as Meatless Mondays where no meat is served on that specific day of the week, and the Healthy Beverages Initiative, which encourages healthy beverage vending and access to public drinking water,\textsuperscript{14}. Throughout the campus and cafeteria, there is significant signage and posters with sustainable food information on them, listing, for example, their local food sources, partners, and reminding visitors to eat healthy foods daily, as shown by Figure 1.

In 2015, UWMC’s food consisted of 25% local food, 13% organic produce, 70% sustainably raised/antibiotic-free meat, and 39% grass-fed beef\textsuperscript{15}. While rankings are important, it was paramount to visualize and quantify the extent of success that the UWMC has had, as described through our methods and findings.

\textbf{Figure 1\textsuperscript{16}:} We visited the UWMC Plaza Café and observed the food system.
Methods and Findings:

Survey

In order to evaluate staff opinions on the sustainability of the food system at the University of Washington Medical Center, we worked with our client partner, Sean Schmidt, Assistant Director of Communications and Programs for UW Sustainability, to develop a survey to faculty and staff at the UWMC. The survey was created and hosted through the Survey Monkey online program, and consisted of 6 questions for the respondents to answer, either in the form of multiple-choice or Likert scale questions. The survey was opened on April 28th and closed on June 2nd. We accumulated a total of 10 responses, which was less than favorable and not entirely representative of the employee population at the facility, but still informative and a good initial step.

After identifying the occupation of the survey respondent, each was asked a series of questions about their own personal food preferences and choices. The first of the six questions asked what role or occupation that the respondent held within the UWMC. As shown in Figure 2, 60% of the respondents were nurses, while 30% of the respondents held a clerical role within the hospital. One surgeon had responded (10%), yet no physicians did. It was encouraging that respondents were from multiple fields within the hospital, suggesting that if this survey was conducted on a larger scale, there would likely be participation from members of various hospital committees.

![Figure 2](image)

Given the choices of No Preference, Vegetarian, Gluten-Free, or Vegan, an overwhelming 80% answered that they had no preference, while 20% answered that they were vegetarian. No respondents were gluten-free or vegan. This question could help to show the diverse food habits within the hospital.
Question 3 (Figure 4), asked respondents how they typically get food to work. This helped determine the eating patterns of the respondents in regards to the food that they eat during their shifts. This data begins to represent the diversity of preferences in terms of where hospital staff prefers to get their food.

Question 4 offered a Likert scale, in regards to whether the respondent believes that there are enough locally-sourced food options within the medical center. The responses were greatly dispersed as shown by Figure 5, but slightly leaned towards agreement with the statement.
Forty percent of the faculty believed that there were enough unprocessed foods available, at least to an extent. However, 20% remained neutral, and 40% disagreed in some manner (Somewhat/Strongly Disagree). It was interesting to find that no respondents strongly agreed that there were enough unprocessed options, but if this survey was conducted on a larger scale, a more concrete result could have been yielded regarding this opinion.

Half of the respondents somewhat agreed with UWMC providing enough healthy food options, while 10% strongly agreed. There were no neutral responses.
Area Medical Center Case Studies

To benchmark the sustainability and progress of UWMC’s food system, each member of our team individually researched one of four different area medical facilities and its food efforts.

**Harborview Medical Center**

The Harborview Medical Center is part of UW Medicine, making it very similar to the University of Washington Medical Center. There is a lot of collaboration between nurses, caregivers, dieticians, and more to produce meals that are healthy\(^\text{17}\). Patients always have access to a nutrition consultant, to receive more information about the food in this healthcare facility. Some of the food that is made in the kitchen are from local sources, making the food more sustainable.

Although there is sustainable work being done, there is a lot left to do. There are vending machines, just like at the UWMC, that are full of packaged food\(^\text{18}\). Inside the machines there are candy, soda, cookies, and many more unsustainable, unhealthy foods. At Harborview, there is also a lot of focus on “rot”\(^\text{19}\). In 2009, Harborview only composted 21 tons of organics per year, but in 2015, Harborview composted 320 tons of organics\(^\text{20}\). Being stricter on buying compostable materials and making sure food doesn’t get thrown into the wrong waste stream have been large ways that Harborview has been able to increase the compost weight of the

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\(^{17}\) UW Medicine (2016). *UW Medical Center Events & Programs*. Retrieved June 8, 2016 from [http://www.uwmedicine.org/uw-medical-center/Pages/nutrition-events-programs.aspx](http://www.uwmedicine.org/uw-medical-center/Pages/nutrition-events-programs.aspx)

\(^{18}\) Ibid.


\(^{20}\) Ibid.
hospital. A future goal of the center is to include break room compost bins to make sure that no organics are left behind\textsuperscript{21}.

**Swedish Medical Center**

Swedish Medical Center has also worked significantly to build and maintain the sustainable groundwork of its food system. Like the other medical facilities, Swedish offers room service for its patients and vending machines with snacks, beverages, and microwavable food. The facility consists of a primary Market Café cafeteria which provides space for patients, visitors, and staff to dine with a high variety of food, ranging from continental meals to traditional hot food choices\textsuperscript{22}. The facility incorporates a traditional rotating menu at affordable prices for the consumers. The rotating menu also allows them to implement programs into their daily rotating meal, such as Meatless Mondays, without getting rid of food options that people enjoy. Cafe 1910, a restaurant within Swedish, is devoted to serving food prepared in healthier ways than fryers, such as grills, ovens, and raw, such as in its salads (see Figure 8)\textsuperscript{23}. Swedish also offers a clinical nutrition program, which is staffed by registered dietitians, who help patients reach their dietary goals through counseling as well as therapeutic practices. Equivalent to its peers, Swedish Medical Center also works to improve its waste disposal infrastructure, as it composted approximately 132,480 pounds of yard and food waste in 2013\textsuperscript{24}.

![Figure 8](image_url)

\textsuperscript{21} Ibid.


\textsuperscript{25} Boss, D. (2012, January). *Cafe 1910 and Kitchen at Swedish/Issaquah Medical Center* [digital...
**Virginia Mason Medical Center**

Virginia Mason has taken tremendous steps in recent years to become more sustainable. In 2016, it was awarded with the highest honor from Practice Greenhealth, the Top 25 Environmental Excellence Award. Its environmentally-conscious efforts began in 2007, when it was the first hospital in the Pacific Northwest to compost food waste. In 2013, it eliminated Styrofoam service ware from its campus, utilizing exclusively compostable food utensils and containers. It also strives to purchase as much sustainable and local food, meats, and produce as possible to serve within the hospital. According to hospital representatives, 40% of all of the food purchased for Virginia Mason is sustainable and local, and 80% of the food served at the various facilities around campus is prepared from scratch.

