

Wexner Medical Center Waste Reduction Proposal

Waste-Diversion Initiatives and Single-Use Medical Device Reprocessing



AEDE 4567 Capstone
Dan Woda, John Berger, Chris Donohue, Jay St Clair, Ryan Hollowell

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Executive Summary

As one of the largest teaching hospitals in the United States, the Wexner Medical Center strives for excellence in healthcare and beyond. The Ohio State University, the parent university of the Wexner Medical Center, recently developed numerous 'sustainability goals' that the university hopes to achieve by the target date of 2025. Being a representative of the great Ohio State name, the Wexner Medical Center should include itself in all the goals that Ohio State has set. This proposal was developed to assist the Wexner Medical Center with their waste-reduction goals by developing a two-pronged approach to tackling primary sources of waste throughout the medical center campus. The first objective of this proposal is to increase waste diversion rates through several strategic and educational-based activities that focus on daily waste from patients, visitors, and employees. The second objective of this proposal centers around expanding a current contract for single-use device processing, which strictly focuses on the employee-side of waste. Overall, the general recommendations are as follows: in order to achieve objective one, additional well-labeled and educational recycling receptacles must be added, as well as increased collaboration with other university medical centers and The Ohio State University main campus; in order to achieve objective two, the current reprocessing program must be expanded and the current contract with the Wexner Medical Center's medical device supplier must be restructured. As a whole, the combination of these two objectives offers the strongest and most comprehensive way to implement a waste-diversion program while keeping costs and time requirements to a minimum.

Introduction

Zero waste is the idea of reusing nearly all products in some form or fashion, therefore diverting 90% or more from landfills. With regards to hospitals, zero waste is a nearly impossible achievement due to many factors influencing waste disposal, including biomedical and hazardous waste sources. Therefore, this is why the more realistic goal of developing a waste-reduction proposal for the Wexner Medical Center was set. Minimizing waste at medical centers overall is a challenge that the medical community is going to face over the next decade. As social awareness rises over the amount of waste that gets sent to landfills every day around the world, there will be a growing consensus that waste management is just as important as energy and water management. The Ohio State University understands this is an issue that must be addressed at the forefront and has taken immense steps in making the campus a zero-waste institution. It is now time for the Wexner Medical Center to follow the university's lead and help set the example of what a minimal-waste medical facility should be.

Objective One: Increasing Med Center Diversion Rates

Research Methods

Achieving waste reduction in a setting such as a major medical center is complex and requires the integration of several interested parties with many decision-makers and moving parts. Therefore, one of the most efficient research methods to develop a waste reduction proposal is to consult with the leaders in the medical field with regards to waste diversion. Several institutions consulted throughout the project were UCLA (University of California, Los Angeles) Medical Center, UC-Davis Medical Center, and the University of Michigan Medical Center. Additionally, several key individuals involved with the current waste program at the Wexner Medical Center were consulted for baseline data to determine where the medical center currently is and what current waste-diversion methods are. Online data collection and research were also used to look at institutions that performed exceptionally in particular waste-diversion aspects.

Data Collection and Analysis

Key data was collected and analyzed from the current waste diversion rates of the Wexner Medical Center and the University of Michigan. Additional waste diversion techniques obtained from the California medical centers referenced in the research methods above. Partnering with these university medical centers to develop new ideas in waste reduction would be beneficial to all, and this proposal begins the process to make such a partnership happen.

Research Findings

A two-faceted approach was used to analyze where the Wexner Medical Center currently stands with regards to waste diversion. The first method was analytically

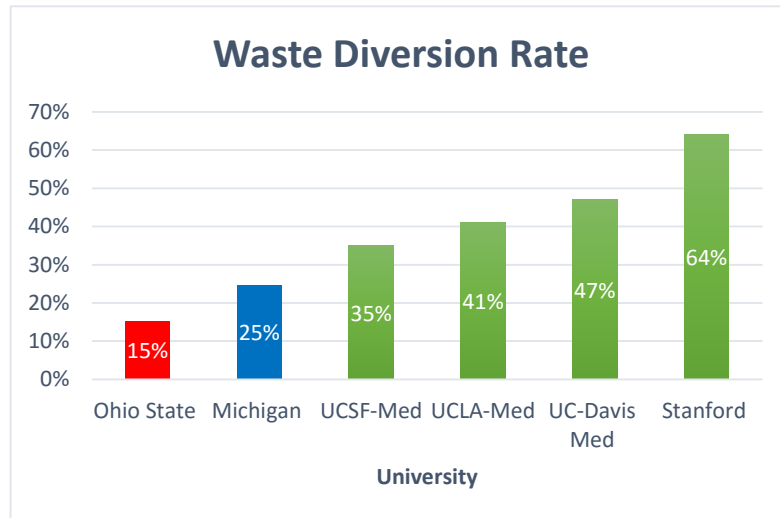


Figure 1- Ohio State Medical Center vs. Similar medical centers across the United States

