

Greening UW Health Sciences

UW Sustainability Office



Jake Vogt, Jennifer Power, Julia Bucy

Abstract

The purpose of this report is to address the pitfalls and successes of sustainability within the health science center at the University of Washington. This report aims to find what sustainable practices are currently underway in the health sciences and to find what needs to be done in order to make it more sustainable. The scope of our study is the University of Washington Health Science Center, which includes the medical schools and the hospitals. We surveyed students in order to gauge interest and awareness of sustainability efforts in health care. We also interviewed medical professionals at local hospitals to gain first hand recommendations on what sustainability gaps need to be

addressed. We used online research to help solidify our findings. We found that the medical schools at UW are lacking in awareness efforts and available sustainability classes. In addition, we found that the hospitals have are increasing their sustainability efforts, however they are lacking in a few areas, including pharmaceutical waste, noise pollution, and waste diversion. We offer a few suggestions to improve sustainability efforts at both the medical centers and the schools.

Objectives:

- Identify current state of sustainability across the six Health Sciences Schools and UW Medical Centers
- Find gaps and successes in current sustainability efforts
- Identify key individuals for further assistance with the Greening Health Sciences Committee
- Determine leaders in sustainability healthcare in the Seattle region to serve as role models for future development
- Provide recommendations for the Greening Health Sciences Committee for future implementation

Introduction/ Background

Why should we prioritize sustainability within healthcare? The issue of sustainability within the healthcare field has been of growing concern over the past few decades (Goodman 2011). As climate change and environmental degradation issues are brought to the forefront, hospitals are trying increasingly to do their part to be more sustainable and environmentally friendly (Goodman 2011). Issues such as environmental pollution and energy use are just a few of the issues at hand.

An important step for the University of Washington Medical Center in becoming more sustainable is investigating what other hospitals are doing in order to improve their efforts. The University of Washington Medical Center, as well as other local hospitals such

as Virginia Mason, Harborview Medical Center and Swedish Hospital, have won numerous awards for their sustainability efforts. Although the University of Washington is on the right track, there is still a lot that can be done to increase sustainability within the medical centers and schools. Hospitals and teaching facilities represent a large sector of the U.S. total energy consumption, waste production and pollution (**SOURCE**). Therefore, they are a crucial component of creating a more sustainable and environmentally friendly future.

A crucial way to improve sustainability efforts in the medical field is through education (Dhage 2013). Without educating new doctors and nurses about the importance of sustainability within healthcare, it will be difficult to inspire change. Little research has been done to determine the level of understanding and interest of sustainability within the medical school at University of Washington. Interviewing and surveying staff, faculty, and students is an important way to gain understanding of the level of knowledge and interest in regards to sustainability issues (Goodman 2011). In addition, identifying and compiling contacts willing to participate in sustainability efforts could help to spur change. Analyzing this information will help in making recommendations, as well as encourage sustainability efforts in the future. This could include more environmentally friendly classes and protocols that could be implemented moving forward.

What Is Currently Happening?

Methods

An online survey through Catalyst was created to gain a baseline understanding of existing sustainability perceptions of the Health Sciences Schools. The survey questions were designed after consulting our Site Supervisor and reviewing relevant literature that performed similar surveys (Judith 1998, Patel 2002). The survey was approved through

the Human Subjects Testing through the University of Washington. Certain questions were edited and reviewed after consulting our Faculty Advisor and community partners to better capture our objectives. There are 12 questions in the survey that range from perceptions of the individual's department commitment to sustainability, to producing specific environmental initiatives that are currently happening. The results of this survey is discussed in detail below. The survey was dispersed using a University list-serv that contained all on-campus advisors. An email was attached with the survey that explained our project scope and requesting the advisors forward our email to their students and staff. Additionally, the survey was sent out to multiple student Facebook groups in the six Health Sciences Schools. Lastly, we followed up in person with the appropriate advisors, and student services Directors of each school to emphasize the importance of survey results.

The survey captured 64 responses after a 4-week period. Three responses were retracted from the data analyzed below. Two responses were not related to the Health Sciences schools and only 1 student responded from the Nursing School. Zero responses from the Dentistry School. In the first two basic demographic results (Figure 1 and 2) the Nursing respondent was kept in the data. Any data analysis thereafter, the Nursing respondent was retracted as there was not sufficient respondents in this School to make significant conclusions.

In order to obtain data on the number of sustainability related courses throughout the six Health Sciences Schools, a report of all identified sustainability courses was accessed through our Site Supervisor. Each School was then individually analyzed and irrelevant or multiple courses were deleted. Figures 5-6 are a result of this analysis.

In order to obtain contacts for future initiatives with the Greening Health Sciences Team, we deployed a variety of methods. First, we drafted an email that was sent to all six Deans of the Health Sciences Schools requesting they identify faculty members that have been an integral component of sustainability efforts within their school. The results of this

email can be found in Figure 7. Figures 8-9 are from direct referrals from our Site Supervisor, Sean Schmidt, or from contacts we have made throughout our internship work. These figures are designed to be used for future interest with more sustainability efforts.

Results

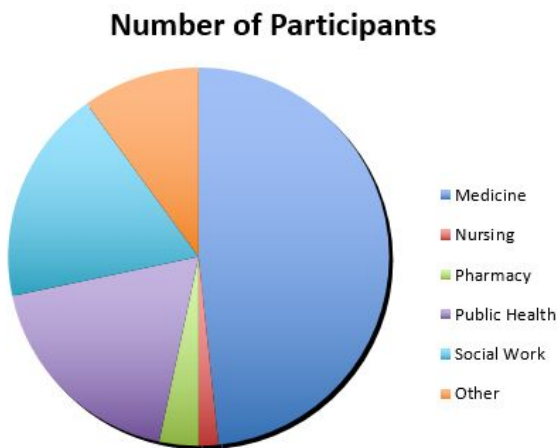


Figure 1. A breakdown of the diversity of respondents from the online survey

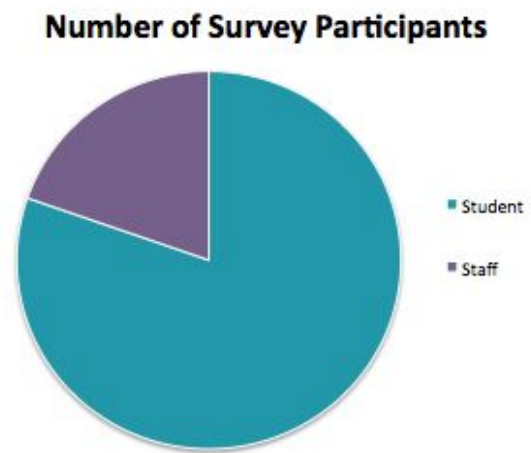


Figure 2. The comparison of students and faculty members in the online survey

Only one respondent came from the School of Nursing, from this point on, this data was retracted from our analysis. No respondents from the School of Dentistry were recorded.