To cut down on food waste, Virginia Mason now requires chefs to put food waste into clear containers so that the executive chef can assess if the chef is cutting the food item properly, and if s/he is using the item to its entirety before disposing of it. Virginia Mason also offers a 'room service' menu throughout the day, which gives the patient the ability to customize any food of their choice. The menu also clearly labels each item that is gluten-free, vegan, or certified sustainable seafood. The food served within the cafeteria and various other restaurants around the campus have also undergone some changes in 2016, as Virginia Mason has worked to remove the deep fryers, and serve smaller portions of meat. A reduction in the amount of meat served not only helps to reduce the hospital’s carbon footprint, but also helps to increase vegetable intake of patients and guests. The hospital has previously donated excess food to local charities to minimize their food waste, but with the implementation of Just In Time, a program focused on “producing just what is needed, the amount that it is needed, when it is needed,” the hospital no longer has excess food to donate.
Seattle Children’s Hospital

Seattle Children’s Hospital has made big strides in hospital sustainability emerging as a leader, and is another recipient of Practice Greenhealth’s 2016 “Top 25 Environmental Excellence Awards”\(^{35}\). The hospital launches *Mission: Nutrition* in 2012 where it eliminated foods that are high in fat, are deep-fried, contain high-fructose corn syrup, are high in sodium, and highly-processed\(^{36}\). Deep-fried foods have been replaced with baked versions. The hospital committed to the Childhood Obesity Prevention Coalition’s healthy beverage program and cut out sugary beverages from the hospital, replacing them with drinks with low-to-no sugar (less 10 grams per 8 ounce), such as low-fat unsweetened milk, unsweetened teas, and no-sugar-added 100% juices\(^{37}\).

Seattle Children’s is in the process of building an entirely new inpatient food program that will begin Fall 2016\(^{38}\). Recently-hired Patient Chef Ryan Garcia is focusing on sourcing fresh, local, sustainable, organic ingredients to make healthy, therapeutic food for hospital patients\(^{39}\). Partnering up with Puget Sound Food Hub and Seattle Tilth, the menu will consist of healthy, wholesome meals mostly made-from-scratch\(^{40}\).

**Assessment:**

Throughout the course of conducting the project, we ran into numerous challenges and shortcomings:

- *Low survey participation*. If the survey link was out for a longer amount of time, more people would have taken it and we could have done more work with it.
- *Timeline*. There was not a lot of time allotted to this project every week and more time would have been extremely helpful.

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• **Limited visits.** We only visited the UWMC – data from the other medical facilities was all through online and print sources. Visiting Swedish Hospital, Virginia Mason, Harborview, and Children’s Hospital would have given us more insight to the food systems that are implemented.

In addition, more time would have allowed us to get in contact with food management staff of each respective medical facility, and thus valuable accounts on how efficient they believe the current food systems are. A larger team would have aided in developing stronger experimental and field data.

**Conclusions:**

The results of the six survey questions revealed that there was not a significant trend between the opinions and preferences of faculty and staff toward the UWMC’s food system. This conclusion could have been different if we received more respondents. It does however signify that the food preferences of people are diversified, possibly illustrating a heavy contrast between the kinds of food choices and structures that individuals like and those that they do not prefer. This emphasizes and reinforces the justification of having diversified food choices, regardless of how unhealthy some of the choices may be perceived to be.

The UWMC has done a lot in regards to sustainability, however, more can always be done. Based on the audit done at the UWMC, one recommendation that we have is to remove unhealthy vending machine snacks from the campus. Although this would cost money to remove all of them, it would provide the hospital with less unhealthy, unsustainable snacks.

Another more radical approach to take would be to remove all non-locally sourced foods as well as non-organic foods, while also no longer serving items that are deemed unhealthy on the menu. Environmentally, this would be more sustainable as it reduces the cost of transportation, the carbon emissions, as well as allows people to eat healthier. However, behaviorally and socially, this is unfeasible, as people will demand some unhealthy foods. Patients and visitors, who already may be dealing with a whole array of issues that affect their appetite, are not likely to support their favorite foods being discontinued from the menu.

**Next steps:**

A crucial next step for us to take would be to continue to keep the survey open so more faculty members could respond. By doing this, we would acquire a larger and more quantifiable sample size and a better understanding of the opinions the UWMC hospital staff have of the
food served there. If the staff feel compelled towards particular opinions in the existing food system, they may be able to influence administration and the regulatory bodies of the medical facility to implement changes in the food system infrastructure.

Targeting the primary consumers (i.e., the patients) of the food products is also valuable in accumulating significant, measurable data of opinions and preferences on the food infrastructure at the UWMC. Giving these consumers access to the survey would help influence food infrastructure based on their health as well as visitor needs, because they are responsible for either amplifying or discouraging the demand. However, contacting these consumers is a difficult task to achieve. Patients generally have to deal with traumatic issues, depression, as well as their health complications. In their condition or present state of mental capacity, they may feel uncomfortable and thus unwilling to participate in a survey. Visitors who visit the patients may also be dealing with emotional issues and depression for their loved ones, as well as not have the time or desire to complete such a survey. Nonetheless, proper advertisement and the emphasis of how beneficial the answers of the survey can be for promoting sustainable, healthy food for them to eat at the medical facilities may sway them to participate.

To help achieve sustainability in its food structure, the UWMC must therefore conduct projects that seek out innovations in the reporting as well as communications systems of their food management. Efficient reporting as well as adequate communication must be carried throughout the life cycle analyses of all the foods served, ranging from the medical facility itself up to the transportation system, the vendors, and the producers.

**Main Point:**

The sustainability of the food system at medical facilities like the University of Washington Medical Center is an inherently more complex issue than “people versus the environment”. Specific rules and regulations are not going to facilitate change, but rather conflict. People have differing preferences in regards to how they perceive sustainability in food. To truly achieve sustainability, lifestyle changes and preferences cannot be forced, but rather offered.
Green vs. Green:

Cost Saving and Waste Reduction for Recycled Xylene

XDG: Andrea Hatsukami | Jake Vogt | Julie Bucy | Alan Garvey

Client Partners: Tracy Harvey | John Wallace - UW Environmental Health & Safety
SECTION 1 - OVERVIEW

Our project for this quarter was to perform a cost benefit and feasibility analysis of two xylene distillation machines as well as gauge the interest on the topic of onsite xylene distillation at the labs of the University of Washington Medical Center (UWMC) and University of Washington School of Medicine (UWSM).

Group Roles

- Alan and Jake communicated with various labs and hospitals regarding xylene use to gather information and determine a cost benefit analysis.
- Julia created the PowerPoint and consolidated the data collected.
- Andrea gathered background data on xylene and helped with the PowerPoint and visual aids.

QUESTIONS:
The overarching questions that our group has regarding the topic of onsite xylene distillation include;

- How is xylene distilled?
- What are the barriers to implementing onsite xylene distillation?
- What is the return on investment and/or cost savings for this process?

OBJECTIVES AS A GROUP:

- To learn about the xylene distillation process.
- To understand who at the University of Washington uses xylene, and how much they use.
- To find out the hurdles labs have to overcome in order to recycle their xylene, with the end goal of mitigating those hurdles in the future.
- To perform a cost-benefit analysis of xylene distillation.
- To expand our research to other hospitals in order to come up with a framework for University of Washington to recycle their xylene.

