Workplace Engagement Around Stewardship and Recycling in a Healthcare Setting

Montana Stevenson, Angela Wan, Qiaoting Zhao & Caitlin Harrington

for Beaumont Hospital – Royal Oak

April 2016

A project submitted
in partial fulfillment of the requirements
for the degree of Master of Science
(Natural Resources and Environment)
at the University of Michigan.

Faculty Advisors:

Kim Wolske

Michaela Zint

Contents

List of Figures, Tables & Acronyms

Figures

Tables

Acronyms

Beaumont RO	Beaumont Hospital – Royal Oak
CBSM	Community-Based Social Marketing
GO	Green Officer
PGH	Practice Greenhealth

Executive Summary

The healthcare industry is second only to the food industry in overall waste production, and there are many opportunities to mitigate the environmental impacts of waste through waste reduction and recycling programs in healthcare. Beaumont Royal Oak is a 1,000-bed hospital in Southeast Michigan that is part of an eight-hospital, non-profit health system called Beaumont Health. Beaumont Royal Oak is unique in that it has a voluntary training program that educates employees on environmental stewardship in the work place. The Green Officer program is administered by a Green Team made up of leaders in the hospital. In addition to running the Green Officer training program, the Green Team also implements other environmental stewardship initiatives at the hospital. While the Green Team had been successful in recruiting 483 employees to undergo the Green Officer certification program at Royal Oak, as of January 2015, they lacked information about whether Green Officer's attitudes, knowledge, and behaviors differed from non-trained employees. At the same time, data on the hospital's waste management revealed that the hospital's recycling rate was lower than other hospitals with dedicated stewardship programs.

This master's project attempted to answer two questions: (1) how do Beaumont Royal Oak staff perceive and engage in environmental stewardship in the work place, and (2) how can Beaumont Royal Oak increase its recycling rate? To help us answer the second question, we used the Community-Based Social Marketing (CBSM) framework to give us guidance on how to address recycling in particular. The framework helped us focus on identifying barriers and benefits to recycling and engagement in environmental stewardship. We employed a wide variety of methods, including site visits, a literature review, an online survey, and employee interviews to answer our two questions.

Our survey formed the crux of our data collection process and the findings from it provided the foundation for our recommendations. We used Qualtrics software to design our 10-minute, online survey which we distributed to both Green Officers and non-Green officers within the hospital. The goals of this survey instrument were two-fold: one, to gather data about environmental stewardship among employees at Beaumont Royal Oak, and two, to identify reasons why employees were not recycling at Beaumont Royal Oak. The first half of our survey measured whether there were differences between the environmental behavior and attitudes reported by Green Officers and non-Green Officers, while the second half narrowed in on recycling and measured employee knowledge and awareness of recycling procedures, self-reported recycling behaviors, and employee perceptions of barriers to recycling.

We conducted our analysis based on a sample of 294 responses, composed of 116 GOs and 178 non-GOs. Based on our analysis, we saw that attitudes towards the hospital's work in environmental stewardship were positive across all employees suggesting ample support for future stewardship programming. Green Officers, however, reported practicing environmental stewardship behaviors in the work place more often than their colleagues who are not Green Officers. This finding suggested that Green Officers are a key group to include in developing and rolling out behavior change interventions.

The second portion of the survey focused on recycling, and for all items that we asked about, we found that Green Officers recycle them more frequently than employees who have not been trained. Our survey findings demonstrated that Green Officers are also more knowledgeable about what is recyclable in the hospital. However, across both groups we found that there was a lower level of knowledge about how recycling worked in the hospital. When we asked about barriers to recycling, we found that non-Green Officers reported finding recycling more difficult than Green Officers. They consider it more

inconvenient, they are more confused about labels, and they do not feel it is as worthwhile as their Green Officers counterparts do. They also reported feeling less encouragement from supervisors and colleagues to recycle. The barriers identified by respondents demonstrated a need for greater communication about how the recycling program works and how the hospital is performing over time. The physical infrastructure of the recycling bins could also use greater standardization, while still keeping unique needs for different types of workspaces in mind.

Based on our site visits, survey, literature review, and interviews, we created six recommendations that fit into three themes: convenience, awareness and knowledge, and motivation. These six recommendations are to increase bin availability, standardize bin appearance, inform employees how and where to recycle, tap into effective communication channels, renew commitments regularly, and to recognize recycling leaders for their efforts. A summary table of recommendations is shown in Section 7.3. After describing our recommendations, we provide guidance to Beaumont for completing the final steps of the CBSM process. This includes piloting, evaluating, and adjusting strategies, then scaling them up across the hospital.

In conclusion, this project helps the Beaumont RO Green Team understand the current state of attitudes, knowledge, and engagement regarding environmental stewardship and recycling. After investing heavily in training hundreds of GOs, a feat unique in healthcare organizations across the country, there is still much more to do to help GOs succeed in helping their peers be better stewards at work. This project contributes to the small body of knowledge surrounding healthcare professionals' opinions on environmental issues. This is an important contribution because healthcare professionals are trusted members of the community and can be strong environmental leaders with the right support and direction.

1. Introduction

Hospitals in the United States produce an average of 25 pounds of waste per staffed bed each day, adding up to a total of five million tons annually, making the sector as a whole second only to the food industry in overall waste production (Practice Greenhealth, 2016). Waste management in hospitals is especially complex because it can involve up to a dozen waste streams, many of which are closely regulated. However, studies have reported that upwards of 85% of hospital waste by volume is non-regulated (Sustainability Roadmap for Hospitals, 2015). In addition, the majority of this non-regulated waste is recyclable or compostable. By emphasizing recycling over landfills or incineration, hospitals can create environmental, social, and financial benefits from diverting their waste. Reducing waste is an opportunity that Beaumont Health has identified for improvement.

Beaumont Health is a non-profit healthcare organization in Southeast Michigan that serves Oakland, Macomb and Wayne counties. The largest of its eight hospital campuses, Beaumont Hospital – Royal Oak (Beaumont RO), has demonstrated significant progress in adopting sustainable practices and providing training for its staff since 2011. An internal leadership team headed by a senior administrator and known as the Green Team drove this success. Beaumont RO has received recognition from Practice Greenhealth as being one of the top 25 hospitals in the country for innovation in sustainability. Practice Greenhealth (PGH) is a coalition of hospitals that seeks to address the healthcare industry's environmental footprint. PGH collects common metrics from hospitals nationwide through an awards program and a campaign known as the Healthier Hospitals Initiative. The Healthier Hospitals Initiative is a national campaign that encourages hospitals to improve sustainability in six key challenge areas: engaged leadership, healthier foods, leaner energy, less waste, safer chemicals, and smarter purchasing. Beaumont RO has committed to making improvements in all six areas. By instituting sustainable purchasing policies within a number of different areas of the hospital, Beaumont has made major headway in addressing the smarter purchasing and safer chemicals challenges of the Healthier Hospitals Initiative. Another key strategy in Beaumont's robust sustainability program is the Green Officer Certification Program. In five years, this program trained nearly 720 employees to be environmental stewards in the work place across the health system.

While Beaumont RO has been successful in recruiting volunteer Green Officers (GOs), the Green Team lacked information about whether their attitudes, knowledge, and behaviors differed from non-trained employees. The leadership at Beaumont RO was also interested in learning how GOs model and encourage stewardship among their peers on a daily basis. At the same time, Beaumont RO's data on waste management and annual applications to PGH awards revealed that the hospital's recycling rate posed an opportunity for improvement.

This master's project sought to understand how Beaumont RO staff perceived and engaged in environmental stewardship in the work place, with a specific focus on recycling. The project used a survey and employee interviews to collect information on both employee engagement and employee's beliefs about the barriers and benefits to recycling. By comparing survey responses of GOs and non-GOs, we gained a better understanding of employee behavior and used this information to recommend strategies for improving engagement and increasing Beaumont's recycling rate. We structured the remainder of this report as follows: Section 2 describes the current state of Beaumont RO's Green Officer certification program. Section 3 outlines a behavior change framework the team used to approach the project. Sections 4-8 describe steps in the behavior change framework we used to identify recycling as our focal behavior and address recycling at the hospital, with recommendations in Section 7. Section 9 provides some concluding thoughts.

2. Beaumont's Stewardship Program

Successful sustainability efforts often require a system-wide effort. The size and diversity of many healthcare organizations, combined with the need to prioritize safe and high quality patient care, create further challenges for engaging healthcare employees in sustainability. The Beaumont RO campus covers 3.1 million square feet that includes a 1,070-bed tertiary hospital, a children's hospital, outpatient clinics, and several other buildings. As of February 2016, Beaumont RO had over 8,990 regular and contingent employees. Approximately 80% were clinical staff and 20% were non-clinical or support staff.

Healthcare professionals understand that the physical environment is important to wellbeing. Yet, education about environmental issues is only recently growing in importance as part of training that takes place in healthcare organizations and professional schools (National Environmental Education & Training Foundation, 2004). One survey of administrators and clinicians found that approximately half of healthcare employees had never received any training or education related to environmental and/or occupational health (Liebman & Harper, 2011).

Beaumont recognized this lack of training and began to address it by creating the Certified Green Officer (GO) Program in 2011. The program started as a four-hour training session and was refined into a 1.5-hour, in-person training session administered by Green Team leaders. These trainings are offered regularly for staff to attend voluntarily on an individual basis and are scheduled on an as-needed basis by departmental request. The training includes a brief introduction to environmental issues related to health and healthcare operations, an overview of Beaumont's progress in the Healthier Hospitals Initiative, and opportunities for staff to get involved. The trainings conclude with a post-test to check participants' understandings of the concepts covered. Participants are also given a GO pin for their name badge and a GO job description (see Appendix A: Green Office Duties) to remind them of activities that they should incorporate into their daily routines and model for their colleagues. From August 2011 through February 2015, 718 GOs received training across Beaumont Health System, of which 483 work at Beaumont RO. The Green Team kept a record of each Certified Green Officer (GO) by date of training and department. See Figure 1 and Figure 2.