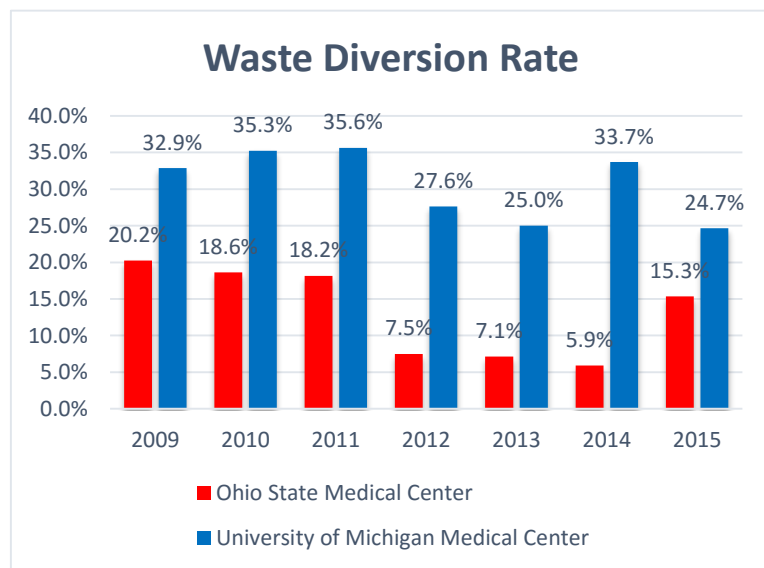


Figure 2-Ohio State Medical Center vs. University of Michigan Medical Center

focused, with basic diversion rates for the Wexner Medical Center compared to similar university medical center institutions across the United States. The second method used a hands-on approach, with physical visits to the Wexner

Medical Center to help spur ideas and get a perspective of how a visitor or employees might view waste disposal techniques.

Comparing the Wexner Medical Center to the other university medical centers in this proposal, Figure 1 clearly shows how the

Wexner Medical Center lags behind the leaders in waste

diversion by a significant margin. Stanford University clearly has the highest waste

diversion percentage, at 64%, with several other California schools having significantly better rates than the Wexner Medical Center as well (Executive Summary, 2016).

As noted in Figure 1, the University of Michigan also has a significantly better waste diversion rate than the Wexner Medical Center, based on data collected from each university's sustainability office (Chur, 2016; Gillund, 2016). Figure 2 expands on the comparison with the University of Michigan. Since 2009, the University of Michigan has significantly been better in medical center waste diversion, with a period from 2012

to 2014 where the University of Michigan was diverting nearly four times as much waste as the Wexner Medical Center. A staff member from the Wexner Medical Center waste program even noted that

representatives from the University of

Michigan come down and visit the Wexner Medical Center to see what they are currently doing, and then take those ideas and improve on them. The Wexner Medical Center takes no initiative to do the same. Partnering with a noted rival on an issue as large and complicated as sustainability can go a long way towards achieving long-term goals.

The overall atmosphere of the Wexner Medical Center, as a whole, does not seem to put forth much effort in educating visitors and employees on what is recyclable



Image 1-Explain of a trash and recycle bin in the new James Cancer Center.

and what is landfill waste, or even having the appropriately labeled containers for each.



Image 1 depicts a standard landfill trash-recyclables combination bin, and it is nearly impossible to tell which side is for what until an individual is almost on top

Image 2- Control panel used to signal a robotic vehicle to transport a specific type of waste to the waste disposal facility

of the bin. There is also no signage



Image 3-Example of a robotic vehicles used by the Wexner Medical Center

to indicate what goes in each bin, a significant issue for all types of bins such as this across campus. Image 2 is an example of a typical trash bin located in the main cafeteria in the Wexner Medical Center campus. It is evident that there is only one bin, so no effort to divert recyclables plus many of the items placed in the bin could be recycled or composted. Simple efforts such as having the proper bins and labels can go a long way in making waste diversion a common practice.