PROJECT HYPOTHESIS:

Our hypothesis is that xylene distillation is cost effective and feasible for implementing at the University of Washington Medical Center with appropriate funding from the university.
PROJECT BACKGROUND:

Xylene distillation on campus is nothing new. The university has been distilling xylene from UWMC and UWSM since 1993 and has been successful in dramatically reducing costs associated with new xylene purchase and disposal. As an added benefit, 1,000 gallons of hazardous waste is prevented each year. While this program has been successful, the Environmental Health and Safety Department (EHS) has been looking for ways to increase cost savings and waste reduction targets. EHS believes that additional savings can be made if xylene distillation was to be done onsite at UWMC and/or UWSM rather than at the Environmental Services Building (ESB), which is located over a mile and a half away. For many years, EHS has tried to convince the labs at UWMC and UWSM to purchase xylene distillers for own onsite use. However, those attempts thus far have not been successful, which is why ESB has reached out to the Sustainability Studio to conduct an in-depth analysis to understand constraints and interest in onsite xylene distillation.

SECTION 2 - METHODS

1. Our team received contacts from our client partner of UW labs that may use xylene.
2. We created a 10-question survey tailored to these labs, asking them about their xylene use and willingness to adopt this new distillation process.
3. We administered our survey via email and phone conversation.
4. To supplement our survey results, we conducted online research to get a better understanding of the topic.

Before we could formulate a list of appropriate questions, we thought it was imperative to get a better grasp of what xylene is, its uses, hazards, and how it’s distilled. The details of this research are touched on below in the “Background” section. Additionally, we thought it was equally important to try and get a sense of what the waste processing at UW is like. For this portion of the research, we toured the waste management facility and talked with our clients about details that helped us shape the interview questions, such as the labor involved in distillation, processing time, a realistic cost benefit analysis, and xylene waste quantities. After gathering enough data, we began creating the survey and interviews.

In order to conduct our survey our team worked with our client partners to create a list of questions tailored to each specific lab. The goal of our survey was to figure out how much xylene each lab was using in order to figure out if their purchasing of a distillery was worth it. We
received a list of potential buyers and called said labs in order to obtain the information for the survey. If the labs needed more time to answer the surveys we administered the survey via email. In order to gain a better understanding of xylene use and to supplement our results, we also conducted background research on the benefits of xylene distillation and recycling.

SECTION 3 - FINDINGS

Background:

What is xylene?\(^{41}\)
Xylene \([\text{C}_6\text{H}_4\text{(CH}_3)_2\text{(dimethyl benzene)}]\) is an aromatic hydrocarbon solvent found in a variety of products, including petroleum, coal, and wood tar. It can be synthesized as a gas or a liquid, but for the purposes of this assignment it is used predominantly as a liquid solvent. Its uses include:

- Histology
- Tissue processing
- Staining
- Pathology
- Autopsy
- Pharmaceutical solvent

What is xylene distillation?\(^{42}\)
Distillation is a process that separates mixtures based on the physical properties of each component (e.g. boiling point, freezing point). For example, fractional distillation—which is used for xylene recycling—requires multiple chambers with different set temperatures. The input is a substance that is contaminated, and the outputs should ideally be each constituent in its original form. Distillation is a commonly used process, widely known for its integral part in separating different types of fuel.\(^{42}\)

Xylene recycling uses the fractional distillation method in order to purify the xylene (at UW, it is usually mixed with paraffins and ethanol). The ‘dirty’ xylene is the input, which is then heated up. At a specific maximum temperature (to avoid chemical breakdown), the various contaminants exit the heating chamber and move through compartments that each have a set temperature which is cooler than the previous one.


For example, the boiling point of ethanol is 78°F and the boiling point of xylene is around 140°F. As the heated, contaminated xylene moves out of the furnace, xylene condenses into a liquid before ethanol does and separates out of the heated mixture in the compartment that is set to 140°F. Eventually, the ethanol constituents will cool down enough to condense in the compartment set to its boiling point temperature. Since paraffin does not boil, they will make up whatever is left over once the process is completed. Distillation is not perfect. There may still be some trace contamination, but it is at a negligible amount. However, this means that recycled xylene cannot be used for certain procedures that require 100% pure solvent.43

Why Recycle Xylene?

Recycling xylene allows you to use it up to eight more times before having to buy more. In addition, there is a 90% recovery rate for lightly contaminated xylene. Another benefit is that there is no vapor release or spilling, which results in a healthier environment for lab workers. Finally, a reduction in the amount of xylene purchased and transported off site results in cost savings and increased sustainability.44

Environmental and Human Health Impacts,

Xylene leaked at surface level will evaporate quickly and be broken down by sunlight into less dangerous compounds. Unfortunately it is relatively common for xylene to seep into the ground from underground petroleum product storage containers. Contact with the compound occurs primarily through this pathway. Once it is absorbed into the soil, surface water, or groundwater, months can pass before it degrades. Xylene is found in over 50% of current or former national priority list (NPL) sites.45

Human exposure to xylene occurs via inhalation, ingestion, eye or skin contact. The liver can metabolize xylene, and small amounts can be purged through exhalation. Although there is a little likelihood of accumulation, xylene can cause serious health effects when a human is faced with chronic exposure. Over a short period of time, inhaling xylene can cause headaches,

dizziness, nausea and vomiting. These symptoms will lift after a short period of time if exposure is limited (less than 14 days of ~100ppm air levels).\(^{46}\)

Extended contact is another story. After a year of exposure, the headaches, dizziness, nausea, and other signs of central nervous system (CNS) depression will continue, but more serious problems begin to arise. “Organic solvent syndrome” is a condition caused by xylene that can triggers onset of depression, insomnia, lethargy, tremors, impaired concentration and short-term memory loss (correct?), among other symptoms. The most serious impact of overexposure is the potential for life-threatening pulmonary edemas. Pregnant women should not be exposed to high concentrations of xylene as they risk increased chances of spontaneous abortions, developmental effects on the fetus, and breast milk contamination.\(^{47}\)

Recycling xylene reduces carbon dioxide emissions through reduced transportation and incineration. Currently, the University of Washington sends its used xylene to be burned as fuel in Utah at a rubber factory. By reusing xylene, we can reduce the need to transport it down to Utah and incinerate it.

**Distillation Machines**\(^{48,49}\)

- Two sizes: 9L and 19L models
- 15-20 minutes per liter of xylene, an hour per gallon processing time.
- Easy to use, self automated.

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**Harborview Medical Center**

Through our interview with Toni Baullinger, a pathology lab worker at Harborview Medical Center, we discovered that over the past couple of years, Harborview has been distilling about 183 gallons of xylene annually on-site. This has saved them $11,577 per year, and is a good example of how the UW Medical School could implement the same system. For them, having an on-site distiller is beneficial because they can cut out the cost to transport xylene off site. This not only reduces transportation costs for the hospital, it also reduces their carbon footprint. Therefore, Harborview serves as an example of a success story for xylene distillation and sustainability.  