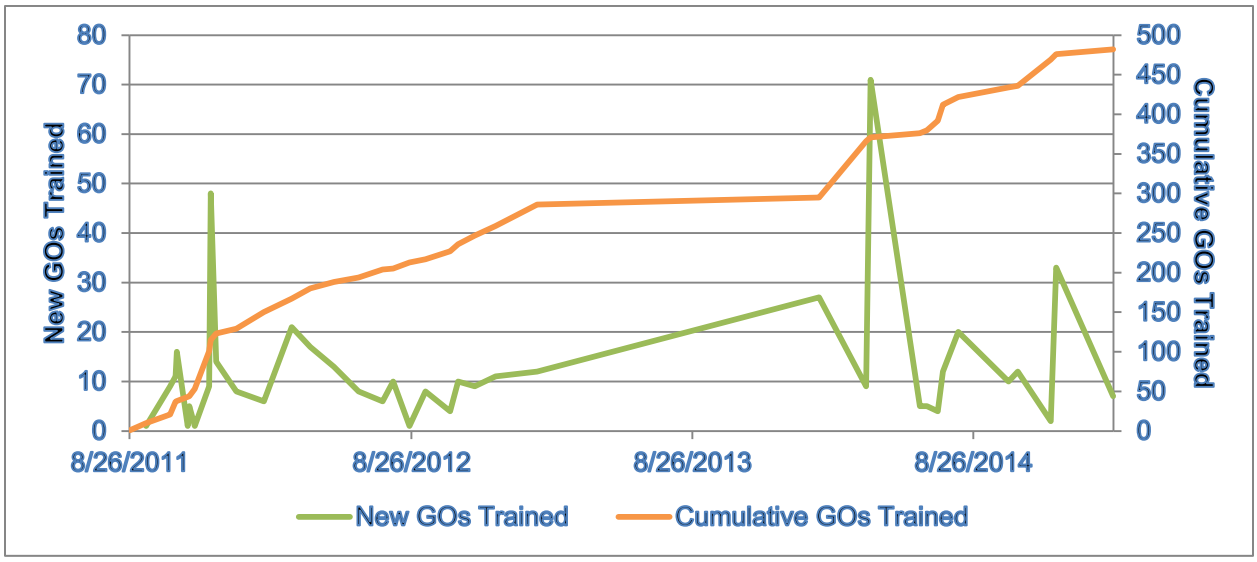


Figure 1. Progress of Royal Oak Green Officer Training over Time (2011-2015)

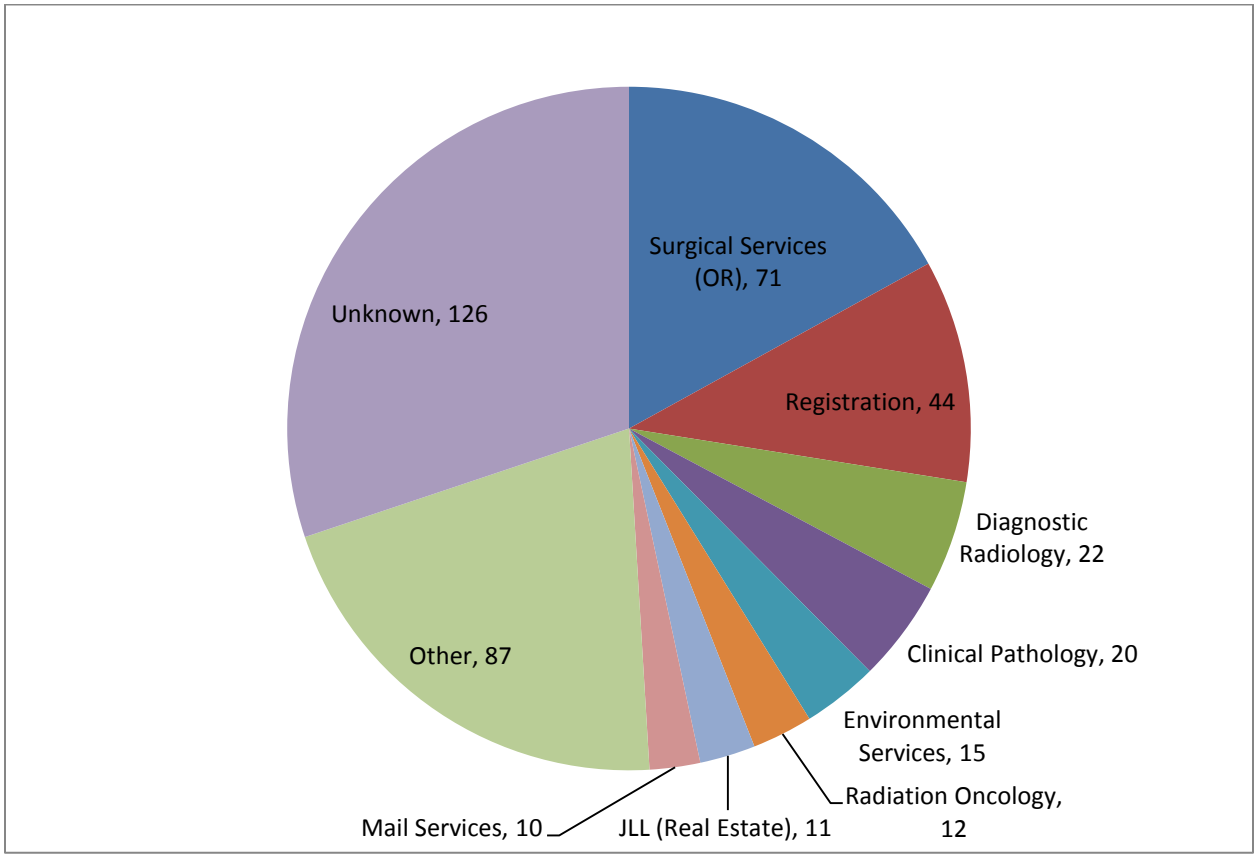


Figure 2. Department Representation by Green Officers at Royal Oak

The Green Team uses a dedicated GO email distribution list and a Green Blog accessible on the organization's intranet to continually send communications to GOs. The Green Team also hosts various events throughout the year, like Green Town Halls. Green Town Halls occur quarterly and provide an opportunity for environmental champions to share successes and best practices with their peers; the Green Team shares outcomes from the organization's investments and commitments in environmental stewardship, and attendees provide questions and comments to the Green Team. Environmentally engaged staff, mainly GOs, regularly attend these Town Halls, although the Green Team does not keep close track of attendance records. Another event to engage both GOs and the broader Beaumont RO staff is the annual Earth Day Fair. The 2015 event took place on Earth Day and featured booths where engaged staff discuss their environmental work. It was open to the public and increased the visibility of Beaumont RO's stewardship program.

While the GO program has attracted a large number of participants, the Green Team has never collected data about GO actions post-training. Furthermore, engagement post-training has been mainly educational in nature. This Master's Project Team, together with our client, saw a need to identify ways in which GOs could play a more active role in promoting environmental stewardship in the hospital. We chose to employ the Community-Based Social Marketing behavior change framework as a guide for thinking how Beaumont RO could build on the GO's training and interest in stewardship to help the organization achieve longer-term sustainability goals.

3. Approach to Project: Community-Based Social Marketing Framework

Many studies of environmental psychology have demonstrated that informational campaigns can be effective at increasing awareness or improving understanding of an issue, but they are generally not effective at changing behavior (McKenzie-Mohr, 2000). Community-Based Social Marketing (CBSM) is a framework that seeks to provide a pragmatic approach to effectively changing behavior. We chose to use this framework because many case studies document its ability to successfully promote stewardship behaviors, such as home energy efficiency, environmentally-friendly transportation habits, and recycling and waste reduction (Tools of Change, 2016). A key feature of CBSM is that it helps the user focus on a specific behavior. We felt that applying this framework to a behavior that was related to one of at Beaumont RO's sustainability goals would provide the client with a replicable model for approaching future behavior change efforts.

The CBSM framework defined by Doug McKenzie-Mohr in *Fostering Sustainable Behavior: An Introduction to Community-Based Social Marketing* (2011) consists of five steps (see Figure 3):

1. Identify a measurable behavior that is impactful, retains a high probability of success, and can be easily adopted into an organization's infrastructure
2. Identify barriers and benefits to this behavior
3. Develop strategies to influence this behavior
4. Pilot and evaluate strategies
5. Implement those strategies on a broad scale

Given the timeframe of this project, our University of Michigan team focused on Steps 1-3 and provided detailed recommendations that would enable Beaumont Health to complete steps 4 and 5. Furthermore, we hope that Beaumont will find the process documented here a useful guide for designing and implementing behavior change strategies that address other behaviors in the future.

The following sections of the report describe the various methodologies we used to fulfill Steps 1-3, which included: literature review of work place sustainability interventions and Beaumont's internal documents and data, site visits to assess Beaumont's current recycling program, surveying employees about their attitudes towards stewardship and recycling, and conducting follow-up interviews with employees to validate our survey findings. Throughout the project, we continuously focused on gaining insights into the GOs' behaviors to see how we could make recommendations for enhancing their training and engaging them in behavior change efforts. The figure below describes the CBSM steps and is adapted from the steps outlined by Doug McKenzie-Mohr.