The main points of contact for the current Wexner Medical Center waste program, Dean Russ and Debra Blakely, were able to explain how the current system for waste disposal works at the hospital. Essentially, there is a robotic trash cart system,

containing approximately 139 trash carts and 66 robotic vehicles, which are used to transport all types of trash to the basement of each medical campus building. Carts are picked up by the robotic vehicles periodically, and waste is unloaded manually and sorted for biomedical, landfill, linens, and if applicable, recyclables. One major roadblock to expanding a recycling program across the medical center campus is a lack of carts. Carts have a specific load capacity, and floor personnel is currently instructed to place recyclables on the top of all other diverted waste. Due to human error, lack of attentiveness, or any number of reasons, this may not happen at either the floor end or the sorting end. Additionally, Russ and Blakely noted that an option added to the control panel for signaling a recyclables pick-up could help in increasing waste diversion efficiency. At the new James Cancer Research Center, a vacuum-tube waste system was installed that can efficiently separate trash, recyclables, and linens, so this project could expand to the other medical campus buildings.

Discussion

After investigating numerous similar institutions across the United States, it is quite obvious that the Wexner Medical Center lags behind the notable leaders in waste diversion. Some university medical centers, such as UCLA, have established various cost-saving strategies with regards to waste that the Wexner Medical Center can imitate and implement that would allow the cost-savings to be passed along to the patients or to help further advance healthcare research and instructional quality. Even simple initiatives, such as mimicking the University of Michigan by finding a new item every year to add to recycling efforts, can help the long-term goal of waste minimization.

With regards to a partnership to help achieve waste reduction targets, UCLA Medical Center appears to be the best fit, both in size and quality of the institution, to work with long-term. An example of a program UCLA has implemented that the Wexner Medical Center could easily administer is the usage of reusable isolation gowns, which allow a single gown to be used up to 75 times before being disposed of in the landfill. This program has amounted to nearly \$2 million worth of savings over a five-year period and has eliminated the use of 189 tons of disposable gowns annually (Markhamet, 2012). Another UCLA program that would be easy to implement is the use of highly visible, well-labeled recycling containers in staff lounges and administrative areas. An initiative that the Wexner Medical Center already shares with UCLA is the disposal of wood pallets after delivery of products. Wexner Medical Center is either reusing them wherever possible and where not, recycling them back to a local distributor. This initiative saved nearly 80 tons of landfill waste for UCLA. The use of reusable transport tubes is another effort that has led to the reduction of cardboard waste.

Waste reduction is multi-faceted, so waste reduction initiatives sent down from the top are only half the battle. Education is a fundamental component where the Wexner Medical Center has the most ground to make up. There are many examples of effective waste reduction programs that the Wexner Medical Center can implement. UC-Merced recently completed a waste reduction program, which resulted in an increase in their waste diversion by 98% (Strem, 2014-2015). UC-San Francisco has an employee interactive video program focused on waste education, which helped increase waste diversion rates as well. An informal survey of randomly selected Wexner Medical Center

employees of whether an item is recyclable or not resulting in promising responses, but the lack of proper receptacles may be hindering potential in this aspect.

Objective Two: SUD Reprocessing

Research Methods

To get a better understanding of the possibilities for implementing a reprocessing program at the Wexner Medical Center, research tasks covering a variety of focus areas were performed. One of the most important research tasks about this objective was to obtain the best possible understanding of the safety risks and best management practices for reprocessing programs. The implementation of reprocessing programs throughout the country demonstrates that there are safe operating procedures. The second research task was to gather any available information on the baseline data for reprocessing programs already in place at the Wexner Medical Center. This information helped us determine the size and scope of a proposed device-reprocessing program that would adequately fit the Wexner Medical Center's needs. The final research task was to form a detailed understanding of the costs and savings associated with working with a device reprocessing contractor allowing for an accurate and valuable cost-benefit analysis.

To better understand the risks associated with single use device repressing, researching what devices are FDA approved for reprocessing is critical. Furthermore, research was conducted using case studies and peer-reviewed journals along with

congressional testimonies published by the FDA. The second research objective was to gather any available information from Wexner Medical Center on their current reprocessing practices to expand further with new single use devices. The final reprocessing objective was to understand better the potential cost savings Wexner Medical Center could incur from reprocessing single-use devices, as well as possible waste reduction and improved sustainability. Case studies and peer-reviewed journals were used to gather a general baseline of the average cost savings by reprocessing single-use devices along with collecting information from Wexner Medical Center to calculate their cost savings based off of current reprocessing practices.