**Cost Benefit Analysis**

<table>
<thead>
<tr>
<th>CURRENT SOLVENT USE AND DISPOSAL COSTS</th>
<th>Xylene</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Usage:</td>
<td>1,032 gallons</td>
</tr>
<tr>
<td>Cost per Gallon:</td>
<td>$63.42</td>
</tr>
<tr>
<td><strong>Total Solvent Cost:</strong></td>
<td>$65,449</td>
</tr>
<tr>
<td>Annual Disposal Cost:</td>
<td>$8,101</td>
</tr>
<tr>
<td><strong>Total Annual Solvent and Disposal Costs:</strong></td>
<td>$73,550</td>
</tr>
</tbody>
</table>

**Projected Savings with Recycling**

| Total Annual Costs: | $69,039 |
| Projected Recovery: | × 95% |

Annual Savings with Recycling: $69,872

COMBINED ANNUAL COSTS: $73,550 ($6,129/monthly)
COMBINED ANNUAL SAVINGS: $69,039 ($5,823/monthly)

Prepared by: Rosemary Longenbaker, National Equipment Sales Representative, CBG BIOTECH, 800-941-9484

A cost benefit analysis was performed on the Xylene Distillation Group and CBG Biotech models in order to determine the savings achieved from avoided purchasing and labor costs. Using the amount of xylene that UWMC and UWSM recycled last year, we used **1,032 gallons** as the total amount of xylene that the university purchases annually in order to calculate the cost savings. At a rate of **$63.42 per gallon** of xylene the annual purchase cost for the

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university is $65,449.00. In addition the Environmental Safety Building (ESB) charges a fee of $7.85 per gallon of xylene to cover the labor and transportation costs to take used xylene from UWMC and UWSM to the ESB and back once it has been recycled. This per gallon disposal fee also applies to contaminated xylene that is sent out for disposal. The labor and transportation costs associated with this fee amount to $8,101.00 annually or approximately $675.00 each month. This means that the university will spend $73,550 annually or approximately $6,130 each month for the purchase of new xylene and traditional disposal.

However, because the university has been recycling xylene since 1993, they are already avoiding the purchasing cost with the exception of occasional replenishment of xylene when necessary. The recycling process returns 95% of the original product with the remaining 5% being contaminated xylene that will be sent to Utah as fuel for rubber factories. Because the university already avoids the majority of the purchase costs by recycling xylene the only further cost reductions that could be achieved in this scenario are from the labor and transportation costs $8,101.00. Based on the price ($18,700.00 - $22,000 - 10% hypothetical WA tax included) of both sizes of xylene distillation machines used in this analyses, it would take a lab or the university between 2.5 - 4 years to recoup the cost of having onsite xylene distillation at UWMC or UWSM rather than at the ESB. If up front cost is an issue, CBG Biotech is able to do a lease program through a third party vendor. Interest rates of the lease would depend on a credit application.51

Survey Data Overview

The general consensus from our survey was that although there is not a specific goal to save money, there are no specific changes that need to occur. The labs all want to reduce waste; however, they also do not have any specific goals in mind. Interview overviews can be found in Appendix A.

We faced many obstacles when collecting our data. In order to conduct our survey effectively, we needed to reach out to labs that were currently using xylene. However, this was a challenge because the contact list we were given was out-of-date. We only received three responses to the survey which was far below our goal. For instance, out of the 20+ people we reached out to, we were only able to reach the intended lab technician about four times. One of those four people we reached out to no longer used xylene in their lab and had switched to formalin. Other contacts we tried were either outdated numbers, or required access to a specific university building phone to dial out. As a result, our survey data fell short since it does not

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51 (R. Longenbaker, personal communication, May 26, 2016)
represent the majority of opinions on xylene distillation from those that use it. If our team had a full year and an updated contact list, we would have been able to better identify the opinions of a large number of lab workers using xylene. In addition, we could have sat down and interviewed some of them to get more in-depth knowledge of the topic. Finally, had we had more time, it would have been beneficial to research where to get funding for xylene distillation machines. For example, the University of Washington has a sustainability fund with money for such projects, but it would have taken time to see if this project qualified for such funding.

SECTION 4 - CONCLUSIONS

The most environmentally friendly option is phasing out xylene in favor of a cleaner substitute. This is easier said than done, since many of the current substitutes are of similar or more severe toxicity than xylene. One option is mineral (paraffin) oil mixtures that can be used in place of xylene for tissue processing. These mixtures are cheaper and safer than xylene and can be used for histology.\(^52\) While this is a good starting point, xylene at UW is used predominantly in pathology labs which might not be able to utilize the paraffin substitute as effectively. Because xylene has many uses, it is unlikely that researchers will discover a single replacement compound that does it all. In the meantime, practicing xylene distillation can help decrease waste until the appropriate substitutes are integrated. Additionally, looking into stills that recycle more than just xylene (e.g. ethanol as well) may help increase interest among potential buyers.

As determined from our cost benefit analysis, a distillation machine would pay for itself in two to three years. Therefore, although it is an initial investment, it will be cost effective in the long term to switch from transporting xylene off campus to distilling it on campus. As a result, the economic impact would be a benefit. One caveat to this is that the UW would need to come up with funding up front to pay for the machine initially.

As stated, the environmental benefits are significant. Thousands of gallons of xylene end up in landfills, and recycling could mitigate that. This would mean reduced risk of groundwater contamination and other types of environmental damage.

SECTION 5 - NEXT STEPS

There are several next steps to making xylene distillation a reality at UW. For one, improved communication between labs and the Environmental Health and Safety Services will

allow for better coordination. Second, an updated contact list for labs that use xylene in order to identify the main players would be beneficial. Third, a more extensive survey of lab technicians and decision makers to gauge interest in switching to xylene distillation for the future is needed. Finally, determining if there is an interest in recycling other solvents is a necessity. This way, we could get a machine that is capable of recycling multiple solvents and potentially recoup even more savings and sustainability at our school.

SECTION 6 - MAIN POINT

Although xylene distillation on campus would be a smart move because it would be better for the environment and would save the university money in the long term, it will require a lot of coordination and planning. In order for xylene distillation to be a reality at UW Medical School, we need the Health and Safety Committee and the lab technicians that would be using these machines to be connected via updated contact lists. Furthermore, understanding the hurdles that lab workers perceive to be standing in the way of them using a distillation machine is important in order the mitigate these issues. As shown in our cost analysis, a distillation machine will pay for itself in two to three years. However, coming up with the upfront cost is something that the University of Washington would need to find a way to fund in order to make this vision a reality.

Appendix A: Interview Summaries

Toni - HMC Histology

- How much xylene do you use in your lab? *Depends on our volume and how often we change our processors and the stain line. Right now we have ordered and used about 40 gallons, plus all the recycled xylene.*
- What do you use it for? *We use it as a clearing agent. For tissue processing it clea* *rs out the alcohol and allows the tissue to be impregnated with molten paraffin. It is also used in slide staining to remove paraffin from the tissue section and allow for the tissue to be stained.*
- Would you be willing to add a few extra steps for your lab workers to save cost and increase sustainability? *We are already recycling all of the xylene used in the lab.*
- Are you familiar with xylene distillation? *All ready do it using a recycler from CBG.*
- What are your concerns with xylene distillation? *No concerns.*
• Would you be willing to do distillation at your lab? Already do. John Wallace has all of our numbers.
• How much do you currently pay for waste disposal? (xylene, in this case) Unknown since we don't send any for waste disposal.
• How difficult is it for you to manage waste on site? (is there enough room? Administrative workload and risk?) We have plenty of flame cabinet room. We recycle as we accumulate waste. The purchased xylene is stored in a flame room in the building.
• Do you have waste minimization goals that you're expected to meet? No.
• How much do you pay for new xylene? Not sure. I don't do the purchasing.
• How much time and energy do you spend on procurement; ordering more, shipping, receiving, shuffling up and down from the dock? 15 minutes unloading. Ordering is maybe 5 minutes.
• Do you have cost-savings goals to meet? No. Any cost-savings is a plus.