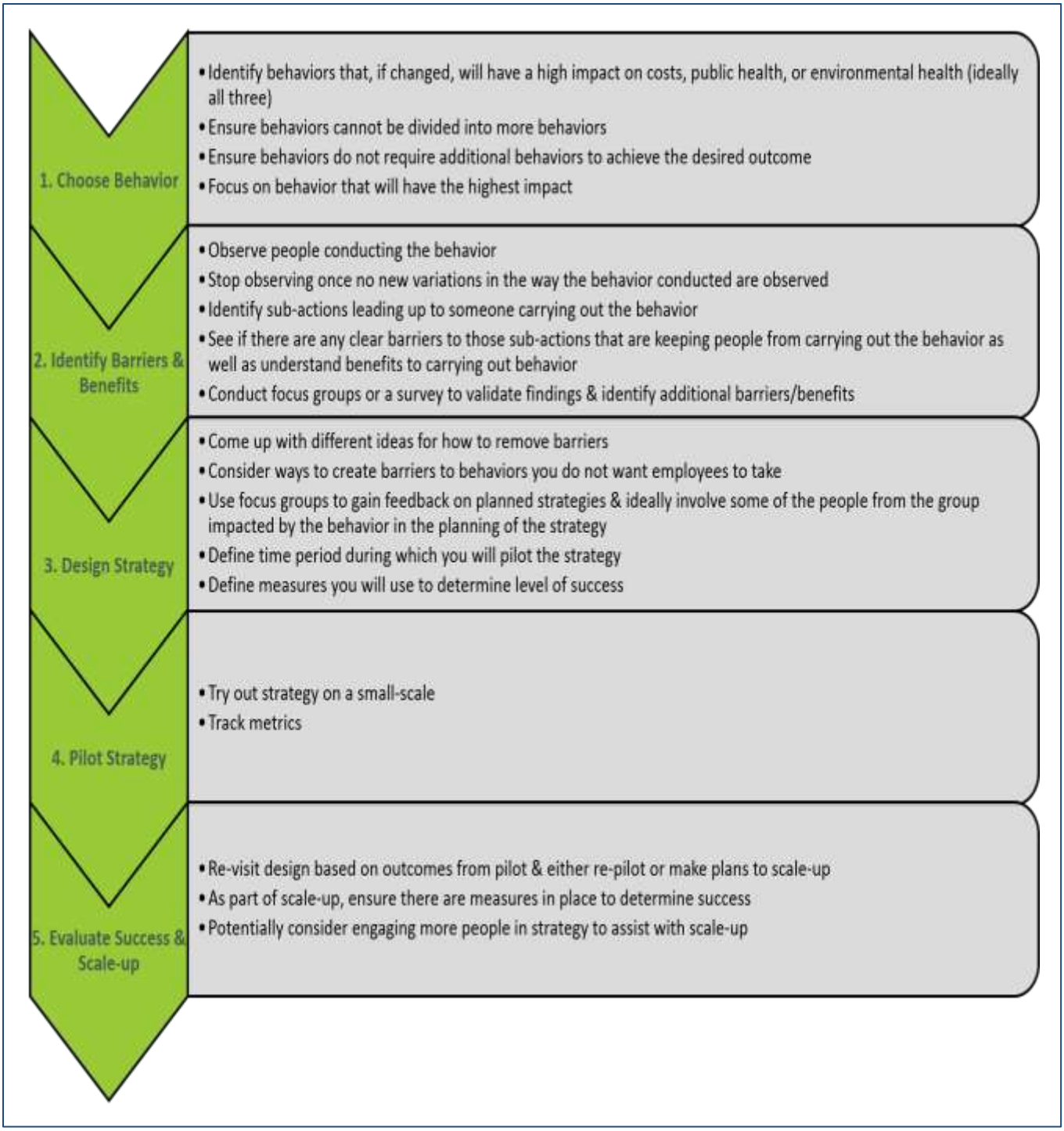


Figure 3. The Community-Based Social Marketing Framework (CBSM) [1]

1 Adapted from Community-Based Social Marketing steps outlined by Doug McKenzie-Mohr in Fostering sustainable behavior: An introduction to community-based social marketing, 2011, 3rd ed., Gabriola City, BC: New Society Publishers.

4. Step One: Choosing a Behavior - Why Recycling?

The first step in the CBSM process involves identifying a behavior that has a meaningful impact and is amenable to change. We identified recycling as a target behavior because it is a measurable behavior emphasized during GO training and a review of Beaumont RO's sustainability efforts suggested that the recycling rate was an area where Beaumont RO could continue to improve its efforts. Beaumont RO has received both regional and national recognition as an environmentally engaged hospital, and the organization participated in an award competition held by Practice Greenhealth (PGH) on an annual basis. In PGH's 2014 benchmark report that compared data from all competing hospitals, Beaumont RO outperformed many other hospitals across the country in a number of categories, including:

- Overall percent reduction of medical waste
- Reduction of medical waste per staffed bed per day
- Increase in single-use device reprocessing
- Reduction in meat purchases
- Expansion of healthy beverage expenditures
- Percent reduction in energy use intensity from baseline
- Percent reduction in water usage

However, recycling rate, percent of food sourced locally and sustainably, and percent energy use from sustainable sources were three areas where Beaumont performed below the median reported by peer institutions. Among these three areas, only recycling is a behavior that requires participation from staff across the hospital; the other two areas encompass behaviors that mostly depend on the decisions of a few key staff.

According to PGH's 2014 benchmarking report, Beaumont RO reported it recycled 20.42% of its waste in the previous award application year. In the 2013-2014 year, peer institutions reported recycling a median rate of 30.55% of all waste, while hospitals in the top 90th percentile (of N=99 reporting hospitals) reported recycling 47.76% of their waste.

The financial savings from avoided landfill costs and rebates from the recycling program provided another reason to focus on increasing the recycling rate in the hospital. Although rebate programs and the value of recycled materials are largely out of Beaumont RO's control, increasing its recycling efforts is still financially worthwhile. Across all available data ending in December 2015 in the Key Green Solutions data platform, Beaumont RO posted stable recycling rates, although total saving from the recycling program varied broadly, from a high of $457,936.24 in 2013 and a low of $99,206.93 in 2015 because of changes in the recycling market. See figures below for recent years' recycling weights and cost savings.

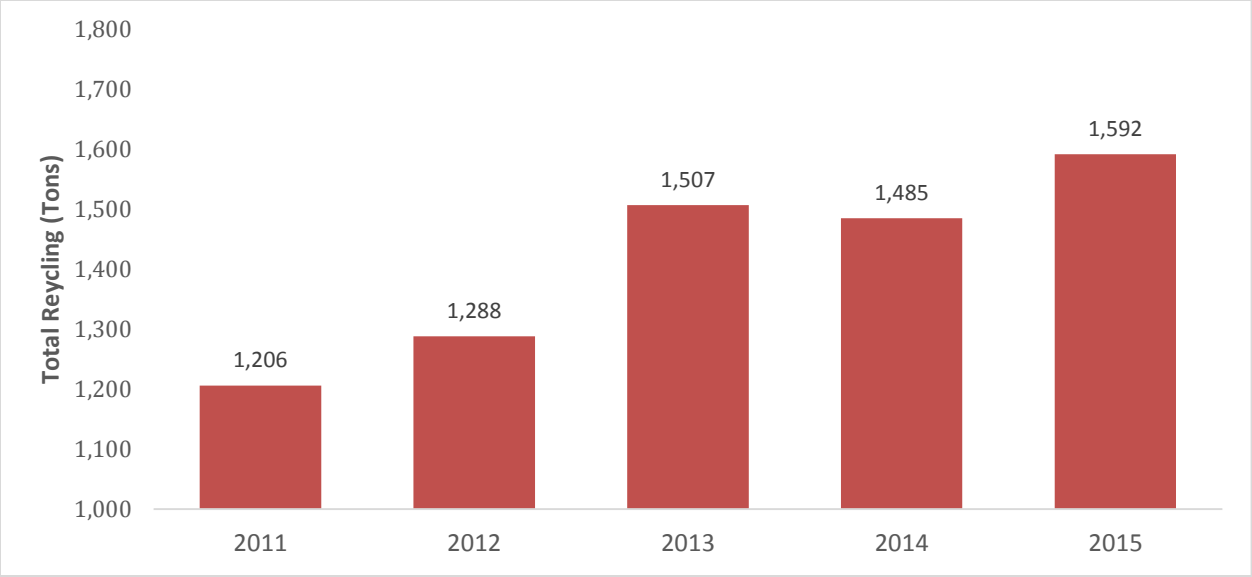


Figure 4. Beaumont RO Total Recycling in Tons

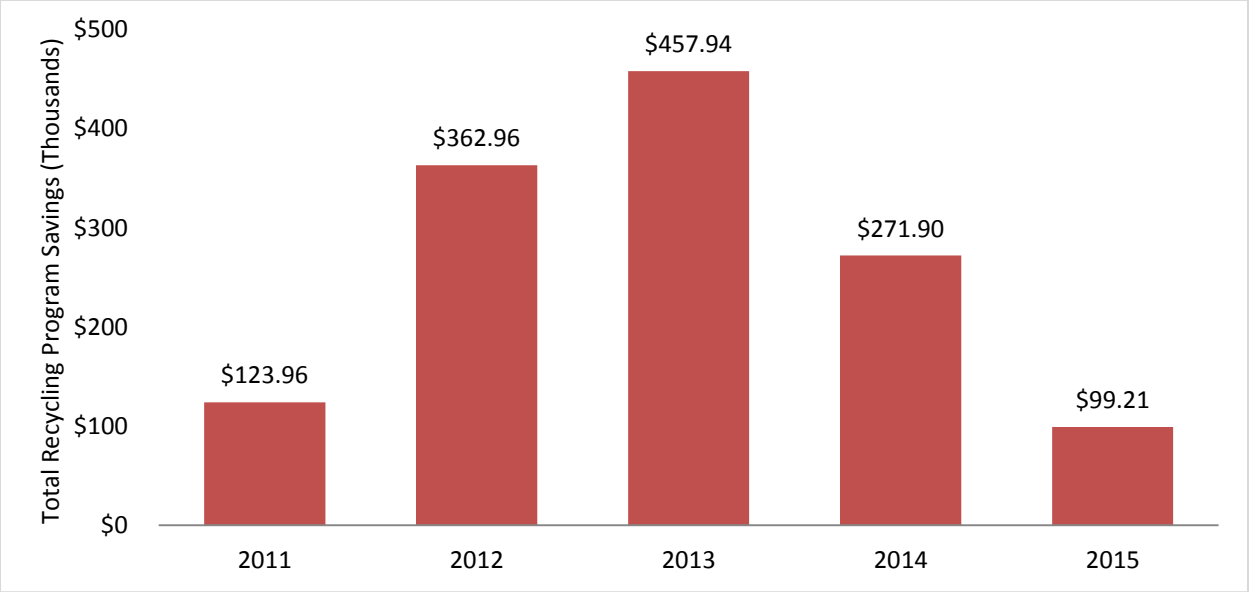


Figure 5. Beaumont RO Total Recycling Program Cost Savings in Thousands

In addition to being an area where Beaumont RO could continue to improve its performance, recycling also met both of the criteria indicated by the CBSM model—the behavior must be "non-divisible" and "end-state." The non-divisible criterion requires that a CBSM initiative focus on a single behavior, rather than a category of behaviors, and recycling fits into the single behavior category. End-state means that measurable results can be seen from changing the behavior. Changing employee behavior to increase recycling and reduce disposal of recyclable items into municipal solid waste stream will have a direct impact on the recycling rate.