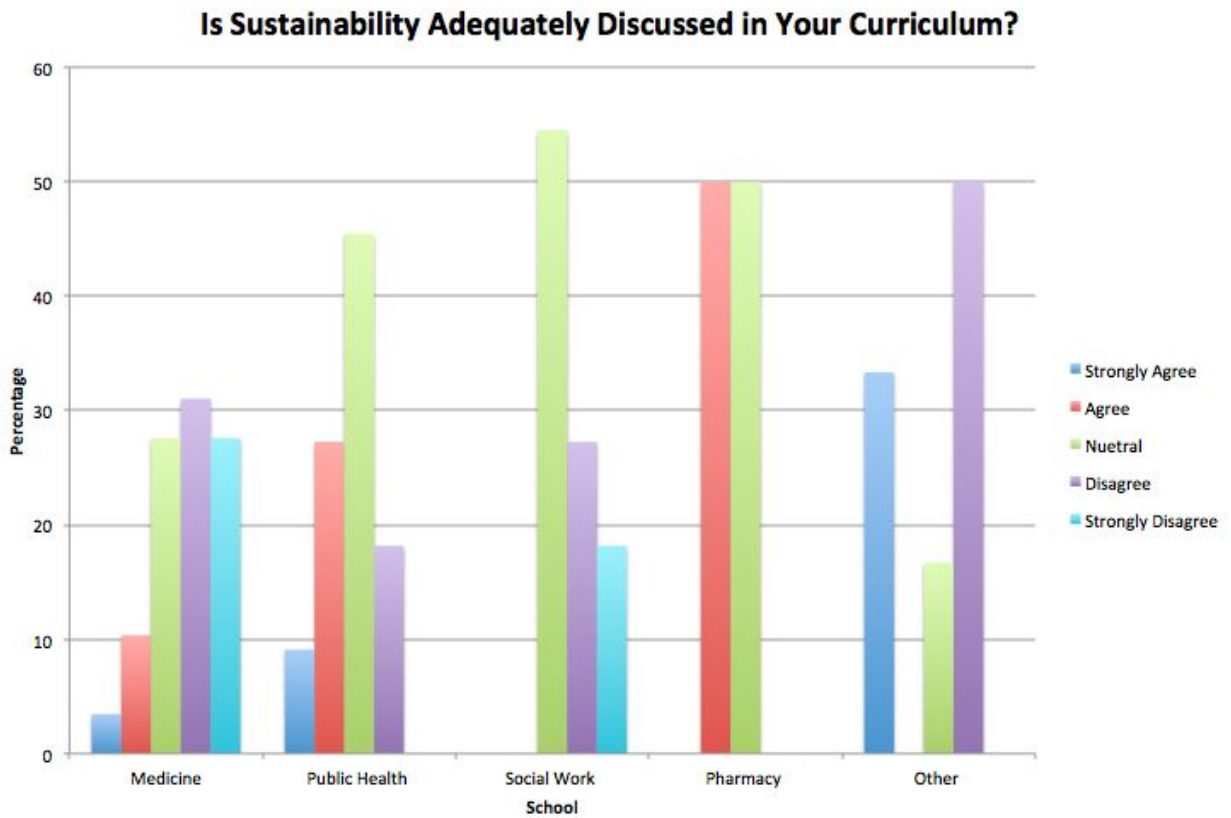


Figure 3. Opinions of survey respondents regarding sustainability efforts

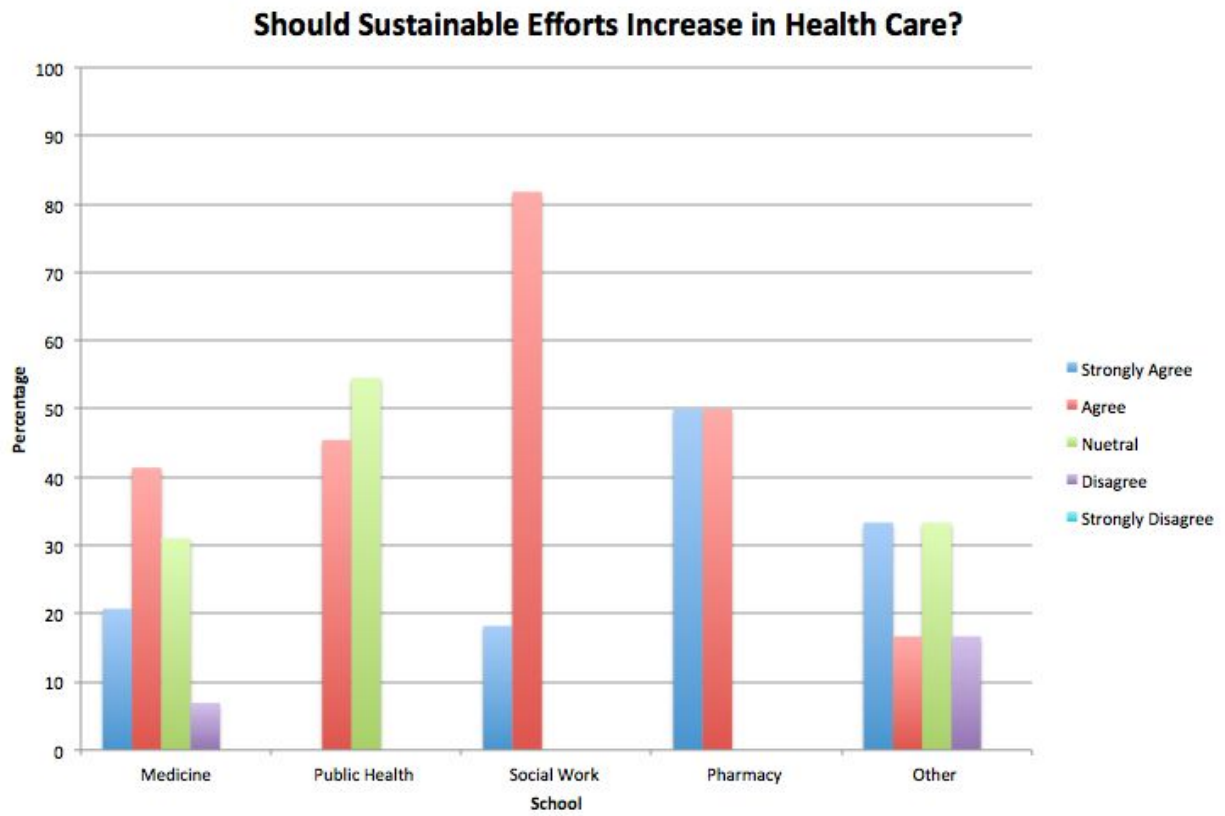


Figure 4. Beliefs of the Health Sciences Schools priorities regarding sustainability efforts

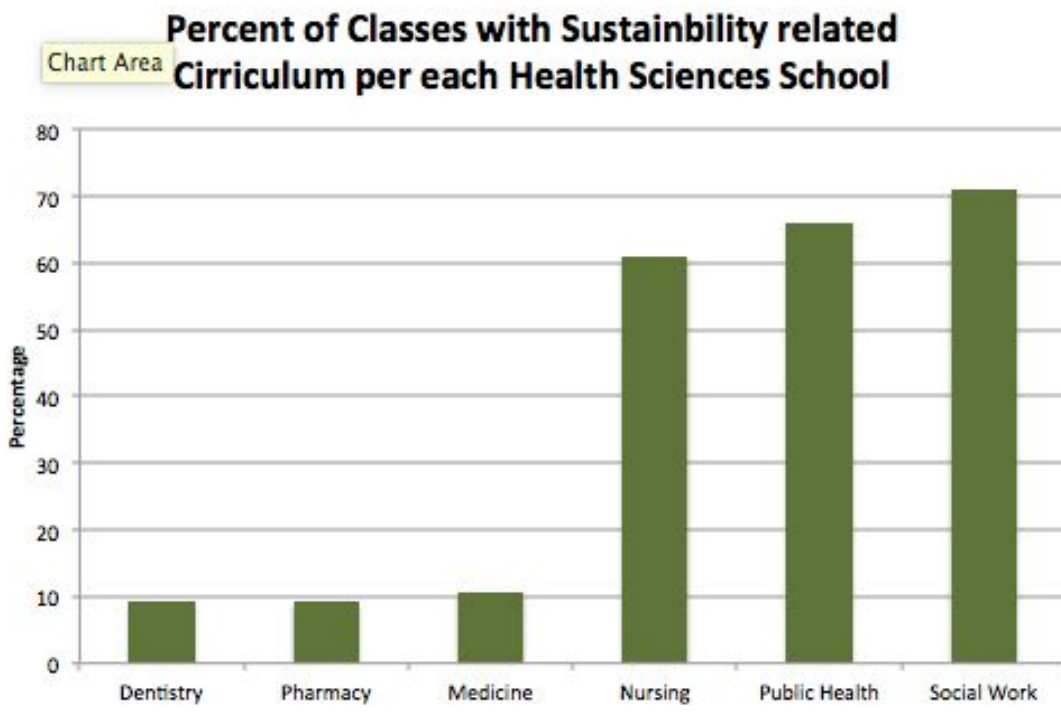