Bernadine - UWMC Anatomic Pathology Supervisor
• How much xylene do you use in your lab? 4-6 cases a month (4 gal. Per case)
• What do you use it for? Processor and Staining
• Would you be willing to add a few extra steps for your lab workers to save cost and increase sustainability? Not at this time
• Are you familiar with xylene distillation? Yes
• What are your concerns with xylene distillation? Purity of end product, Space, tech time, initial cost of installation, repair/management
• Would you be willing to do distillation at your lab? Not at this time
• If you are not willing to do distillation, can you share your reasons?" Purity of end product, Space, tech time, initial cost of installation, repair/management
• If cost is an issue, would you be willing to share a xylene distillation machine with another lab close to yours or in your department? Maybe, depending on the proximity between labs
• How much do you currently pay for waste disposal? (xylene, in this case) Not sure.
• How difficult is it for you to manage waste on site? (is there enough room? Administrative workload and risk?) Not difficult at all. EH&S are a good group to work with. They allocate us enough waste discard container.
• Do you have waste minimization goals that you’re expected to meet? *Not that I am aware of but any savings we can contribute will be valued I’m sure.*

• How much do you pay for new xylene? *$10.29 a gallon*

• How much flammable storage space do you have available? *(never enough!)* 2 flammable cabinets *(like you said, not enough)*

• How much time and energy do you spend on procurement; ordering more, shipping, receiving, shuffling up and down from the dock? *1-2 hour(s) a week*

• Do you have cost-savings goals to meet? *Yes*

**Evelynne - Program Operations Manager - GI Biopsy Lab**

• How much xylene do you use in your lab? *We use about 4 liters of xylene per week.*

• What do you use it for? *For tissue processing*

• Would you be willing to add a few extra steps for your lab workers to? *Cost effectiveness is always a lab’s goal*

• Are you familiar with xylene distillation? *Yes*

• What are your concerns with xylene distillation? *I have no concerns*

• Would you be willing to do distillation at your lab? *The University does the distillation for us. We use recycled Xylene*

• If you are not willing to do distillation, can you share your reasons?* If we had to distill it ourselves, the problem would be space and cost*

• If cost is an issue, would you be willing to share a xylene distillation machine with another lab close to yours or in your department? *Yes*

• If cost is an issue would you consider a lease or payment plan option? *Probably lease*
Chemical Spill Clean-up Video: The Making Of

Group Members
Sam Maylor
Michelle Suga
Andrew Newton
Lan Luo

Client Partners
Erin McKeown
John Wallace
1. Project Overview

1.1 Project objectives:

For our group project, we were tasked with developing an instructional video for the UW Environmental Health and Safety Department on how to clean up a minor chemical spill in a laboratory.

Our project objectives included:

1. Create a high quality instructional video on chemical spill cleanup procedures
2. Learn about the UW Environmental Health and Safety (EH&S) department
3. Satisfy the academic criteria for Sustainability Studio

1.2 Background:

Chemical spills are one of the most common accidents that can happen in the laboratory during daily lab procedure. According to our client partner Erin McKeown (Program Operation Specialist of UW Environmental Health & Safety), over 500 incidences of chemical spills have been reported to the EH&S department since 2013. Many lab chemicals are toxic or otherwise hazardous to human health, thus it is important to know what to do when a chemical spill occurs. These were things we had to keep in mind when creating our product.

Before starting the an experiment, lab personnel should know about the basic information of the chemical that they are using (such as the hazards, composition and concentration etc.) which can be found in the Standard Operating Procedure (SOP) document and the material Safety Data Sheet (SDS). Sometimes it is necessary to take training classes on how to handle the chemical and how to deal with chemical accidents. When working in a laboratory, knowing the floor plan is also important, so that when a chemical spill happens, you can locate the clean-up equipment, eyewash, and shower quickly and efficiently. Also important is being aware of the locations of the nearest exit, emergency phone and fire alarm in a major chemical spill.
Safety Data Sheet
according to 29CFR1910.1200 and GHS Rev. 3
Effective date: 10/24/2014
Page 1 of 7

Lead Acetate, Trihydrate

SECTION 1: Identification of the substance/mixture and of the supplier
Product name: Lead Acetate, Trihydrate
Manufacturer/Supplier Trade name:
Manufacturer/Supplier Article number: S25378
Recommended uses of the product and uses restrictions on use:
Manufacturer Details:
AquaPhoenix Scientific
9 Barnhart Drive, Hanover, PA 17331
Supplier Details:
Fisher Science Education
15 Jet View Drive, Rochester, NY 14624
Emergency telephone number:
Fisher Science Education Emergency Telephone No.: 800-535-5053

SECTION 2: Hazards identification
Classification of the substance or mixture:

Health hazard

Environmentally Damaging

Standard Operating Procedures
Laboratory Specific
Chemical Lead compounds (replace with specific compound)
Please fill out the form completely. Print a copy and insert into your Laboratory Safety Manual and Chemical Hygiene Plan. Refer to instructions for assistance.

Department: ___________________________ Date when SOP was written: ___________________________
Date when SOP was approved by the lab supervisor: ___________________________
Principal Investigator: ___________________________
Internal Laboratory Safety Coordinator/Lab Manager: ___________________________
Laboratory Phone: ___________________________
Office Phone: ___________________________
Emergency Contact: ___________________________
(Name and Phone Number)
Location(s) covered by the SOP: ___________________________
(Building/Room Number)

Type of SOP: ◆ Process ◆ Hazardous Chemical ◆ Hazardous Class

Purpose
(Describe the procedure the specific chemical is used for in the purpose of the chemical)
Physical & Chemical Properties/Definition of Chemical Group

CAS#: ___________________________
Class: Carcinogenic & Reproductive Toxic
Carcinogen (ARC Group 2A)
Molecular formula: ___________________________
Form (Physical State): ___________________________
Melting Point: ___________________________

Potential Hazards/Toxicity
Oral LD₅₀: 4,685 mg/kg (Rat) (given for lead acetate trihydrate, change according to specific chemical used in lab)
Permissible Exposure Limits (PEL): 50 µg/m³

◆ Physical Hazard: Elemental lead can be symptomatic if in a finely divided/powdered metallic form.
◆ Inhalation: Lead can be absorbed through the respiratory system. Local irritation of bronchi and lungs can occur and, in cases of acute exposure, symptoms such as metal taste, chest and abdominal pain, and increased lead blood levels may occur. See also Ingestion.
◆ Ingestion: POISON! The symptoms of lead poisoning include abdominal pain and spasms, nausea, vomiting, headache. Acute poisoning can lead to muscle weakness, “lead line” on the gums, metal taste, definite loss of appetite, insomnia, dizziness, high lead levels in blood and urine with shock, coma and death in extreme cases.
◆ Skin Contact: Lead and lead compounds may be absorbed through the skin on prolonged exposure; the symptoms of lead poisoning described for ingestion exposure may occur. Contact over short periods may cause local irritation, weakness and pain.
◆ Eye Contact: Absorption can occur through eye tissues but the more common hazards are local irritation or abrasion.
◆ Chronic Exposure: Lead is a cumulative poison and exposure even to small amounts can raise the body’s content to toxic levels. The symptoms of chronic exposure are like those of
If the chemical is highly toxic or flammable, pull the fire alarm and call 911 as soon as possible. However, if it is neither, and if those in the room are trained and feel comfortable to clean up the spill, then there is no need to call 911. This is where our video comes in: It will provide the necessary training for cleaning up a non-lethal chemical spill.