5. Step Two: Identify Barriers and Benefits to Recycling

Step 2 in the CBSM framework required us to identify the barriers and benefits to engaging in the behavior. Once we identified recycling as our target behavior, we conducted interviews with key staff and a site assessment to validate whether the behavior we chose made sense in the Beaumont context and to gain insight into some of the key barriers to the behavior. Our observations and conversations with staff helped us create a hospital-wide survey to further understand the current state of the recycling program. Post survey interviews helped us validate and understand our findings from the survey.

5.1 Interviews and Site Visits

We formally interviewed Beaumont's Green Team leaders from interior design and environmental services departments regarding Beaumont RO's recycling program, which started in 2009. These interviews confirmed that the program had received ample attention when it launched and now requires renewed attention. The Environmental Services Coordinator outlined Beaumont RO's entire recycling program, including all involved parties and departments. We followed up with the relevant departments during our site visit. These interviews offered us a nuanced view of how the hospital operated, and by extension, helped us to understand what types of strategies would be feasible and realistic for the organization to implement in order to address the recycling rate.

During our site visit, two team members received a thorough tour of the recycling facilities. The team examined receptacles in various clinical and non-clinical departments, including the materials handling department. Since Beaumont's vendors offer greater financial incentives for separated recyclable materials, Beaumont RO does not have single stream recycling. There are a number of different receptacles to separate different materials, e.g. plastic, paper, aluminum cans, batteries, cardboard, etc. Glass recycling and food waste composting formally ended when vendors stopped offering the service to the hospital due to financial feasibility.

The multi-stream recycling system at Beaumont means that employees must place items into the proper receptacle. The site tour highlighted the lack of uniformity in bin accessibility and appearance throughout the hospital. Large, high-quality bins that accept plastic and paper appear in threes throughout high-traffic areas of the hospital. Only one set we observed, located inside the South Lobby entrance, was color coded (see Figure 6, left), while the others were very similar in color and were only distinguished by the shape of the top and the white lettering on the side (see Figure 6, right). Labels solely on the sides of bins are less helpful than labels on both the sides and top because the side of the bin is difficult to read once a person has approached a bin. In many sets of bins throughout high-traffic sections of the hospital, the waste bin also misleadingly includes a recycling symbol, which can confuse people into incorrectly thinking that they do not need to separate recyclable materials (see Figure 6, below right for an example).

The green bin in Figure 6 suggests aluminum cans and plastic bottles can be recycled together, which is inconsistent with the multi-stream recycling program at Beaumont RO. Mixing cans and bottles in the green bin in Figure 5 is considered comingling, and environmental services staff will throw away contaminated materials.

Figure 6. Two Sets of Multi-stream Recycling Bins in Public Areas of the Hospital

In the majority of the hospital areas, plastic bottle recycling bins look like the one in Figure 7 below and are only for plastic. Plastic bottles are usually collected in white plastic bin liners, while cans are collected in receptacles that vary by department. A uniform system was set up in each department when the recycling program started, but over time, different departments have added new receptacles or changed which receptacles are used for which purposes with handwritten signage. This initial assessment suggested there is need to reassess the types of recycling receptacles, locations, and signage.

Figure 7. Green Plastics Recycling Bin Located Next to a Vending Machine

During conversations with Beaumont staff responsible for the recycling efforts, we asked these recycling leaders to identify current barriers and opportunities for improving the recycling rate. Many identified the need for a vocal staff member who encouraged recycling in their office area or department. They felt that a vocal staff member, or "recycling champion," can strongly impact the behavior of other staff in the department. Interviewed staff also recognized that recycling required a time commitment, noted the high prevalence of contamination in the hospital recycling bins, and the lack of space for the number of bins they would like to have. Using the information collected during the interviews and site visit, we created a survey that would identify a broad cross section of hospital staff's perceptions of the most significant barriers to recycling.

5.2 Survey Methodology

Using Qualtrics software, we designed a 10-15 minute online survey instrument to gather data about environmental stewardship and recycling behavior at Beaumont RO (see the full survey in Appendix B: Sample Version of Survey). Our survey first measured whether there were differences between the environmental behavior and attitudes reported by GOs and non-GOs. The goal was to understand how employees currently behaved and whether they were supportive of stewardship initiatives. We also collected qualitative data on why people chose to become GOs and what types of other sustainability behaviors they practiced. In the second half of our survey, we narrowed in on recycling and measured employee knowledge and awareness of recycling procedures, self-reported recycling behaviors, and employee perceptions of barriers to recycling.

5.2.1 Survey Distribution

We aimed to obtain a sample of approximately 300 respondents, ideally composed of 150 Green Officers and 150 non-Green officers. While we were able to obtain an e-mail list for all GOs, hospital policy made it impossible for us to obtain a full list of all hospital staff so we could not construct a random sample of non-GOs to contact. Since there were only 400 some GOs at Royal Oak, we were concerned about receiving a low response rate if we constructed a random sample and only contacted people in that subset of the total group. Therefore, both non-GOs and GOs participants came from convenience samples.

Using guidance from Dillman (2007) on how to increase response rates for internet-based surveys, we distributed the survey to employees at Royal Oak through a variety of electronic avenues. We notified participants that their answers would be confidential and only shared with hospital leadership in aggregate. To distribute the survey to GOs, a Green Team member emailed the survey link and a message regarding the survey to the entire GO list serve. To distribute the survey to employees outside of the GO program, we worked with the Beaumont communications department to post information about the survey in two places—the Daily Dose, a daily internal email communication sent to all staff, and the Green Blog, a page on the internal company website.

Our survey was included in the Daily Dose five times during a three-week period and was sent through direct email to the Green Officers two times. We varied our email messages to encourage more people to respond to the survey by indicating how many had already responded, how many more responses we hoped to receive, and why we valued a high response rate. We also shared that the average survey completion time was around 10 minutes to further communicate that the survey would not take a significant amount of time.

Since the Daily Dose and GO email distribution lists included staff from all Beaumont Health hospitals, we asked people, at the beginning of the survey, to identify whether or not they worked at Royal Oak. If they indicated they were from another hospital in the Beaumont system, the survey redirected them to the end of the survey and thanked them for their interest. This helped to ensure that our sample was only composed of employees from the Royal Oak site.

5.3 Survey Measures

We wanted to understand if there were differences in knowledge, perceptions of barriers, and behaviors among employees with different backgrounds and roles in the hospital. We were specifically interested

in differences between GOs and non-GOs, as well as if there were differences between clinical and non-clinical staff and between staff who had worked at the hospital for a long time and those who were relatively new. We also collected demographic characteristics, such as age and gender, to see if those variables explained any of the differences in knowledge, perceptions of barriers, or behavior.

5.3.1 Environmental Stewardship: Self-reported Behavior and Attitudes

Stewardship Behavior

We measured the extent to which GOs reported performing the duties outlined in their training and the overall attitudes in the hospital towards environmental stewardship. Upon graduation from the Green Officer Certification program, GOs are charged with modeling environmentally responsible behaviors, as well as educating and motivating their colleagues to also engage in those behaviors. These behaviors include things like looking for ways to reduce, reuse, and recycle goods or turning off the lights when leaving one's office. We were curious whether GOs would report a higher frequency of engaging in these behaviors than their non-Green Officer counterparts. We asked all participants how often they engage in these behaviors and whether or not they encouraged their colleagues to do the same. We thought that understanding how GOs and non-GOs currently report engaging in environmental behaviors in the work place would help us gain a better understanding of the workplace context and help us identify opportunities for improvement.

Attitudes toward Stewardship

We wanted to gauge the attitudes among employees towards environmental stewardship. We thought GOs and non-GOs might have different views on whether the hospital should devote resources toward stewardship, and we wondered if employees felt that GOs and leaders at the hospital were currently instrumental in promoting stewardship efforts. The goal of this group of questions was to identify if there was ongoing support for stewardship programing. The findings could potentially demonstrate to the hospital administration that environmental stewardship is an important issue for employees. We developed a bank of statements with items such as, "Environmental stewardship is directly relevant to the health of our patients" and asked to rate them on a 5-point Likert scale from 1 = *Strongly Disagree* to 5 = *Strongly Agree.* Using a procedure called factor analysis, we grouped the statements into two factors: a belief that Beaumont RO should promote environmental stewardship and a belief that hospital leadership and GOs help to improve environmental stewardship behavior in the hospital.

5.3.2 Recycling: Knowledge, Behavior, and Barriers & Benefits

In the second half of the survey, we focused specifically on gathering information that would help us to develop recommendations for how Beaumont could improve its recycling program. Through three different clusters of questions, we asked employees about their level of knowledge of how to recycle in the hospital, their self-reported recycling behaviors, and their perceptions of barriers to. A final question asked employees to provide input into different programs that could address barriers.

Recycling Knowledge

To examine recycling knowledge, we adapted a simple and engaging questionnaire designed by Harvard's Office of Sustainability (2015). In our version, we asked employees to look at pictures of different objects and identify whether they could recycle the object at Beaumont RO. This section also included True and False questions related to how the overall recycling program worked. Examples of statements used in the survey included:

- Beaumont has single stream recycling where all recyclable materials (e.g., paper, plastic, cardboard, etc.) are mixed together before they are sent to a recycling facility). *[FALSE]*
- If some trash is found in a recycling bin, the entire contents of the bin will be considered trash and not recycled. *[TRUE]*
- Beaumont RO generates revenue from recycling. *[TRUE]*

Recycling Behaviors

To understand recycling behaviors, we asked participants to self-report on a 5-point Likert scale from never to almost always the frequency with which they recycled certain types of recyclable and non-recyclable items while at work. Items included paper, cans, cardboard, plastic, Styrofoam, and batteries. Since it was infeasible for us to observe and report the recycling habits of everyone we surveyed, we had to rely on self-reported recycling behavior as a proxy for observed behavior.