Figure 5. Percentage of sustainability-related classes relative to all classes offered in each of the six Health Sciences Schools.

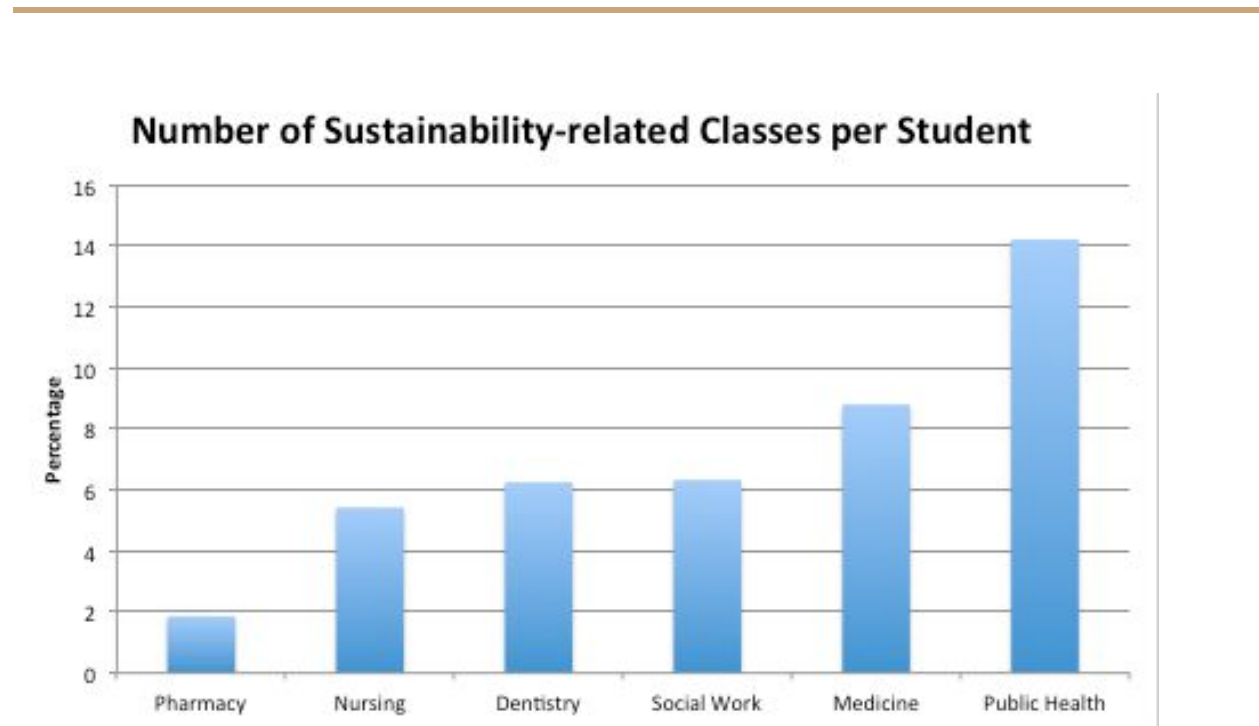


Figure 6. Analysis of students/sustainability-related class for each Health Sciences School