2. Methods:

In order to become familiar with the UW EH&S department and to learn our client partner’s requirements for the video, we emailed our client partner to set up a meeting with her. During the first meeting, she talked about the basic responsibility of their department and showed us the various levels of personal protective equipment. She also showed us a chemical spill kit, explained the use of each item, and talked us through a basic chemical clean-up procedure to give us a basic idea about how to create our storyboard for the video.

To learn the basics of the chemical spill clean-up process, we took the online training class “Managing Laboratory Chemicals” that is provided on the EH&S website. By taking this class, we learned about the different kind of hazards that chemicals can pose, broken down into categories: toxic, corrosive, flammable and reactive. We also learned how to safely store chemicals in a lab and the basic protection that people can find in the lab, such as gloves, goggles, and aprons. It also clarified the appropriate disposal of different kinds of chemical waste. The course also introduced the normal chemical spill clean-up kit and the mercury clean-up kit.

After using this information to make an initial storyboard and script, we set up another meeting with Erin to make sure we were demonstrating the correct chemical spill clean-up procedure in the video. With her feedback, we made another storyboard and script and met with Tracy Harvey to make one more set of revisions and get the final go-ahead.

To introduce the chemical spill clean-up kit in the video, we show the audience all the items that are contained in the spill kit and demonstrate their usage. We make sure to review the checklist of questions that need to be answered before beginning clean-up and walk the viewer through the process step by step. We tried to keep it a little humorous because no one likes to sit through a completely boring video, especially when they have to watch it!

The filming process involved everyone on the team. In addition to Erin, a Masters videography student named Zhang Wen was brought in to help us with some of the technicalities of filming. A friendly chemist instructor let us use his lab to film in and even gave us a labeled beaker to break for the video. We had three cameras rolling for most shots in order to give us a variety of angles to choose from in the final product. We did film part of a practice hazardous material spill (to get shots of people in full haz mat suits) but it didn’t make it into the final cut of the video.

After obtaining all of the footage, we moved into editing. We started by reserving the Odegaard Sound Studio to record high quality audio for the voiceover. Using audio recording and editing software, we recorded and altered sound to make a track that was professional and free of any background noise. We recorded the voiceover using a script we made to go along with the storyboard.
Editing the video involved consolidating the footage that was recorded from our various cameras, and putting it into a video editing program in the proper order. From there, the clips were altered so as to align with the voiceover track and make for a professionally edited film. License-free music was added when needed.

3. Findings Evaluation:

The team found the cleanup video to be satisfactory, but there are ways in which we wish we could have done better. The full chemical safety training course the team took ended up hurting more than it helped, as it wound up being unclear what parts of the hour course were and weren’t essential for the two minute video. Meeting with our client partner did little to help the issue, as the requirements list we wound up getting from Erin was far too long and would have required random cuts to tidbits of information that had nothing to do with the cleanup training video.

Much of this wound up being solved in editing, as one of our group members eventually had to sit down and decide which of the many requests by Erin he was and wasn’t going to ignore. This was obviously not an optimal solution and may have resulted in key information going unsaid in the video. Looking back, we should have pressed harder to get a neat and clean requirements list from Erin.
4. Conclusion

Training for chemical spill management is essential for all lab employees regardless of whether they are students or professionals. As we learned in the chemical management lecture, lab staff need to gain some knowledge on how to figure out the hazards of chemicals, such as toxicity and flammability, and how to identify the most suitable spill response plan in order to clean chemical spills completely. There are the chemical spills that people without special training can handle, and the cleaning spills video that we created will be helpful as an educational tool for all lab employees, and help them to understand necessary steps they have to consider if chemical spills occur. Teaching chemical spill management is connected not only to safety, but also to environmental sustainability because proper waste disposal is included in proper chemical spill management. Once spills happen, all of the materials used for cleaning, such as universal pads and gloves, need to be disposed of correctly, in order to avoid contamination with other waste and individuals.

Our project could be a first step toward this, and the Environmental Health and Safety department should create more videos for quick review. It is important for people to have some ways to remember points that they have to consider when they face emergency incidents. Instructional videos, especially short ones are quite handy.

5. Next Steps

We have learned the importance of chemical spills management and created a great video for spill response plans. However, we could not conduct any further research on the connection between the proper chemical spill management and environmental health for a next step. Obviously the main purpose of this project was creating a short video promoting the safety in the lab, but the environmental consequences caused by chemical/hazardous waste must be essential knowledge for individuals using the lab as well. Regardless of whether it is a laboratory activity or not, education institutions, such as universities and high schools, have generate a massive amount of chemical waste annually, and most of them are highly toxic due to the disposal of toxic acids, solvents and metals. It is crucial that hazardous waste are classified, stored, and disposed of properly. In the video, we put a great emphasis on the clear procedure for chemical spills cleaning, so we could not include any information that could emphasize the importance of the proper disposal.

Furthermore, it would be better to conduct more research on other methods to reduce environmental/health impacts and risks due to the chemical waste as well. One of the latest ways to do so is reusing and recycling them. One of the biggest examples is on-site distillation.
of used solvents, which allows people to avoid a new purchase of new solvents and hazardous waste generation. Additionally it will help them cut their expenses.

Chemical waste management, including chemical spill cleaning, could be foundational knowledge for all of the people in the lab in order to use the laboratory facility and conduct experiments more sustainably and in eco-friendly way. This additional research could be helpful in the video to encourage people to learn the reasons why they have to learn proper chemical waste management.
Healing UW Medicine with Corporate Social Responsibility:
A Case Study on Improving CSR Practices

Alexandra Bradley, Danielle Flanagan, Megan Kamerman, and Tessa Yip
ENVIR 480 - Spring 2016
UW Sustainability - Sean Schmidt
**Project Overview**
The overall objective of our project was to provide research on current Corporate Social Responsibility (CSR) programs at Pacific Northwest Medical Centers in order to devise a plan and steps for other hospitals, specifically UW Medicine, to follow. With our project, we sought to explore the role and responsibility that academic medical centers have to further develop their commitment to the community and educating healthcare professionals. Our client partner for this project was UW Sustainability and we specifically worked with Sean Schmidt.

Main questions of our project:

1. What is Corporate Social Responsibility (CSR)?
2. What does CSR in healthcare look like?
3. What are hospitals currently doing with their CSR programs?
4. How can UW Medicine implement CSR programs?