Perceived Barriers & Benefits to Recycling

To understand why people may or may not recycle, we created a bank of statements to measure the following concepts:

- Attitudes towards recycling, e.g., whether employees thought recycling was worth their time or makes a difference
- Convenience, e.g., whether they felt it was simple and easy to recycle at work
- Label confusion, e.g., whether they were confused by labels on types of receptacles throughout the hospital
- Encouragement, e.g., whether or not employees felt their colleagues encouraged them to recycle

All items were measured on a 5-point Likert scale from strongly disagree to strongly agree. We then used factor analysis to group these items into categories. We identified the concepts mentioned above as the main barriers and benefits to recycling at Beaumont RO through our previous conversations with Beaumont RO staff, our site visit, and a review of the literature on work place sustainability and recycling programs. We wanted to see if Beaumont RO employees experienced similar barriers to those identified by other researchers in other contexts. Our review of the literature also helped us to identify statements or phrases that we could include in our survey as measures.

Attitudes towards recycling. While some research suggests that eliminating structural barriers to recycling is more important than changing attitudes (Lo, Peters, & Kok, 2012; Young et al., 2015), we still wanted to see whether people's perceptions of positive benefits of recycling or the efficacy of their actions was correlated to their reported level of recycling behavior. To measure attitudes we included statements such as, "*I don't think recycling at work makes a significant difference in protecting the natural environment*" and "*It's worth my time and effort to recycle at work*."

Based on our conversations with Green Officers during our site visits and our interviews with other staff involved in the recycling program, we believed that many people became GOs or chose to dedicate time to creating or maintaining their department's recycling program because they believed it was important and their actions made a difference. While other research may not find a strong connection between attitudes and behavior, interventions consistent with dominant attitudes are more likely to be successful (Heberlein, 2012). Finally, we thought it was important to understand if there was a difference in

attitudes between GOs and non-GOs because it would give us insight into the types of interventions and communication that would best motivate the two segments.

Convenience. A number of studies have highlighted convenience or proximity to bins as a factor that facilitates recycling behavior (Brothers, Krantz, & McClannahan, 1994; Pike et al., 2003; Tonglet, Phillips, & Read, 2004; Valle, et al., 2005; Wan, Cheung, & Shen, 2012). Therefore, we included statements to measure perceptions of whether or not it was easy and convenient to recycle at work, such as "*I would recycle more if there were more bins*" and "*It is easy to recycle in my department*." We also tried to parse whether getting to bins versus having to sort one's waste presented a more significant barrier to recycling by including statements like "*Separating items into different bins for paper, plastic, cans, etc. is too time consuming*" and "*Recycling bins aren't in convenient locations*."

Label confusion. A review of recycling education programs conducted by De Young (1990) stated that to increase recycling participation, "education efforts should focus on helping people become more familiar with the details of how to recycle." Our observations from our site visits, where a lack of standardization of recycling containers across departments and the existence of multiple waste streams, suggested that procedural knowledge, specifically confusion around labels, may be a significant barrier to recycling. We measured this through participant responses to the following statements: "*The labels on the recycling bins are confusing*," "*I'm not sure what should go in each bin,"* and "*It is not always clear which type of bin is for recyclables and which is for trash*."

Encouragement. In a meta-analysis by Hornik et al. (1995), the authors find that social influence, specifically support among friends, neighborhoods, and family members, can have a moderate influence on consumer recycling behavior. An older study by Humphrey et al. (1977) found that when employees were encouraged by departmental heads or supervisors, they separated their wastepaper more accurately. Based on these findings from the literature, as well as the fact that GOs are explicitly asked to encourage their colleagues to recycle, we decided to measure whether encouragement played a role in influencing self-reported recycling behavior. We included statements in our survey like "*There is at least one person in my department who encourages others to recycle"* and "*My manager encourages recycling*."

5.3.3 Free Response Portion & Post-Survey Interviews

In addition to quantitative questions, we included three qualitative questions in the survey to capture a variety of opinions. First, we wanted to understand GOs' motivations to join the GO program, in hopes of understanding approaches the Green Team can use to re-engage existing GOs. Second, we wanted to offer employees the opportunity to share what they have done related to stewardship. This free response question was designed to solicit stewardship activities that were otherwise not measured in the survey. Finally, wanted to gauge employees' interests in a few proposed methods of addressing the barriers to recycling and the low recycling rate. Results from these free response questions are presented in Appendix E as they are not directly related to recycling.

Following the survey, we also asked interested employees to enter their contact information in a separate Google Form if they wanted to discuss the survey and potential strategies for addressing the barriers during brief interviews. These interviews helped to validate our findings with survey participants and to see if preliminary recommendations we identified sounded feasible to employees. We also wanted to give highly engaged employees the option to share additional ideas by phone.

6. Survey & Post-survey Interview Findings

The following section describes the major findings from our survey and the various types of analyses that we conducted. Conclusions about ways to improve the recycling rate and employee engagement follow in the recommendations section.

6.1 Comparison of GO and Non-GO Participants in Sample

We received 331 responses to the survey. We dropped 18 responses because the respondents indicated they did not work at Beaumont RO, and we excluded an additional 19 responses because those respondents did not indicate whether they were GOs. We conducted our analysis based on a sample of 294 responses, composed of 116 GOs and 178 non-GOs.

Between the samples of GOs and non-GOs, we found a similar distribution of clinical and non-clinical staff, genders, and age groups (see Appendix C for more information). More people who identified as non-clinical staff responded to the survey in both the GO and non-GO groups. This did not surprise our team given that non-clinical staff probably spend more time in front of a computer than their clinical counterparts, making it easier for them to complete an online survey that they received via e-mail; however, it is not reflective of Beaumont RO's overall demographics, where clinical staff account for over 80% of total hospital staff according to Human Resource records.

The distribution of genders within the GO and non-GO groups is similar. Overall, the gender representation skews towards 80% female, which reflects the overall demographics at Beaumont. The GO sample is slightly older than the non-GO sample, but the difference in age distribution is not very large. Unlike age, the distribution of length of tenure at the hospital looks considerably different between the GO and non-GO groups. Over 70% of GOs reported working at Beaumont RO for 11+ years, while only 54% of non-GOs reported that length of tenure at the hospital.

6.2 Findings on Stewardship: Self-reported Behavior and Attitudes

The first section of the survey measured the extent to which GOs and non-GOs reported performing environmental stewardship behaviors, as well as overall attitudes towards environmental stewardship in the hospital. In the following section, we first discuss findings related to behaviors, followed by findings related to attitudes.

6.2.1 Stewardship Behaviors

The environmental behaviors that we asked about in the survey were part of a job description that all GOs were given at the end of their training. Trainers encouraged GOs to model these behaviors and share them with their colleagues.

Table 1 and Figure 8 show respondents' answers to the question: *"How often to do you do each of the following while at work?"* Respondents could answer on a one-to-five scale with one being "never" and five being "always." We found that GOs reported engaging in all behaviors more often than their non-GO counterparts did, and these differences were statistically significant at p <.001. We did not find that tenure at the hospital, whether someone had a clinical vs. non-clinical role, or gender make a difference in reported frequency of doing these behaviors.

For ten of the eleven behaviors, GOs reported carrying them out at least sometimes, as indicated by having mean values greater than three. By contrast, non-GOs had lower scores on all behaviors and only had four behaviors where they reported carrying out the behavior at least sometimes. These four behaviors are: encouraging co-workers to recycle; helping to keep up the recycling system in their departments; bringing reusable bottles and containers; and, turning off the lights.

The results in this section and all subsequent sections could reflect a social desirability bias on the part of the GOs who may be over-reporting the frequency of carrying out favorable behaviors. However, based on the GOs that we met during our visits to the hospital and the data collected from the survey about why people choose to become GOs, we think that GOs are more engaged in these issues and the differences between GO and non-GO behaviors likely reflect a true difference between the two groups.

While on average, GOs reported more frequently carrying out the behaviors in the job description, there was a small minority who reported never carrying out some of the behaviors. These behaviors included attending town halls, sharing ideas with the Green Team, encouraging co-workers to attend town halls, and encouraging co-workers to become GOs. Interestingly, none of these were behaviors directly linked to stewardship but rather ancillary behaviors related to communications around stewardship. In the case of sharing ideas with the Green Team, we suspect respondents may have interpreted the responses options in a variety of ways. Since most people probably do not have ideas for the Green Team regularly, they may report that they do not share ideas with the Green Team often; however, it could be the case that they do share their ideas every time they have them.

If reported behaviors are fairly accurate, then GOs demonstrate a greater propensity to carry out environmental behaviors and encourage their co-workers to do so. They are a clear resource and should be utilized by the Green Team to address gaps in stewardship behavior in the work place.

Table 1. Employee Engagement in Environmental Stewardship Behaviors

Group	Non-Green Officers		Green Officers	
How often do you do each of the following while at work?	n	Mean (SD)	n	Mean (SD)
I attend Green town halls. ***	167	1.23 (0.56)	109	2.93 (1.01)
When I have ideas about environmental stewardship and employee engagement, I share them with the Green Team. ***	168	1.74 (1.07)	109	3.03 (1.15)
I encourage my co-workers to attend town halls. ***	166	1.76 (1.14)	109	3.05 (1.10)
I encourage my co-workers to become Green Officers. ***	n/a	n/a	111	3.34 (1.21)
I encourage my co-workers to bring reusable bottles and containers. ***	165	2.26 (1.30)	111	3.64 (1.18)
I read the Green Blog. ***	167	2.48 (1.31)	111	3.66 (1.07)
I encourage my co-workers to turn off the lights. ***	166	2.78 (1.40)	111	4.06 (1.01)
I encourage my co-workers to recycle. ***	166	3.32 (1.37)	111	4.37 (0.80)
I help keep up the recycling system in my department. ***	167	3.57 (1.39)	111	4.42 (0.83)
I bring reusable bottles and containers. ***	167	3.98 (1.17)	110	4.48 (0.81)
I turn off the lights when not in use. ***	165	4.20 (0.89)	109	4.73 (0.46)

Note: Stars indicates there is a significant difference between the mean frequencies of GOs vs. non-GOs. ***p <. 001 with Bonferroni correction. [2]

[2] When doing multiple statistical comparisons, some differences will appear significant by chance. For example, with a p value of .05 and 20 statistical tests, we would expect 5% or one of the 20 tests to be significant by chance. To account for this, we used a conservative Bonferroni correction. This involves dividing the p-value (.05) by the number of comparisons, .05/11 = .0045. "***p < .001 with Bonferroni correction" indicates that the comparison was significant at less than p = .001/11=.00009. All subsequent p values incorporate the Bonferroni correction.