Figures 5 and 6 are two variations of an analysis of the six Health Sciences schools sustainability related curriculum. Figure 5 compares the sustainability-related curriculum to the overall number of classes in each School. With this analysis Dentistry and Pharmacy score the lowest and Public Health and Social Work champion. Yet, when the sustainability related curriculum is compared to the number of students in each School, Pharmacy and Nursing score the lowest and Medicine and Public Health excel. These results could be explained by a number of factors. One reason the School of Medicine scored low in the class-class analysis, but high in the class-student analysis is they offer more small, niche classes than other departments and have a larger quantity of overall classes. Dentistry scores extremely better in the second class-student analysis. This could be because they have relatively few people in their program. Through both analyses,

Public Health excels. This could be because sustainability themes are embedded in the discipline. The same can be said of Social Work.

Contacts

Figure 7.

Individuals Identified from the survey

Name		Email	School
FOWLER	TROY EDWARD	trofo@uw.edu	School of Nursing
HILD	MACKENZIE	hildm@uw.edu	School of Medicine
KIM	SUSAN SUNKYOUNG	ksusan21@u.washington.edu	School of Medicine
FOEHRING	CHRISTEN	c4ring@uw.edu	Other: College of the Environment
BUSCH ISAKSEN	TANIA M	taniabusch@yahoo.com	School of Public Health
PINGREE	MELISSA R	mpingree@uw.edu	Other: Env and Forest Sci
KINCHELOE	ARICA LOUISE BISCHOF	aricak@uw.edu	School of Social Work
TAN	STANLEY YI-CHONG	simglance@live.com	School of Pharmacy
AZODI	NAVID	nazodi@uw.edu	Other: School of Business

Figure 8.

Individuals Identified from Administration

School Identifying	Name	Email
Medicine	Patricia Riley	priley@uw.edu
Medicine	Elisabeth Goldstein	egolds@uw.edu
Nursing	Jennifer Thomspen	thomjenn@uw.edu

Nursing	David Cullen	dculle1@uw.edu
Social Work	Leanne Do	leannedo@uw.edu
Dentistry	No Response	
Public Health	No Response	
Pharmacy	No Faculty Members to Identify	

Figure 9.

Individuals Identified by Site Supervisor and Data Collection

Name	Department	Email
Tim Nguyen	Recycling UW	t2nguyen@uw.edu
Janet Bower	UWMC Nurse	lyubabower@gmail.com
Brenda Nissley	Harborview	bnissley@uw.edu
Edward Smith	UWMC	etsmith@uw.edu

Challenges and Successes

The following list provides the roadblocks and success stories we came across during interviews and data collection. Addressing and tackling the challenges will improve the efforts of the Greening Health Sciences Committee moving forward. Learning how the success stories below were able to lead the way will provide insight for further initiatives.

Challenges:

- Creating faculty and administrative contacts in each Health Sciences school to set up a cohesive Green Team across the six Health Sciences schools
- Low response rate from Administration when inquiring about information or interviews

“Given how important healthy diet and the environment is to health, it is sad that we never cover this in the curriculum.”
-School of Medicine Student

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- The Health Sciences Schools have little outreach and education efforts for sustainability (ie. educational posters, student clubs)
 - Student's lack of access to sustainability education in curriculum and resources
 - Lack of awareness on sustainability efforts
 - Having a full understanding of the current sustainability efforts
 - Medical system is established to produce a constant stream of waste
 - The School of Dentistry and the School of Pharmacy have the lowest interest level, and lowest sustainability classes to students ratio.

"In the actual hospital, as we all know, there is such tremendous waste in the name of sanitation and protection of patients. I do not want to compromise patient safety, but I know we can do better."
-School of Medicine Student

Successes:

- A central, administrative effort with the formation of Greening Health Sciences Committee
- Various grassroot efforts of sustainability measures
- Interest with students and faculty in sustainable healthcare practices
- The School of Public Health and the School of Nursing have excelled in leading the way for a high ratio of sustainability classes to students

How do UW Medical Centers compare?

Virginia Mason

Virginia Mason is consistently one of the most sustainable hospitals in the United States every year. It was once again named in the top 50 greenest hospitals in America for the 2015 year. There are extensive overall waste management programs that are in place to help reduce excess waste. They were able to utilize a program they called EnviroMason and “divert more than 3,400 gallons of wastewater from landfills from 2009-2014. The organization recycles more than 50 percent of its waste overall, compared to the healthcare industry average of only 20 percent.”(Fast Facts 2016)This program focuses entirely on how to make hospitals more sustainable. They work to effect change in several areas of sustainability from energy conservation all the way to serving healthy sustainable foods.

From an energy standpoint they have been able to save almost “8 million kilowatts an hour,”(Fast Facts 2016) and were awarded the EPA Energy Star award. This means that were able to use 35 percent less energy than a normal build would have needed. On top of saving energy Virginia Mason has made strides to help cut water usage.

They claim to have been able to cut up to 6 million gallons of water per year. They were able to do so by “replacing their linear accelerator with a more water efficient model, retrofitting their restrooms with more efficient toilets faucets and showers, installing new low-flow showerheads in their hotels, purchasing a new high efficiency kitchen dishwasher, replacing their sterile processing equipment with more efficient models” (Fast Facts 2016).