Data Collection and Analysis

Collecting data for reprocessed devices can be challenging because hospitals deal on contractual basis with reprocessing companies, and privately owned hospitals are hesitant to release financial information. Riverside Hospital in Columbus, Ohio was very helpful when collecting information regarding reprocessed devices and the industry as a whole from a hospital's perspective in dealing with reprocessed devices. Furthermore, using a peer-reviewed article, *Economic Analysis of Reprocessing Single-Use Medical Devices*, from Infection Control and Hospital Epidemiology, it was concluded that based on 2008 data, the average cost savings for reprocessing single-use devices was 49% (Phillips, et. Al, 2008). Finally, data from Wexner Medical Center was retrieved for their reprocessing practices where they provided a two-year analysis from March 2014 to March 2016 regarding reprocessing practices currently used at the hospital. From here it was calculated that Wexner Medical Center currently has average cost savings of 56%.

The total waste diverted from the landfill came from this two-year analysis, but due to significant variability in what this value can be -- depending on device weights, some devices used, etc. -- it was too difficult to determine a 'per device' waste reduction. The Wexner Medical Center was able to divert 45,872 lbs of waste from landfills over the two-year period through reprocessing six devices (Stryker, 2016). Expanding the suite of reprocessed devices will only increase this diversion value and improve the medical center's sustainability.

At first, a cost-benefit analysis was required to analyze this program, but after reviewing the data and information received, it was not necessary due to the significant cost savings using reprocessed single-use devices. The cost savings stand alone as an economic reason for reprocessing single-use devices.

Research Findings

The analysis of Wexner Medical Center's current single-use device reprocessing practices found, a cost savings of 56%. The 56% cost savings of Wexner Medical Center is significantly higher than that of the 2008 case study average of 49%, which is an advantage for the Wexner Medical Center and should encourage further reprocessing. Some commonly reprocessed devices that Wexner Medical Center currently doesn't reprocess are shown below in Figure 3 with their suggested reprocessing cost compared to their OEM cost, assuming the calculated 56% savings rate.

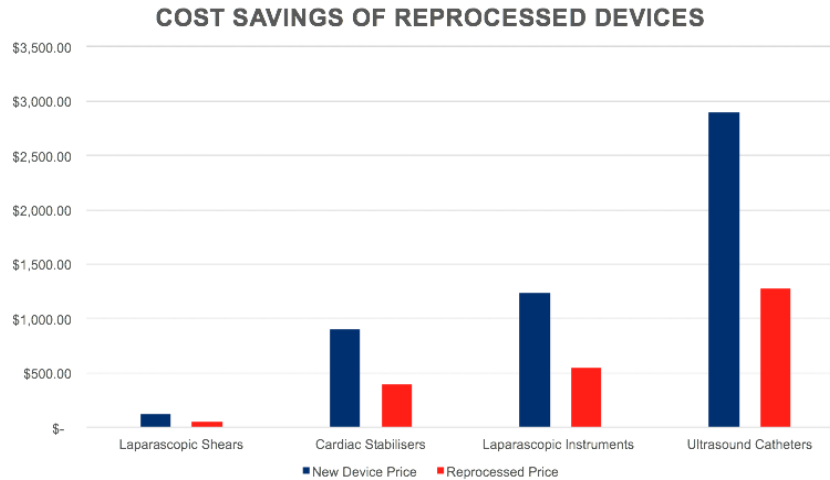


Figure 3-Cost of OEM SUDs vs. Reprocessed SUDs

Research regarding current single use device reprocessing at the Wexner Medical Center also indicated that there were only about six different types of devices currently reprocessed while the FDA list of devices that can be reprocessed spanned a wide range of devices. In a list of the most commonly reprocessed single-use medical devices provided in a document by PracticeGreenHealth, the Wexner Medical Center was not reprocessing 4 of these devices, indicated in Figure 3 above (Practice GreenHealth). There is clearly an opportunity to expand the number of single-use devices reprocessed at the Wexner Medical Center, and an expansion of the reprocessing contract will help to drive further cost savings as well as increase the medical center’s overall waste diversion.