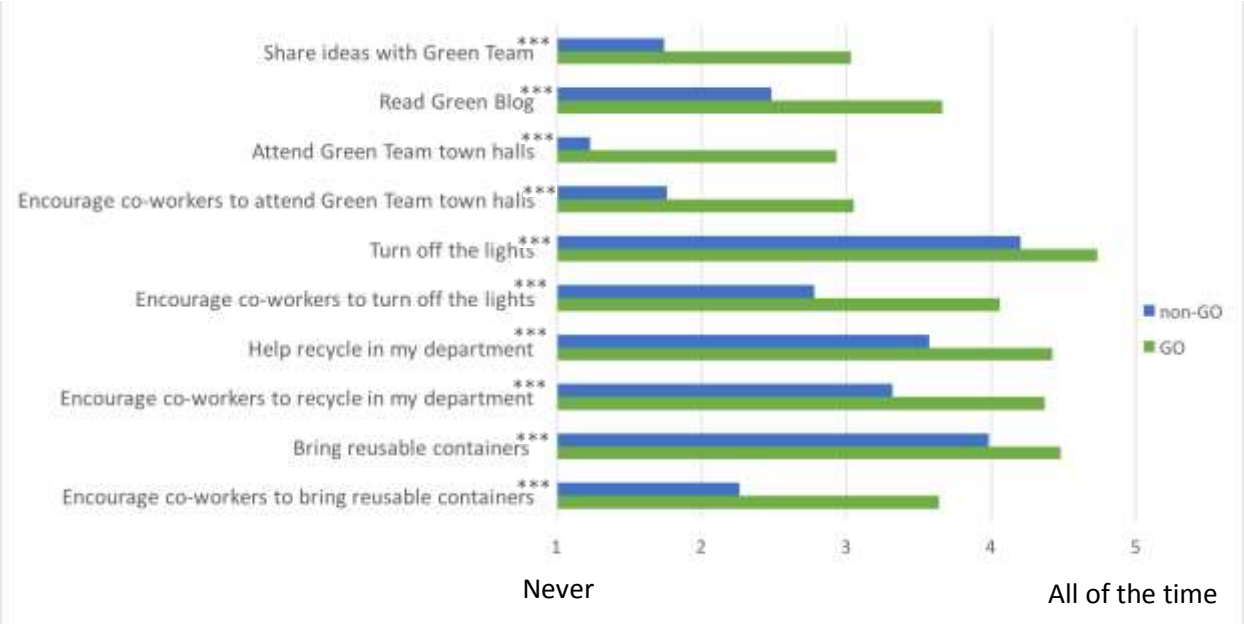


Figure 8. Comparison of GO and non-GO Self-reported Environmental Stewardship Behaviors

6.2.2 Attitudes toward Stewardship

To measure attitudes about environmental stewardship, we asked respondents to indicate on a scale of one to five how strongly they agreed with statements regarding Beaumont RO's environmental stewardship efforts. Through factor analysis, we combined those statements into two group based on how similarly respondents' answered them. For each group, we created a new variable that represented the average score of all questions in the group.

The first factor measured whether employees believe Beaumont should promote environmental stewardship. Overall, both groups agreed that Beaumont RO should increase environmental stewardship efforts. The GOs, however, agreed more strongly with this sentiment than the non-GOs, which is indicated by their statistically significant higher mean response to this question (see Table 2 and Figure 9). This finding may indicate that people who believe in these types of initiatives are the same people who are willing to take the time to complete GO training.

The second factor identified whether employees believe that hospital leadership and GOs help to improve environmental stewardship behavior in the hospital. We found that GOs tended to agree more strongly than non-GOs with this idea and again; the difference in mean responses to this question was statistically significant. One explanation for this finding is that GOs learn about environmental stewardship efforts that the Green Team has carried out during their training; thus, their attitudes positively correlate to awareness of hospital stewardship efforts. Their opinion on GO effectiveness could reflect greater awareness of GO efforts, and/or a desire to believe that their own efforts to promote stewardship are effective.

Taken together, these findings suggest that there is significant support from employees for continuing environmental stewardship efforts in the hospital. With widespread support for these efforts, we would expect that new initiatives in this vein would be well-received. Furthermore, if GOs' greater awareness

of stewardship efforts leads them to believe more strongly in the value of those efforts, then the Green Team may want to better publicize their efforts across the hospital.

Table 2. Employee Attitudes towards Environmental Stewardship

Factor 1: Support for future environmental stewardship programming*** • Beaumont should prioritize decreasing its impact on the environment. • Beaumont should not invest in environmental stewardship initiatives. (item reversed) • Beaumont should designate a full-time staff member to promoting environmental stewardship • Beaumont can do more to decrease its environmental impacts. • Environmental stewardship is directly relevant to the health of our patients.
Factor 2: Belief that leadership and GOs help improve environmental stewardship behavior*** • The leaders at Beaumont take environmental stewardship issues seriously. • Green Officers play an important role in promoting environmental stewardship.

Note: Stars indicates there is a significant difference between the mean frequencies reported by GOs vs. non-GOs. *** p<.001 with Bonferroni correction. n=154 for Non-GOs and n=106 for GOs

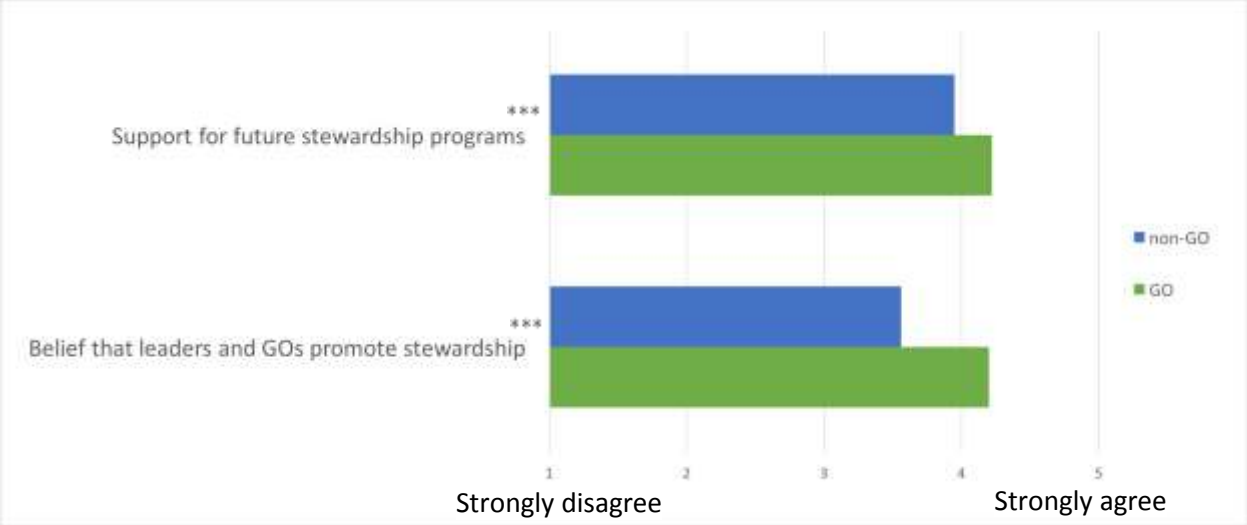


Figure 9. Comparison of GO and non-GO Environmental Stewardship Attitudes

6.3 Findings on Recycling Knowledge, Behavior, and Barriers

In the second part of the survey, we included questions that focused on three aspects of the recycling program at Beaumont. First, we asked about respondents' level of knowledge about how to recycle in the hospital. Second, we asked them to self-report the frequency of their recycling behavior at work. Finally, we asked about the barriers that prevent employees from recycling more regularly.

6.3.1 Recycling Knowledge

We quizzed employees' recycling knowledge with eleven questions related to facts about Beaumont RO's recycling system. The average score for all responders was 77% correct on the overall quiz and GOs had a statistically higher percentage of people respond correctly than non-GOs. There was a statistically

significant difference in the percentage of correct responses for four of the questions between the two groups at p<.001 (see Table 3). As for tenure, we found differences in recycling knowledge across different lengths of tenure, where employees with longer experience at Beaumont RO had higher proportion of people answer correctly for a few specific questions. We did not see any differences in the quiz performance between people with clinical versus non-clinical roles.

In this section, we asked whether seven different items were recyclable at the hospital. Of the five recyclable items (paper, cardboard, aluminum cans, plastic bottles, and batteries) GOs and non-GOs were able to correctly identify that they were recyclable at least 79% of the time, with aluminum cans being the recyclable item that people were least likely to identify correctly. For Styrofoam and chip bags, which are not recyclable, GOs and non-GOs were only able to identify that they were not recyclable about 60% of the time. For only cardboard and plastic, GOs were correct significantly more often than non-GOs (see Figure 10. Recycling Knowledge.

It is possible that respondents were confused by the questions regarding chip bags and Styrofoam cups. However, this finding may also reflect a true lack of awareness about these items being not recyclable at Beaumont. If so, the Green Team should include content about items that are both recyclable and not recyclable, with emphasis on the latter, in future training.

Another possible explanation for lower cardboard, battery, and aluminum recycling knowledge is that the recycling systems for these exists on a department-by-department basis, and therefore are not as readily available across the campus. How frequently these items are used in certain departments can also influence the ability for employees to correctly identify that Beaumont RO has the capability to recycle cardboard, batteries, and aluminum. The lower scores on the aluminum cans also suggest that this is another item to target in future employee education campaigns. The hospital does not currently have a standard bin for aluminum cans and bins for aluminum recycling are not accessible in all parts of the hospital. This is also the case for batteries and cardboard. However, it is likely that the latter two items are used more frequently in specific departments, and some sort of recycling infrastructure may be in place within these departments. Aluminum cans are likely to be consumed more broadly across a wider array of departments with varying degrees of recycling infrastructure in place for cans. All of these findings suggest that employees could benefit from an informational resource that details where they can recycle different items.

Surprisingly, very few people (among GOs and non-GOs) knew that Beaumont throws out any recycling that is contaminated with improper items. This suggests that staff may not be aware of how important it is to sort different types of recyclables properly, and a misconception may exist that environmental services or someone else later sorts the materials. This represents another message that needs to be communicated by the Green Team and others involved in recycling at the hospital.