Waste reduction has also been a huge factor in helping Virginia Mason reach their sustainability goals. They attribute all of their success in waste reduction by, “Expanding recycling across their facilities, improving their electronic recycling, providing composting to all lunch and break rooms, implementing a construction debris recycling program, recycling the fiber from their shredded office paper, reprocessing medical supplies that

can be reused.”(Fast Facts 2016) In order to stop polluting chemicals as well they have begun “green cleaning.” This is the process of using less potent chemicals to clean and kill pathogens. This allows for the cleaning of the hospitals while having a lower impact on the environment.

Last they utilize healthy local food to serve to their patients. Utilizing local food allows for the allocation of fresher ingredients while at the same time reducing their carbon footprint. They have also started their own farmers market so they can help the neighborhood to be successful in sustainability efforts. During these farmers market session they educate the public on how to be more environmentally conscious and how to cook properly.

Virginia Mason is currently one of the leading hospitals in sustainability practices and has been continuously trying to increase their green practices. Everything from their waste management programs all the way to their farmers market they make sure to include sustainability. The University of Washington through sustainable in its own right has a lot to take from the current practices of Virginia Mason. I would recommend the formation of a team similar to the EnviroMasons. Having a sector of the hospital dedicated to sustainable practices would allow for groundbreaking achievements similar to what Virginia Mason has already achieved.

Swedish

Swedish hospital has currently put in several additions to its Ballard campus in terms of waste reduction. They have enacted these changes by adding several highly effective recycling programs. Their current recycling rate is at 56% while the rest of the nation is currently at 36% (How we do recycling 2014). “This campus composted 132,480 pounds of yard and food waste, and recycled 77,300 pounds of commingled materials. We accomplish this by the combined efforts of employees, patients and guests” (How we do recycling 2014). There are a few ways they are able to accomplish this first of which is

through education. One of the largest issues we have found within the University of Washington Health Science Center is there is a lack of general awareness about sustainable medical practices. Another method that was utilized was receptacles that were placed in key areas. They “ put recycling bags in the patient rooms, blue recycling bins are located in obvious areas, and the surgery department recycles all recyclable materials” (How we do recycling 2014). They also needed patients to cooperate with the actions that were being put emplaced in order to see effective results. Lastly they attribute their success to passion. What they mean by this is they needed people who could “walk the walk” and could act as role models and leaders. From their recycling program they were able to recycle 517,063 pounds in 2013. They saved about 4 cents per pound, which saved them \$20,683 dollars.

Another way Swedish is helping to lead the sustainability charge is by changing the way they deal with landscaping. Back in 2011 they decided to switch the way they dealt with landscaping in order to help increase their sustainability efforts. They were able to “save money, reduce water use, improve its landscape appearance and quality, and protect the health and safety of the patients, visitors, and staff” (Case Study 2014). Their first step in accomplishing this goal was to assess the landscape in all areas from appearance to the maintenance effort that this would require. They then needed to develop a plan of action, and they decided to “eliminate the need for pesticides by improving soils, designing beds to fill in quickly and shade out weeds, applying arborist wood chip mulch in beds, using a weed flamer for hardscapes, and ensuring plant health by putting the ‘right plant in the right place” (Case Study 2014). After implementing these changes they were able to see a sharp decrease in pesticide use. This is an easy fix that could be implemented in the UW health center and yields impressive results.

Recommendations Moving Forward

Methods

Through interviewing, surveying and literature review, recommendations for sustainability improvements were compiled. These recommendations include future projects for interns and classes, as well as recommendations for ways to improve sustainability in the health sciences schools and hospitals.

One consideration for these recommendations was student and faculty opinion. We researched proper ways to conduct interviews through the book *Research Interviewing*, by Bill Gillham (2007). Through interviewing, our team was able to learn about some sustainability strengths and weakness firsthand. This interview group included students, professors, doctors, administrators, sustainability managers and faculty.

A second consideration for these recommendations was literature review. Practice Green Health and Healthier Hospitals Initiative provided a general overview of the issue of sustainability in hospitals and schools. In addition, these sources allowed us to compare University of Washington Medical Center to other regional hospitals in order see where UW Medical center could improve. Further scholarly research was then conducted to supplement.

Future Projects for Interns (or Sustainability Studio)

- Examine the compost and recycling efforts in the cafe and bathrooms
- Continue to survey students opinions on how important this issue is
- Research and compile a document outlying what is happening in other hospitals around the country

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- Identify how transportation could improve for hospital staff I.E. commuting or better public transit
 - Work with schools to further their education on sustainability
 - Continue to address the missing links in the Health Science Centers
 - Establish a functioning group or club that deals with addressing this issue

Health Sciences School Recommendations

In order to promote sustainability within the six health science schools, we have compiled a few recommendations. The first of which is to begin outreach and educational programs for sustainability awareness in healthcare practices. It became apparent during surveying and interviewing that there was a general lack of knowledge about sustainability curriculum in the medical schools. A lot of students remarked that they did not know what their program or department was doing in terms of sustainability. Therefore, awareness is our biggest recommendation. One way in which to achieve increased awareness would be to design posters to be put up in all of the the health sciences buildings. This would help students get familiarized with the idea of sustainability within the health sciences. Another way to begin this process is to start a social media campaign in which students are informed about sustainability issues, awards and general happenings in healthcare via their computers. A good topic for educating students could be to teach them about plastics and waste streams as well as how the life cycles of pharmaceutical chemicals.

Another way to increase sustainability awareness would be to increase the amount of sustainability curriculum that is available to students (see figure 3). The six schools could benefit from making a sustainability class a requirement for their curriculum. As you can see from figure 6, this is especially true for the pharmacy, dentistry, and nursing, who have the least amount of sustainability classes per student. This would increase the amount of environmentally conscious students in the health sciences overall.

Furthermore, it would be beneficial to involve the deans of the six schools in our sustainability efforts. We attempted to contact the six deans during our internship to see if they wanted to take part in our initiative, and we received little response. Therefore, we determined that this is an area of communication that is lacking. To increase communication, we could send out a quarterly email to include them in what is

happening with sustainability each quarter. Hopefully, this will allow them to become more familiar with the movement, and help them incorporate more sustainable curriculum within their school or department.