UW Medicine consists of four hospitals: UW Medical Center, Harborview Medical Center, Northwest Hospital, and Valley Medical Center.

![Figure 5: The Four Hospitals of UW Medicine](http://www.uwmhi.edu/teams/medical-teams/uwmedcenter/)

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55 *Corporate Social Responsibility in Healthcare Project PowerPoint. (2016).*
Defining Corporate Social Responsibility

CSR is a form of business accountability concerned with the present and future of environmental protection, employee wellbeing, and the community. CSR is concerned with a wide range of stakeholders and encompasses the idea that companies can no longer operate in an isolated economic setting.\(^{56}\) Overall, the goal of CSR is to align corporation’s social and environmental activities with its business mission and values.\(^{57}\)

CSR is not only a way to hold companies responsible for their actions; it also beneficial for the corporation. Companies with CSR programs have better public images, often more media coverage, better employee engagement, and are able to effectively attract and retain investors.\(^{58}\) Additionally, CSR is beneficial to the environment and community by increasing charitable giving and volunteerism, and promoting environmental consciousness.

There are a number of benefits to CSR, yet many companies have not implemented CSR initiatives. In several instances, companies have embraced a broad vision of CSR that is not integrated through the company's various programs. To maximize the benefits of CSR, there must be a cohesive strategy plan. Furthermore, gauging performance is a challenging task for corporations. In order for companies to realize the benefits, there needs to be an ongoing system of tracking, a yearly sustainability report, and executive management.\(^{59}\) A good CSR program can help increase transparency while also setting a bar for standards of other organizations.

CSR is a recent concept yet it has become firmly rooted in the global business agenda. Company stakeholders are demanding corporate accountability and many countries in the EU require it.\(^{60}\) As the interest in sustainability initiatives and seeing transparency in corporations continue to rise, more initiatives, both mandatory and voluntary, will continue to rise in the corporate world. Without a CSR program, companies may begin to lose their competitive edge.

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Corporate Social Responsibility in Healthcare

CSR is as important to a hospital as it is to any other corporation. A successful CSR program should be inclusive and engage with patients, employees, the surrounding community, and all other stakeholders. While the healthcare industry is often forgotten about as a for-profit entity, it is important that stakeholders and the general public see the importance and the benefits of CSR. A few of the advantages that a CSR program can bring to a hospital include an efficient use of resources, enhanced patient loyalty, and the attraction and retention of investors and business partners.\textsuperscript{61}

The healthcare industry faces a variety of challenges that other corporations may not have to deal with “such as stringent regulatory compliance, intense labor shortages in nursing, increased and costly technological advancements, implementation of international quality standards and substantial community dependence make this industry one of the most operationally difficult. Hospitals have to work harder than other industries to win and retain that trust while coping with the operational challenges.”\textsuperscript{62} Other barriers include the idea of a hospital as a business and the definition of sustainability. Similar to any other business, it is necessary to have programs in place to ensure both success and a level of accountability in a medical center. That being said, 14 medical facilities were listed in the Fortune Top 1000 Companies and not a single one had any reports that focused on any areas of CSR but finances.\textsuperscript{63} The definition of sustainability is challenging because it holds many different meanings. Although it may revolve around the environment for many, in the business world, sustainability is often defined as how long a company can afford or sustain a project long term. It is important for a corporation to remember that finances, patient care, and the environment are not separate. Their impact on the environment, patient care, and the treatment of employees need to be included in the definition of sustainability.

Another challenge faced by the healthcare industry is transparency. It is difficult to develop a CSR program when there is little information available for hospitals to look to as a guideline or role model. The National Institute of Health developed a checklist for hospitals to follow that encompasses all areas of CSR by implementing policies that support the environment, employees, and the community. When looking to implement a successful CSR program, the healthcare industry must focus on policies that directly relate to their goals of

\textsuperscript{62} Ibid.
\textsuperscript{63} Ibid.
improving the quality of life for both patients and their employees. Ethical practice in hospitals should consist of components like supporting programs of social welfare, serving people with different spiritual or religious needs, and environmental conservation.  

**Methods and Findings**

Our starting question, which sought to define Corporate Social Responsibility, required a significant amount of research. Much of the research completed to define CSR was done through online resources. However, our group also interviewed faculty from the UW Foster Business School. We interviewed Dr. Ryan Fehr and Dr. Elizabeth Umphress, both Associate Professors of Management, to learn about the background and history of CSR as well as how CSR can be the most successful for businesses.

**Interviews with faculty from the UW Foster Business School:**

Through our interview with Dr. Ryan Fehr, we were able to develop an understanding of the historical basis of CSR and the role the environment plays in a CSR program. We learned that CSR practices began to emerge in the 1960s and took hold in the 1970s. Prior to the 1960s, CSR-type practices were considered illegal by managers of trustees. Today, CSR programs are considered a core value in many businesses and CSR practices are integrated into the new business models of companies. Lastly, Dr. Fehr emphasized that CSR programs take into consideration a wide array of stakeholders. The environment is one stakeholder to be considered in a CSR program.

Our interview with Dr. Elizabeth Umphress gave us insight into what a good CSR program incorporates and how to maximize a company’s strengths when developing a CSR program. A CSR program is most efficient when it is linked to the goals of the company. In many cases companies have the resources to create beneficial CSR programs but are not utilizing their companies’ resources. There is a lack of understanding that a CSR program can be highly specialized to a company’s abilities and it does not need to be hard to be highly beneficial. In Seattle, there is already a culture for making responsible corporate decisions. Therefore, there

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is no real barrier for developing CSR programs as the true barriers come from identifying the “low hanging fruit” of a company and knowing how to implement a framework for change.66

Interview with Harborview Medical Center staff:

In order to have an inside perspective on CSR in the healthcare industry, we sat down with Barbara Fromm, the Assistant Administrator of Clinical Support Services & Planning and Chair of the Environmental Sustainability Steering Committee. Fromm, who has been on the forefront of sustainability measures at Harborview, had extensive insight into the topic and helped create the foundation of our recommendations for possible areas of improvement at UW Medicine. Fromm stressed the importance of having a bottom up approach when addressing CSR in the healthcare system. The Pacific Northwest is already a firm believer in sustainable practices. As Fromm stated, “We don’t need to change the culture. We need to get out in front of the crowd and organize them.” Fromm believes that medical centers like Harborview have the infrastructure and the want for CSR measures but in order to have movement, there needs to be a “champion” and the proper resources. Although medical centers face several obstacles from city, state, and county regulations, Fromm stated that in terms of medical centers “we should be leading this; our mission is health and wellness.” Fromm’s recommendations for improving UW Medicine CSR initiatives included a better method for sharing ideas, increasing communication across medical centers, boosting workplace champions, and fostering stronger partnerships among hospital administration. These recommendations helped guide our final proposed plans for improvement.67

Virginia Mason Case Study:

In order to provide UW Medicine with a CSR plan or suggestions for implementing CSR, researching the CSR of other local hospitals was essential. Defining CSR and determining what CSR in healthcare and hospitals looks like were fundamental aspects of our research and necessary starting points. To understand what CSR in hospitals looked like in specific cases, we then had to research actual local hospitals. There are a number of well-known hospitals in the Seattle area, including Seattle Children’s, Swedish, and Virginia Mason. After conducting online research to learn more about local hospitals and receiving information from a presentation from a Virginia Mason representative in our ENIVR 480 class, our group decided to cite Virginia Mason as a successful CSR model.