GOs reported to be more confident in their answers than did non-GOs, although GOs' average confidence falls between "somewhat" and "very." The uncertainty regarding which recycling behaviors and facts are correct within GOs is an indication that GOs may have a difficult time modeling stewardship behaviors and coaching their peers to do the same. Even when GOs feel like recycling is important and they want to contribute, confusion about how the program works can cause them to hesitate in encouraging their peers to recycle.

Table 3. Comparison of GOs and non-GOs on Recycling Knowledge

Group	Non-Green Officers		Green Officers	
Is the following item recyclable at Beaumont?	n	Percent who answered correctly (SD)	n	Percent who answered correctly (SD)
1. Paper	152	96% (.20)	104	100% (.00)
2. Cardboard box***	152	82% (.38)	105	97% (.17)
3. Plastic cup and bottle*	152	86% (.35)	105	96% (.19)
4. Battery	152	82% (.38)	105	93% (.25)
5. Aluminum can	152	79% (.41)	103	84% (.37)
6. Styrofoam cup	153	60% (.49)	105	64% (.48)
7. Chip bag	152	58% (.50)	104	58% (.50)
Is the following statement true or false?				
8. Beaumont Royal Oak generates revenue from recycling. ***	139	68% (.47)	102	89% (.21)
9. Beaumont Royal Oak recycles the blue wrap used in the OR. ***	137	50% (.50)	98	85% (.36)
10. Beaumont has single stream recycling where all recyclable materials (e.g., paper, plastic, cardboard, etc.) are mixed together before they are sent to a recycling facility.	142	76% (.43)	102	83% (.38)
11. If some trash is found in a recycle bin, the entire contents of the bin will be considered trash and not recycled.	139	57% (.50)	100	66% (.48)
Average percentage correct out of all eleven questions***	134	73% (.17)	95	83% (.12)
How confident would you say you are in your answers to the previous questions about recycling at Beaumont Royal Oak? (1=not at all, 5=extremely) ***	146	2.82 (.90)	102	3.67 (.74)

Note: Stars indicate there is a significant difference between the proportion of GOs and non-GOs who got the item correct. *$p < .05$ and ***$p < .001$ with Bonferroni correction.

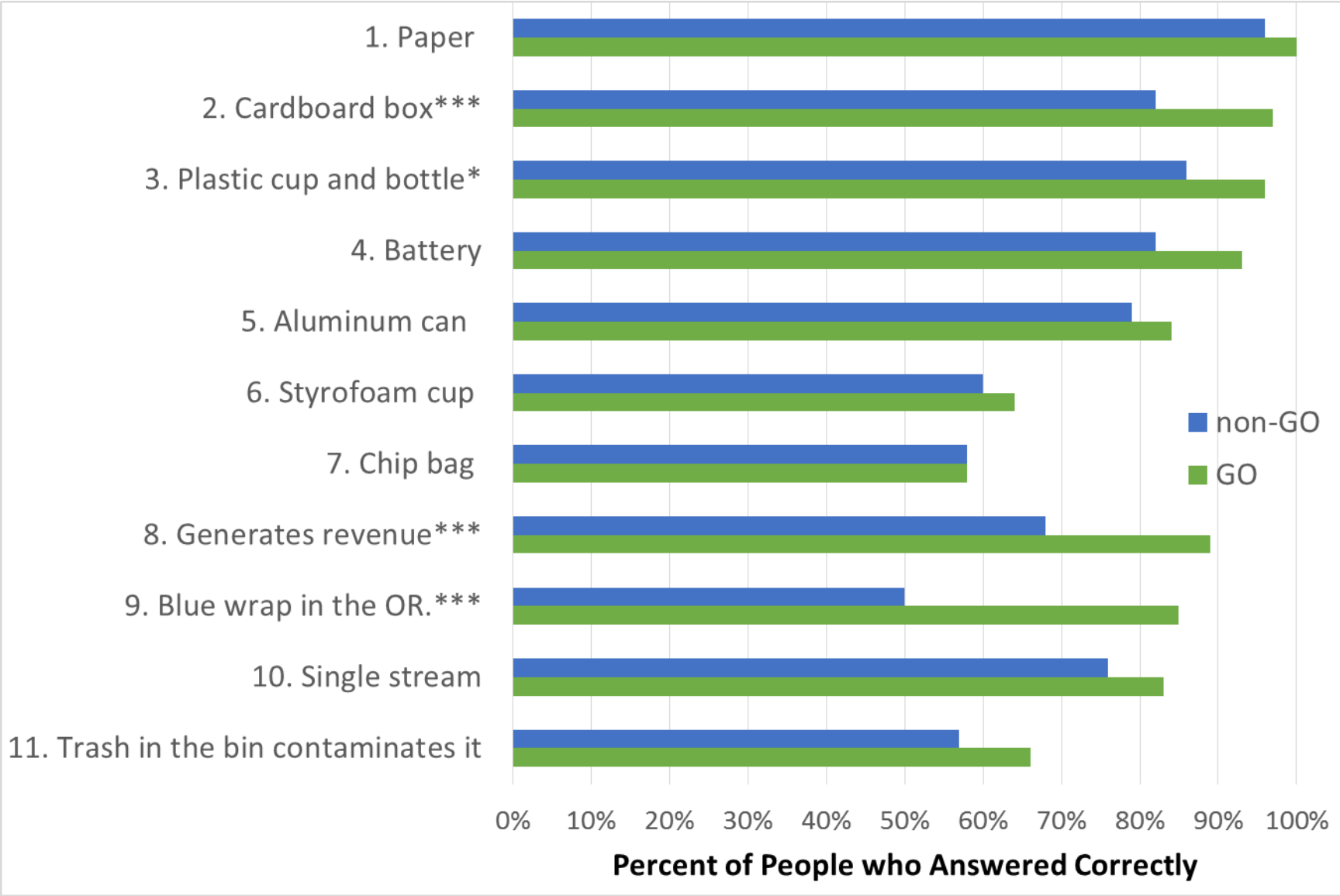


Figure 10. Recycling Knowledge

6.3.2 Recycling Behaviors

To investigate employees' recycling behaviors, we asked how frequently employees recycle paper, cans, cardboard, plastic, and batteries. On average for all survey participants and items, there was a high level of reported recycling behavior. For all five items, we found that GOs recycle them more frequently than non-GOs and the differences in recycling frequency are statistically significant (see Table 4 and Figure 11). While there was no significant difference in the two groups' knowledge of whether paper, cans and batteries were recyclable, there was a difference in their self-reported behavior. It is possible that some employees know that an item is recyclable at Beaumont, but they have other reasons for not recycling, such as being confused about where to recycle it, not thinking it is worth their time to recycle, or feeling it is very inconvenient to recycle.

When we compared the mean frequency of recycling behavior between clinical staff and non-clinical staff, we found that clinical staff reported recycling plastic cups and bottles and batteries less often than non-clinical staff (See Table 4A in Appendix D). However, we did not find that they had lower levels of knowledge regarding these items when compared to non-clinical staff. Some potential reasons for the difference could be that they use those items (plastic cups and bottles as well as batteries) less frequently than non-clinical staff, or that they are more focused on patient care than recycling. This finding suggests that future recycling messaging and infrastructure may need to differ for areas of the hospital used by clinical vs. non-clinical staff.

Table 4. Comparison of GOs and non-GOs on Self-Reported Recycling Behavior, by Material

Group	Non-Green Officers		Green Officers	
How often do you recycle the following items at Beaumont?	n	Mean (SD)	n	Mean (SD)
Paper***	147	4.65 (.88)	101	4.98 (.14)
Cardboard***	147	4.35 (1.28)	100	4.89 (.56)
Batteries**	145	4.28 (1.12)	101	4.82 (1.42)
Plastic cups and bottles***	147	4.18 (1.30)	101	4.77 (.75)
Cans**	146	4.16 (1.39)	100	4.50 (1.26)

Note: Stars indicate there is a significant difference between the mean frequencies of GOs vs. non-GOs.

*** p<.001; **p<.01 with Bonferroni correction.

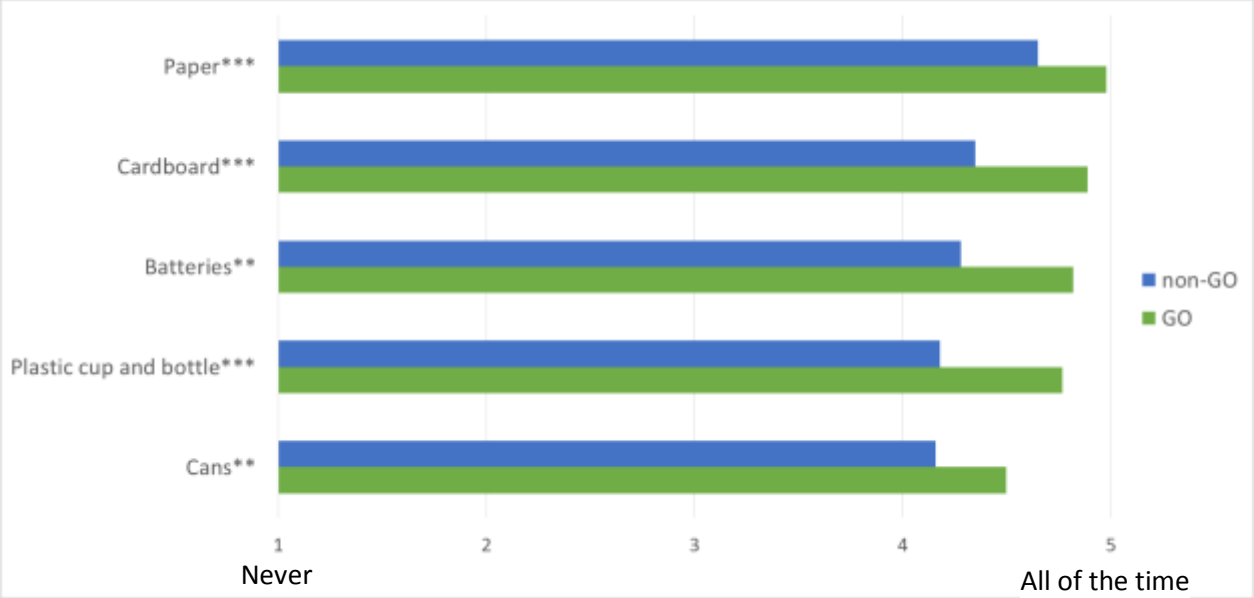


Figure 11. Self-Reported Recycling Behavior, by Material

6.3.3 Recycling Barriers & Benefits

We asked 15 questions about potential barriers to recycling, which included lack of procedural knowledge about how to recycle, whether employees felt it was worth their time to recycle, and whether they felt encouraged by their colleagues to recycle. Using factor analysis, we extracted four groups from the 15 questions. The four factors represented different barriers to and reasons for recycling. They included: inconvenience, label confusion, a belief that recycling is not worthwhile, and encouragement from others (see Table 5 and Figure 12 for the mean values reported for each factor).