In addition to having sustainable classes, there could be a sustainability orientation at the beginning of the school year. It could be available for all medical students to attend, to learn about ways to be more environmentally conscious in their healthcare practice. This could include an opportunity for students to join the Greening Health Sciences committee. In order for this committee to be successful it would require a lot of participation from administration and staff. With this club created, it would ideally create a culture in which students, staff, and administration have the opportunity to discuss relevant sustainability topics.

As we conducted our research, we found that the administrative directors from all six schools met on the first Friday of every month. Many of them showed an interest in sustainability issues and involvement with our Greening Health Sciences Committee. Therefore, it would be beneficial for our cause to get them involved, possibly through a monthly newsletter or email. They could pass along this information to other faculty and students, which would further our cause.

Lastly we recommend that the schools increase their compost and recycling efforts throughout the school. We felt that the medical center was generally lacking available composting and recycling bins. A way they could do this would be to increase the number of recycling and compost bins throughout the buildings and to continue sustainability education and outreach programs to educate people about the importance of composting and recycling.

Hospital Recommendations

Each intern researched one topic that allowed for a deeper understanding and knowledge into this broad-ranging project. Below are the following topics, the relevant research we conducted and finally, the recommendations we have for the University based off of our research.

Case Study: Waste Diversion Strategies at Harborview Medical Center

Healthcare services are designed to promote health and heal. Yet in the process of healing and the promotion of health, the healthcare industry is deemed one of the top toxic polluters contributing to landfills. More than 2.3 million of tons of waste is annually sent to landfills from hospitals (Gerwig 2012). There is a critical gap between the practice of healthcare and the ultimate goal of healthcare services. As the University of Washington is recognizing the importance of reducing environmental impacts, the Medical Centers and Health Sciences Schools are working towards improving waste diversion strategies.

There are various waste streams in hospitals: solid waste, Regulated Medical Waste (RMW), recyclables, hazardous waste, universal waste, and construction and demolition debris (Practice Greenhealth 2013). Each waste stream has its own regulations, policies and costs associated with disposal. My research turns its focus to solid waste and potential recyclables. Single-use items are the major contributing factor to the staggering tons of solid waste that is sent to landfills annually. Items from gloves to gowns, to surgical scissors are all identified as single-use (Government Accountability Office 2008). Harborview Medical Center has implemented several programs that target reprocessing of single-use items, and re use of other materials in the hospital. Brenda Nissley, the Sustainability Director at Harborview initiated the retrieval of several single-use items by taking large pickle buckets from the kitchen and placing them in operating rooms. The single-use items are then properly sanitized following FDA guidelines and reintroduced into hospitals. Harborview has also made the switch from single use sharp containers to reusable sharp containers. With this program alone, 38 tons of plastic have been diverted from Harborview's waste stream (Nissley 2016).

Harborview Medical Center has more than doubled its recycling rates from 20% to 41% in just six years. Harborview has implemented an in-house sanitation system that reduces greenhouse gases from reduced transportation, increased composting rates to 4 times

the historical rate and integrated sustainability practices into orientation for all new physicians (Nissley 2016.)

Clearly, Harborview has been employing waste diversion strategies that have been largely effective. Harborview Medical Center has been recognized on multiple occasions for its sustainability efforts in healthcare by Practice Greenhealth, an organization leading the way for sustainable practices in the healthcare industry. However, there are still areas in which Harborview, and other University of Washington hospitals need to improve. The largest challenges to waste diversion success in medical centers are confusing waste streams that are not regularized across hospitals, achieving physician and employee participation/interest, and lack of awareness for sustainability practices (Patel 2002). Addressing each challenge will result in sustainability initiatives that are effective and more successful.

What benefits do hospitals stand to gain from waste diversion strategies? Upwards of \$520,000 of savings has been recorded with a robust reprocessing of single-use items programs. Landfill waste are 3-4 times as costly as recycling and composting rates. Some single-use items can be sold back for profit. One hospital found \$94,000 in savings from selling back the Blue Wrap (Gerwig 2012). Even if hospitals ignore the environmental arguments for waste diversion strategies, the economic benefits stand on its own for basis to accept these programs.

Broader and more robust waste diversion strategies are imperative for the healthcare's practices and ideals to finally support one another.

Case Study: Pitfalls of the Pharmaceutical industry- what is lacking in the Pharmacy School?

The pharmaceutical industry clearly has a crucial role in the medical field, and the medication it provides has saved countless lives. There is no doubt that without it humanity would suffer greatly. Despite this, there are some inherent problems with

current industry standards with regards to sustainability. When looking at the total life cycle of pharmaceutical drugs, there are numerous factors that contribute to pollution of the environment. In fact, the US Geological Survey found that “human and veterinary drugs...were found in 80% of the 139 streams sampled from 30 states” (Becker 2010). Pharmaceutical pollution is no longer something we can ignore. As measurement tools used to detect these chemicals in waterways become more precise, public awareness of the issue is becoming stronger (Celiz et. al. 2009). Researchers in all fields around the world are working to solve these pollution issues in order to make pharmacy a more sustainable industry.

One of the first pollution sources comes from pharmaceutical manufacturing. During the manufacturing process, a lot of chemical byproducts are created. These byproducts are the result of chemical reactions required to make drugs. These byproducts often end up being dumped down the drain, and without wastewater treatment or incineration, they make their way into the environment (Jiménez et. al. 2004). One potential solution to this issue is by utilizing atom economy. This refers to how pharmaceuticals are made on a chemical level. It means ending a medicine’s chemical process with no extra atoms left over. These extra atoms are often what is referred to when talking about chemical waste byproducts. By changing the chemical processes being undergone in the manufacturing of medicines we can reduce the amount of by products being made (Dhage, Shisodiya 2013).

A second pollution source is through ingestion and excretion of the manufactured drugs from humans and animals. Feedlot animals in the US are fed a large amount of antibiotics for both growth stimulation and disease prevention. In fact, “up to 95% of administered dose of human or veterinary drugs can be excreted unmetabolized and discharged into the wastewater”. Furthermore, because pharmaceuticals are water soluble, they are often not filtered out in waste treatment facilities (Millié et. al. 2013). Humans also excrete medication metabolites that make their way through the

wastewater treatment system and into the environment. Estrogens from birth control pills are one example of these harmful metabolites that go into the environment. This is troubling because once in the environment, these estrogens are endocrine disruptors and can cause feminization of male fish in very small concentrations (Celiz et. al. 2009). Therefore, better waste water treatment practices that can filter out these tiny metabolites would be a key development for pollution reduction moving forward.