As far as risks involved with reprocessed single-use devices, numerous case studies along with congressional testimonies have concluded that the failure rates of reprocessed devices are not higher than brand-new devices. For example, an empirical study looked at the failure rates of multiple medical devices, both original equipment manufacturer (OEM) and reprocessed. The failure rates were found to be lower in the

reprocessed devices, 0.41% between two devices, when compared to the OEM devices, 2.01% between the same two devices after evaluating 1719 reprocessed devices and 1393 original devices (Loftus, 2015). Additionally, a report issued by the Government Office of Accountability acknowledges the fact that the FDA has increased its oversight of single-use device reprocessing, and that available information does not demonstrate a causative link between patient injury or death and a reprocessed device (GAO, 2008). Along with this, a reprocessed device is individually checked for errors and failure before being repackaged and sent to the next medical center. Finally, the FDA has stringent regulations along with auditing processes to approve devices suitable for reprocessing (GAO, 2008).

The final piece of information that was taken into account when evaluating device reprocessing opportunities dealt with the Wexner Medical Center's current purchasing contract with an OEM. The present contract between the medical center and the medical device manufacturer allows the medical center to purchase brand new single use devices at a price comparable to the price of a reprocessed device (Charissa Johnson, 2016). The current contracts in place allow for the medical center to purchase original equipment at a cost that is competitive with that of reprocessed devices, removing the financial incentive to reprocess more devices. However, to meet the waste related sustainability goals set by the university, adding additional devices to the reprocessing contract will help reduce the facility's waste to landfill and accelerate progress toward improved sustainability.

Discussion

As demonstrated in the sections above, there are many benefits to reprocessing single-use medical devices. Based on the data received from the Wexner Medical Center and Stryker Sustainability Solutions, the medical center is receiving an average of 56% cost savings through their current reprocessing contract. Additionally, the medical center was able to divert over 45,000 pounds of waste from landfills by reprocessing just six devices out of a list approaching one thousand devices (FDA Device List). There is an apparent cost saving associated with reprocessing single-use medical devices, and the calculated benefits were shown to be higher than the average cost savings found in empirical studies. This cost-savings indicates further incentives for the Wexner Medical Center to pursue an expanded reprocessing program. With regards to waste diversion, broadening the number of single-use devices reprocessed will increase the medical center's diversion rate by varying degrees depending on the average weight of the devices and the number of devices used over time. Regardless of these variables, expanding reprocessing will reduce the amount of waste sent to landfills, and in turn, will help the Wexner Medical Center push further toward becoming a leader in sustainability. Widespread adoption of device reprocessing in medical centers throughout the United States demonstrates the inherent value and success of device reprocessing, and published government and empirical studies indicate that there is no increased risk to using reprocessed devices over the newly manufactured counterparts. Lastly, with regards to the Wexner Medical Center's current purchasing and reprocessing contracts, there is no significant financial incentive to adjust the OEM purchasing contract and expand the reprocessing contract due to the established

pricing in each. Reducing the number of new devices purchased from the OEM and expanding the number of devices reprocessed through the reprocessor at the end of each respective contract must be a consideration on the table. Although there is no cost savings associated with this contract adjustment, there are also little to no increases in overall costs, and this action will help to drive the Wexner Medical Center toward becoming a more sustainable facility.

Recommendations

Objective 1

After thoroughly analyzing the fundamental tenets of Objective 1, there are several different initiatives the Wexner Medical Center can do to help improve their current waste diversion rate. The first recommendation is to implement a better-labeled waste receptacle with an easy-to-understand graphic depicting what is and isn't recyclable, as this would go a long way to achieving these goals. One key issue that came up with regards to the waste receptacles is that the designers of the new James Cancer Center wanted to make the hospital feel more like a hotel, for patient comfort and image. This appearance is understandable, and explains the clean look of the current waste receptacles; therefore, an appealing and unobtrusive signage system must be used. Dr. Joseph Meyerson, a medical professional consulted on this project, and Debra Blakely are working together to help increase recycling efforts in the operating room. Recycling for the medical center is free, whereas landfill waste is an additional cost. Going for the free option is an obvious choice financially.

The second recommendation of this proposal is for the Wexner Medical Center to collaborate with other similar institutions in developing new methods and programs to reduce waste nationwide across all medical centers. A stable network that continually challenges itself with new goals is how long-term progress is kept going and should be developed here. Sharing cost-benefit analysis, current best practices, and even simple development sessions can all contribute to reaching waste reduction goals.