Figure 6: Virginia Mason Strategic Pyramid

From the interview with Dr. Umphress, we learned that for any business, including hospitals, a CSR program is ultimately going to be much more successful if it follows the mission of the business. The stakeholders within CSR programs are so numerous, but for the environment, Virginia Mason’s sustainability efforts are exemplary. Virginia Mason’s sustainability program, one aspect of CSR, is linked to the hospital’s strategy. Sustainability is integrated within the whole Virginia Mason organization. The mission of Virginia Mason is “to improve the health and wellbeing of the patients [the hospital] serve.” Virginia Mason’s strategic plan, the Virginia Mason Production System, was adopted in 2002 and fully integrates CSR into the entire hospital, rather than making it a small program on the side. With the goal of providing patients with the best healthcare possible, Virginia Mason makes sustainability a component of patient wellness; sustainability is part of the hospital’s quality care strategy.

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CSR follows the mission of the organization by making sustainability a necessary component to bettering the health of their patients; sustainability is described as a “quality imperative.”

To integrate sustainability into the culture of the hospital, Virginia Mason engages various employees, patients, and the community. EnviroMason, Virginia Mason’s environmental responsibility program, consists of six commitments to sustainability, including energy and resource conservation, waste reduction, and environmentally preferred purchasing. However, EnviroMason also encourages Virginia Mason employees to contribute to idea building and innovation to improve sustainability. The Virginia Mason “Green Team” consists of over 50 volunteers from various disciplines within the hospital to discuss how Virginia Mason can continue to reduce its environmental impact. Virginia Mason also seeks to involve their patients and the community in their sustainability through education on the importance of sustainability and the efforts that are currently being made.

Findings from Analyses and Assessments

Through extensive research and informational interviews, we developed four key initiatives that we believe UW could feasibly take to strengthen current initiatives and broaden both health and knowledge at UW Medicine.

Our data had some shortcomings in that we were not able to reach or complete interviews with several prominent and knowledgeable faculty and staff of UW and local hospitals. We were also limited by the timeline of the project and would have liked to better understand in which ways the UW Medicine hospitals interacted with one another and how they are different. Having a better idea of how the UW Medicine network behaves would lend itself to determining the most effective way for each institution to have similar but appropriately different CSR programs. More interviews would provide additional voices and insight from those who have a greater stake in hospital sustainability and may better understand limitations or opportunities that an academic medical center might have.

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75 Our Commitment to Environmental Sustainability.
Drawing on Conclusions

The following are four actions UW Medicine could take as next steps in creating and implementing a CSR program:

The first recommendation is a **broad, large-scale initiative that would focus on improving healthcare access and quality and contributing to the resilience of the Puget Sound region**. Twelve UW Neighborhood Clinics are located in the area from Olympia to Lynnwood and act as places for education, experience, and improving health. There is opportunity for more Neighborhood Clinics to be opened in the future in underserved and disadvantaged neighborhoods located in areas of need in Seattle and the surrounding community. By expanding their care to these communities UW Medicine can not only highlight their emphasis on social care, but these clinics could also be an important place for students to work and develop the skills needed to work in demanding medical environments.

Next, we see an opportunity for **more collaboration and communication to engage hospital leaders**. To do this we recommend that Dean Frumkin of the School of Public Health hosts a forum with leaders from each of the four hospitals to openly talk about opportunities, inspirations, limitations, and focus on academic opportunities created by the incorporation of complementary CSR programs.

A third recommendation is to **draft a report of the efforts already being made to make the UW Medicine network more sustainable**. These could include awards, programs focused on staff or patient safety, green purchasing, waste diversion, efficiency, sustainable infrastructure and construction, charity care, and LEED certifications. Because blanket policies are not feasible due to differing regulations and infrastructure of the hospitals, a report on what’s being done could be inspiring and encouraging to a hospital that wants to expand its CSR. The report could be for an internal audience among the network of hospitals and the school, or the report could be used to increase awareness, visibility, and good public relations by highlighting the positive steps UW is taking towards sustainability in healthcare.

Lastly, we recommend that each medical center **align the mission of the CSR program with the values of the institution and its stakeholders**. One way to do this is by supporting projects and programs that have Champions or Green Team members are excited to implement. Financial and corporation-wide support can strengthen the culture of sustainability in all areas of the hospital with measures that often increase efficiency, safety, and save money. Supporting staff-initiated ideas allows colleagues to innovate and work together toward a
common goal, and utilizes their expertise, creativity and values. It is crucial to have institutional guidance and support to get these ideas started and allow them to be led by dedicated Champions that have been considered successful at Harborview and Virginia Mason.\footnote{Fromm, B. (2016, May 31). Personal Interview.}

**Next steps**

Future research could focus on how to best incorporate the sustainability goals and mission into the corporate structure and academic consciousness. A more quantitative measurement and analysis of what steps are already being taken could be done in order to put those efforts into a format that is easier to compile and compare between hospitals. In the case of healthcare access, making regional resilience a more qualitative measurement may be more desirable. Another interesting compilation could be the classes and educational opportunities for medical students to learn about sustainability inside and outside of the healthcare industry. Student and faculty feedback and interest from these classes could be used to encourage more sustainability-focused coursework that will engage and interest students who may become Green Team leaders or administrative staff and champions that drive the industry in a positive direction.

**Conclusion**

One of the greatest advantages UW Medicine has in starting a robust CSR program is that current culture is not a barrier. Our short research period has helped us understand that the essential elements and inspiration are there, but there just needs to be a greater focus on setting up resources to help UW lead the way in the highest quality healthcare. To get the maximum efficiency from our resources, having strong partnerships as well as facilitated communication between stakeholders and scales of authority in the hospitals and the academic institution are essential. We believe that UW Medicine is in a unique position to educate students about sustainability before they work around the world and they are in a great position to demonstrate what sustainability in healthcare looks like in action. With so much potential and a school full of bright minds, we look forward to seeing how a CSR program will develop in the coming years.
Conclusion

Health and sustainability can be a difficult pairing - many health decisions are emotionally-charged. In the moments when our loved ones are sick, we want them to be better – we often give little to no consideration as to whether or not the bottle used to hold the medicine is recyclable or reusable.

Through this term, however, we learned how important it is to critically analyze our health practices as a community when we are not in one of these high-stakes health situations. We learned that some health issues may even be lessened by finding more sustainable methods. By eating healthier foods and promoting healthier physical habits, we may be able to reduce the number of trips we take to healthcare facilities. By finding ways to recycle medical waste, we can limit the larger population’s exposure to harmful chemicals. By better understanding a surgical tool’s life cycle, we are in a better place to understand what a more sustainable alternative may be.

Our health is intimately tied with that of our environment. By examining what we expose our world to for the sake of health, we are better able to make healthier decisions for everything and everyone involved.