Doctors and nurses could potentially play a key role in the promotion of more sustainable medication protocols. Jennifer Zumsteg, a physician who specializes in rehabilitation medicine at Harborview, states that the education of doctors and nurses about sustainable medication practices is imperative to getting the movement off the ground. She states that it is often hard to work around the hierarchy of surgeons and doctors who are used to doing things a certain way, and that education is the first step towards getting a new generation of doctors who value sustainable practices. In the article "The Need for a 'sustainability Curriculum' in Nurse Education", Goodman emphasizes these same points. He says "a curriculum that does not explicitly address global health and sustainability and instead focuses too much on biomedical skills acquisition will not equip graduates for the wider challenges" (Goodman 2011). An example of the type of learning and curriculum Goodman recommends is what he calls "third order learning", which is transformative learning. Third order learning is about examining assumptions and questioning the norm. It would question the need for certain drug therapies in the first place, and would seek to look beyond the regular protocol in order to do what is best for both the patient and the environment. The challenges we are facing in the 21st century are radical and require radical rethinking of sustainable nursing curriculum. This type of thinking amongst doctors and nurses would help to change medication use and disposal protocols to be more environmentally friendly. Harborview Medical Center and UW Medical Center recently won an award for their sustainability regarding chemical use. Winners of this award "address toxicity through purchasing,

change of products, services and equipment, and educate their staff and the community of hazardous chemicals” (Practice Green Health 2016).

Over the years there has been a lot of discrepancy amongst different government agencies about how best to dispose of unused and expired medications. Organizations like the Federal Drug Administration, White House Office of National Drug Control Policy, Environmental Protection Agency, American Pharmacists Association and the US Fish and Wildlife Service all have vested interest and various levels of power when it comes to pharmaceutical disposal regulations. One method they all seem to agree upon is to mix your medications with an inedible material like coffee grounds, sawdust, kitty litter etc., and then put them into the trash and ultimately into the landfill. However, this is not a flawless method due to potential landfill water runoff into streams, and the safety of children and pets when throwing medications into the trash (Taras et. al. 2014).

Through talking to Pharmacy faculty and students, I have become aware of the need for more sustainability related courses in the pharmacy major. A lot of students I interviewed expressed a desire to learn more about sustainability, and said that they currently learned little to nothing about the issue in their program. Practice Green Health now has a solution to this issue, through online courses that are tailored to pharmacists looking to educate themselves on the impact of pharmaceuticals on the environment. There are several classes available, and educate students about issues such as impact of pharmaceuticals on the environment, hazardous waste management and solutions for change. This is information that the University of Washington could use to create their own sustainability class for the pharmacy major.

In conclusion, concern is growing in regards to the amount of medications that are ending up in our environment. More sensitive instruments are able to detect this pollution much more readily, which is helping to build the case against letting these medications leak into the environment. Teachers, students, doctors and nurses are all gaining awareness of the issue, and are willing to educate themselves to help change the

situation. New innovations in drug manufacturing are allowing us to cut back on pollution in the first place, but a lot still needs to be done. Education in the medical schools will be an important development in the coming years in order to educate the future doctors of tomorrow about proper prescription protocols in order to cut back on pollution. Our future goal for cutting back on pharmaceutical pollution should be about “meeting the needs of the present generation without compromising the ability of future generations to meet their own needs” (Dhage, Shisodiya 2013).

Given the current situation, my recommendations would be to focus on education and awareness. Training a new generation of environmentally conscious individuals who understand the importance of cutting back on chemical use will be paramount. The available technology for making more environmentally friendly drugs already exists (Dhage et. al. 2013). The last piece of the puzzle is implementation. In addition, nurses and doctors have the power to prescribe medications in a more sustainable manner given proper training (Becker et. al. 2010). Finally, online courses like the one that Practice Green Health offers will allow more current pharmacists to learn about green pharmacy. This online class should be utilized by the University of Washington Medical Center to further our sustainability efforts.

Case Study: Noise Pollution in Hospitals

The level of noise in hospitals is a huge problem and has been increasing since the 1960's. As long as there has been life saving machinery health care professionals have been fighting the problem of noise. The main problem is how to decrease noise while still utilizing these life saving devices.

This problem has been well researched and several studies have addressed this issue. In one study they found that the EPA has set a maximum acceptable decibel level for hospitals at 45dB in the daytime and 35db at night (Cabrera 2016). However in several studies it was found that hospital noise passes this limit by a vast margin.

In one study, Cahuna found that hospital rooms containing two patients reached a noise level of 44-95 dB and in rooms with four patients they observed dB ranging from 36-104. This varying range of noise levels is very detrimental to patients healing process and has even been proven to cause several adverse side effects to patients in these hospitals (Cahuna 2011).

One of the most concerning aspects of hospital noise is the phenomenon known as alarm fatigue. Alarm fatigue is a problem in which, "so many alarms are going off so frequently, that it is impossible for hospital staff to respond to each alarm as though it was urgent" (Eggertson 2012). This is a huge problem because there are very bad consequences for patients if this occurs to them. The FDA found that in 2005 there were as many as 566 alarm fatigue related deaths (Eggertson 2012). Obviously this is a huge problem and there have been several studies conducted in order to find a solution.

The main solution that is proposed is not to reduce machine noise, but to reduce conversation noise from hospital staff. One study found that one of the easiest ways to reduce noise in hospitals is to put into place rules to limit hospital staff conversation (Wallis 2012).

It is clear that hospital noise is a huge problem in hospitals and is often a very overlooked aspect in hospital sustainability. However patient outcomes are a huge part of a hospital's success. In order to increase sustainability efforts there needs to be an increase in patient outcomes and in order to do so the noise pollution in hospitals needs to be addressed.

Conclusion

The lack of sustainability efforts in health care has been a growing concern in recent decades. In this study we aimed to uncover the successes and pitfalls of sustainability in

the University of Washington Health Sciences. In order to do so, we utilized scholarly research, interviews, and survey data. We identified several gaps within the hospitals, namely in waste creation, noise pollution and pharmaceutical waste.