The third and final recommendation of this objective is to collaborate with the main university campus to increase awareness overall of waste reduction techniques. Creating a university-wide project can assist in the completion of the mission of waste minimization much quicker and more efficiently. Teamwork is essential to completing any project, and using the university's already established waste-reduction programs can benefit the Wexner Medical Center significantly.

Objective 2

After evaluating the current state of the single use device reprocessing at the Wexner Medical Center, it can be concluded that there are two recommendations regarding the reprocessing of single use devices. First, expand the overall program already established through reprocessing company Stryker. The reprocessing company can provide solutions for a significant number of devices the Wexner Medical Center is currently buying from the OEM manufacturer. Expanding the inventory of reprocessed devices the Wexner Medical Center purchases will help achieve that goal.

Second, revisit the existing contract with the device manufacturer that hinders the reprocessing program from providing economic incentives not to reprocess single-use devices. By re-negotiating the manufacturing contract and eliminating the rebates not to reprocess and expanding the reprocessing program, Wexner Medical Center could see the same cost savings along with becoming a more sustainable hospital.

Conclusion

The hospital environment provides a unique set of challenges in the pursuit of sustainability. Not unlike other industries, large health care facilities must find a delicate balance between environmental sustainability and cost. Looking at sustainability in terms of cost/benefit is increasingly important, and can be one of the most powerful incentives for any organization. Any sustainable change to a healthcare organization requires considering patient health and cost.

Cost and patient care are the priority when recommending winning strategies for sustainable waste reduction at the Wexner Medical Center. First, any risk to the patient was rigorously scrutinized and evaluated. The objectives in this report pose nearly *zero* risk to patient health in comparison to current strategies. Both objective one and objective two have a primary focus on patient health.

Also, cost/benefit was given high priority during the development of the strategies outlined in this report. Increasing waste diversion rates through recycling can require little costs to the hospital, while decreasing the expenses associated with waste removal and management. This initiative provides a two-pronged benefit for the hospital; a reduction in cost and an increase in environmental sustainability.

Objective one addresses the low rate of waste diversion from landfills in comparison to peer institutions. The strategies devised in this report focus on low-cost strategies to increase landfill diversion through educational signage. This plan focuses on changing the behavior of the consumer, and can provide long-term cost savings over

time. Informative signage is a strategy currently implemented in many facilities at The Ohio State University, and would be a simple, non-invasive solution.

Objective two focuses on decreasing regulated medical waste, an expensive byproduct of health care, through further expansion of the single use device reprocessing program at the Wexner Medical Center. In addition to the savings from waste reduction, the purchasing of reprocessed SUDs will offer a significantly lower cost alternative to buying new SUDs.

Addressing the challenge of waste reduction at the medical center requires a concerted effort among hospital administrators, operations staff, and healthcare providers. For any sustainability objective to work in the greater healthcare system requires compromise and collaboration between the separate departments of the medical center staff. Moving the hospital in the direction of sustainability can, if developed with careful consideration for patients and costs, provide significant benefits to the Wexner Medical Center and all of its stakeholders.

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Appendices

Dataset #1: SUD osu data .xlsx

Sources: 2 Year Savings Snapshot.pdf, retrieved from OSU Wexner Medical Center (March 24th, 2016)

Description: This dataset includes two years of monthly costs, types and numbers of devices purchased, cost savings, and total waste diversion through reprocessing six SUDs at the Wexner Medical Center, as reported by Stryker Sustainability Solutions. This data was used to calculate an average cost savings value, determine baseline waste diversion, and identify devices currently being reprocessed. This data is included in sections within Objective 2.

Dataset #2: UM Medical Center Waste Diversion.xlsx

Sources: Retrieved from University of Michigan Sustainability Office (March 6th, 2016)

Description: Breakdown of item by item waste management at the University of Michigan Medical Center. For the waste diversion value, we divided mainstream waste by the total waste. This information was sent to us by Joe Stchur and Jennifer Kuhn.

Dataset #3: OSU WMC Waste Diversion.xlsx

Sources: Retrieved from OSU Sustainability Office (March 4th, 2016)

Description: Breakdown of the Waste Diversion number for the Ohio State Medical Center. The diversion rates were provided in the data sheets. This information was sent by Mr. Tony Gillund the Sustainability Coordinator at Ohio State University.