In addition, we also found issues within the medical schools. The major issue identified was a lack of sustainable practices in the pharmacy and dentistry departments. We recommend that the schools adopt more sustainable curriculum, increase recycling and compost effort, and increase awareness about environmental issues to students through posters and social media outreach.

Through our surveys we were able to better understand students opinions on sustainability in healthcare. Furthermore, we were able to gain insight into how healthcare professionals and teachers respond to the issue of sustainability through conducting interviews and email correspondence. Our research helped aid us in creating our recommendations by seeing what other hospitals and schools were doing across the globe.

Works Cited

Calder, Judith. "Survey Research Methods." *Medical Education* 32.6 (1998): 636-52. Web.

Cabrera, Izumi Nomura, and Mathew H.M. Lee. "Reducing Noise Pollution in the Hospital Setting by Establishing a Department of Sound: A Survey of Recent Research on the Effects of Noise and Music in Health Care." *Preventive Medicine* 30, no. 4 (April 2000): 339-45. Accessed January 4, 2016.

http://ac.els-cdn.com/S0091743500906388/1-s2.0-S0091743500906388-main.pdf?_tid=7e97b6ae-e0f3-11e5-b914-00000aacb35f&acdnat=1456977391_7c7ed02fc5081b06f4efd44b089eb7cb.

Cahuna, Madalena, and Nélio Silva. "Hospital Noise and Patient Well Being." *Procedia - Social and Behavioral Sciences*.

http://ac.els-cdn.com/S1877042815001470/1-s2.0-S1877042815001470-main.pdf?_tid=8fb6e236-e4bb-11e5-a285-00000aab0f6c&acdnat=1457393172_933cc17acd9f02f9de2ecbcc8582cb34.

Case Study: Swedish Medical Center, First Hill Campus. Report.

http://www.seattle.gov/Util/cs/groups/public/@spu/@conservation/documents/webcontent/01_031508.pdf

Eggertson, Laura. "Hospital Noise." *The Canadian Nurse* 108, no. 4 (2012): 28-31.

"Fast Facts EnviroMason." Accessed February 29, 2016.

https://www.virginiamason.org/workfiles/enviromason/enviromason_fastfacts.pdf.

Howard, Janet "Waste Prevention in the Four Streams." *Practice Greenhealth* (2013): 29-64. Web.

"How We Do Recycling at Swedish Ballard." *Swedish*, April 16, 2014. Accessed March 3, 2016. <http://www.swedish.org/blog/2014/04/how-we-do-recycling-at-swedish-ballard>.

Gerwig, Kathy. "Managing and Minimizing Hospital Waste." *Greening Health Care: How Hospitals Can Heal the Planet*. Page 106-128 Print.

Patel, Neha T. "Pollution prevention strategies used by Oregon hospitals." (2002).

United States. Government Accountability Office. (2008). Reprocessed single-use medical devices FDA oversight has increased, and available information does not indicate that use presents an elevated health risk : Report to the Committee on Oversight and Government Reform, House of Representatives. Washington, D.C.]: U.S. Govt. Accountability Office.

"Brenda Nissley: Harborview Informational Interview." Personal interview. Feb. 2016.

Taras, Howard, Nina M. Haste, Angela T. Berry, Jennifer Tran, and Renu F. Singh. "Medications at School: Disposing of Pharmaceutical Waste." *Journal of School Health* 84.3 (2014): 160-67. Web.

Becker, Julie, Mendez-Quigley, Teresa, and Phillips, Maureen. "Nursing Role in the Pharmaceutical Life Cycle.(Environmental Health, Sustainability and Nursing)." *Nursing Administration Quarterly* 34.4 (2010): 297. Web.

Celiz, Mary D., Jerry Tso, and Diana S. Aga. "Pharmaceutical Metabolites in the Environment: Analytical Challenges and Ecological Risks." *Environmental Toxicology and Chemistry* 28.12 (2009): 2473-484. Web.

"Fast Facts EnviroMason." Accessed February 29, 2016.
https://www.virginiamason.org/workfiles/enviromason/enviromason_fastfacts.pdf.

Suresh D. Dhage, and Komalsing K. Shisodiya. "APPLICATIONS OF GREEN CHEMISTRY IN SUSTAINABLE DEVELOPMENT." *International Research Journal of Pharmacy* 4.7 (2013): 1-4. Print.

Jiménez-González, Concepción, Alan Curzons, D. Constable, and David Cunningham. "Cradle-to-gate Life Cycle Inventory and Assessment of Pharmaceutical Compounds." *The International Journal of Life Cycle Assessment* 9.2 (2004): 114-21. Web.

Celiz, Mary D., Jerry Tso, and Diana S. Aga. "Pharmaceutical Metabolites in the Environment: Analytical Challenges and Ecological Risks." *Environmental Toxicology and Chemistry* 28.12 (2009): 2473-484. Web.

Goodman, Benny. "The Need for a 'sustainability Curriculum' in Nurse Education." *Nurse Education Today* 31.8 (2011): 733-7. Print.

Wallis, Laura. "Hospital Noise Puts Patients at Risk." *The American Journal of Nursing* 112, no. 4 (2012): 17

Salandin, Andrea, Jörg Arnold, and Oliver Kornadt. "Noise in an Intensive Care Unit." *The Journal of the Acoustical Society of America* 130, no. 6 (2011): 3754-60.

Bucy, Julia. "Annotated Bibliography" (2016): 1-16. Print.

"Jennifer Zumsteg : Harborview Informational Interview." Personal interview. Feb. 2016.

Gillham, Bill. *Research Interviewing*. Maidenhead: McGraw-Hill Education, 2007. Web.

Becker, Julie, Mendez-Quigley, Teresa, and Phillips, Maureen. "Nursing Role in the Pharmaceutical Life Cycle.(Environmental Health, Sustainability and Nursing)." *Nursing Administration Quarterly* 34.4 (2010): 297. Web.

Healthier Hospitals Initiative | . (n.d.). Retrieved March 19, 2016, from <http://healthierhospitals.org/>

Practice Greenhealth | Home. (n.d.). Retrieved March 19, 2016, from <https://practicegreenhealth.org/>