When we compared GOs with non-GOs, we found that non-GOs believe that recycling is less convenient. Non-GOs also expressed more confusion about where to recycle. These findings may explain why non-GOs reported lower levels of recycling for all five recyclable items. Based on the quiz, non-GOs seem to know whether an item is recyclable in Beaumont, but they have difficulty identifying and accessing bins, which prevents them from recycling.

We also found that GOs placed a higher value than non-GOs on recycling, in the sense that they were more willing to devote time and attention to recycling during work. GOs also reported receiving more encouragement from colleagues within their departments. GOs may place more value on recycling and may feel more encouraged as a result of being part of the GO community. The Green Team could consider ways to improve the messaging around recycling to address these barriers. Future messaging could convey why it is important and what kind of impact it has. The Green Team could also encourage GOs to promote the behavior in other staff throughout the hospital.

When we compared responses from employees with clinical versus non-clinical roles, we found that clinical employees were more confused about labels than non-clinical employees. Non-clinical employees also reported feeling more encouraged by colleagues within their departments. It seems that clinical employees experience more barriers and less encouragement than non-clinical employees, although they value recycling equally. Clinical employees do value recycling, yet may have more stressful or urgent work that prevents them from recycling. This challenge highlights the need to have different

approaches for recycling training and motivation geared to the needs of employees in different areas of the hospital.

Table 5. Perceived Barriers to Recycling

Group	Non-Green Officers		Green Officers	
To what extent do you agree with the following statements?	n	Mean (SD)	n	Mean (SD)
Factor 1: Inconvenience***	144	2.96 (.98)	99	2.49 (.92)
I would recycle more if there were more bins.				
It easy to recycle in my department. (item reversed)				
Recycling bins are easy to find. (item reversed)				
Recycling bins aren't in convenient locations.				
Factor 2: Labels are Confusing***	141	2.67 (1.00)	99	1.99 (.87)
It is not always clear which type of bin is for recyclables and which is for trash.				
The labels on the recycling bins are confusing. I'm not sure what should go in each bin.				
Factor 3: Recycling not Worthwhile***	142	1.78 (.64)	98	1.51 (.51)
It is worth my time and effort to recycle at work. (item reversed)				
I don't think recycling at work makes a significant difference in protecting the natural environment.				
I often forget to recycle.				
Recycling interferes with my job responsibilities.				
Factor 4: Encouragement***	144	3.34 (.82)	99	3.93 (.71)
My manager encourages recycling.				
There is at least one person in my department who encourages others to recycle.				
My colleagues rarely recycle. (item reversed)				

Note: Stars indicate there is a significant difference between the mean frequencies of GOs vs. non-GOs. To determine the cutoff for significance, we used ***p<0.001. with Bonferroni correction.

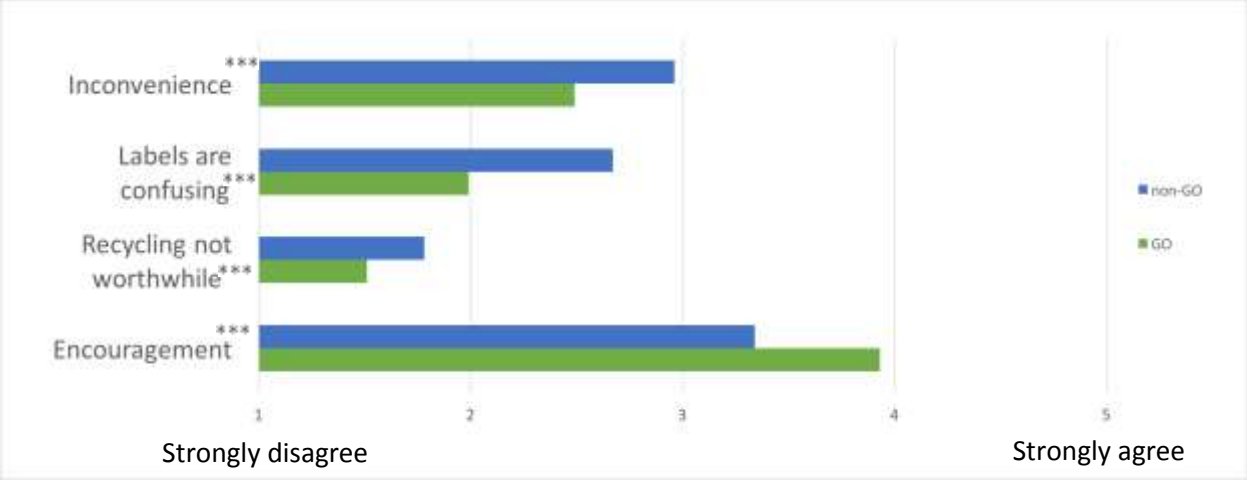


Figure 12. Perceived Barriers to Recycling

6.4 Additional Factors that Impact Recycling Behavior

For the first section of our analysis, we compared how average responses to questions about recycling behavior, knowledge, and attitudes differed between GOs and non-GOs (see Tables 3, 4 and 5, and Appendix D for additional comparisons of stewardship and recycling data across different demographic segments besides GOs and non-GOs). However, this method does not show whether some variables have a stronger effect on behavior than others (To explore this question, we constructed a number of linear regression models to identify which variables had the strongest effect on recycling behavior after controlling for other variables (see Table 6A in Appendix D).

We created a dependent variable to reflect behavior by averaging the frequency with which each respondent reported recycling the items in the survey (e.g., plastic bag and bottle, cardboard, cans, batteries). We then ran three regression models to see which variables that we measured were highly correlated with recycling behavior.

Model 1 is a baseline model with "average-behavior" as the dependent variable and demographic features as the independent variables. The specific features included in this model were gender, tenure at hospital, clinical/non-clinical status, and whether or not the respondent was a Green Officer. Tenure was organized in four-year increments: less than 1 year, 1- 5 years, 6-10 years, more than 10 years. In our models, tenure is treated as continuous variable coded on a scale of 1-4. Gender, clinical status and GO status were dummy-coded to represent males, clinical staff, and GOs, respectively. We exclude age from the baseline model because there was a high correlation between age and tenure.

In Model 2, we added the four indicators from our "perceived barriers" section of the survey (refer to Table 5): inconvenience, label confusion, feeling that recycling is not worthwhile, and encouragement from others. We see that being a Green Officer is still correlated with better recycling behavior, but interestingly, the level of value respondents ascribe to recycling is actually more significant than whether or not they are a GO.

In Model 3, we kept the same variables as Model 2, but added the quiz score. The quiz score was created by summing up the number of questions answered correctly by respondents out of 11 (see Table 3).

The baseline model (Model 1) demonstrated the impact of recycling frequency if someone was a Green Officer or clinical staff person (see Table 6). This model verified that the GO program is effective in improving employees' recycling behavior controlling for gender, tenure and clinical status. Unlike what would be commonly expected, neither gender nor tenure at the hospital made a significant difference in recycling frequency. Non-clinical staff perform better than clinical staff, and GOs perform better than non-GOs. Model 2 indicates that GO status, the belief that 'recycling is not worthwhile' and 'encouragement from others' significantly influence recycling behavior. Clinical status was significant in the baseline model became insignificant in Model 2, which may indicate that clinical staff perform worse due to some of the perceived barriers. The Green Team program may consider provide more targeted training to this group.

In Model 3, 'quiz' and 'recycling is not worthwhile' are significant at $p<0.001$. This tells us that knowledge is a very important contributor to recycling behavior and that the Green Team should put more emphasis on educating employees about Beaumont's recycling program. Although we don't find significance in 'label confusion' in this analysis, we think clear bin labels are a good way to spread recycle knowledge from our site visits.

Table 6. Regression Models

	Model 1		Model 2		Model 3	
	b	*SE*	*b*	*SE*	*b*	*SE*
Constant	4.323***	(.17)	4.84***	(.39)	4.18***	(0.41)
Gender-Male	.10	(.13)	.11	(.13)	.09	(.12)
Tenure	.08	(.05)	.04	(.05)	-.00	(.05)
Clinical-Yes	-.18*	(.09)	-.09	(.09)	-.10	(.09)
GO-Yes		(.10)	.17*	(.10)	.08	(.10)
Inconvenience			-.03	(.06)	-.03	(.05)
Label confusion			-.06	(.06)	-.042	(.05)
Recycling not worthwhile			-.33***	(.08)	-.34***	(.08)
Encouragement			.117*	(.07)	.07	(.07)
Quiz score					1.27***	(.31)
R^2	.10		.23		.29	
R^2_{Adj}	.09		.20		.26	
n	240		232		232	

6.5 Post-Survey Interview Findings

Twenty-two participants entered their information for a follow-up interview at the end of the Qualtrics survey. We were able to schedule 30-60-minute conversations with two employees, and a third responded to our post-survey questions by email. The interviewees represented a research laboratory and 2North surgical services. Themes from these post-survey interviews are presented below and recommendations to address the challenges are embedded in the following section.

The first interviewee gave our team feedback and insight from a research laboratory employee's perspective and identified many challenges and opportunities for recycling in a laboratory setting. As a department outside of high-traffic public areas or direct patient care areas, the interviewee did not feel like there was a structured plan for recycling within this department. The interviewee informed us that the laboratory department currently places filled recycling bags in the hallway under the impression that someone, likely environmental services, will remove the filled bags. The interviewee expressed concern and discouragement over the uncertainty of where the filled bags were taken or who removed them. This department lacks bins within the laboratory, which prompted departmental employees to set up makeshift handwritten signs and collection points. Highly motivated environmental stewards in this department sometimes take items home to recycle because they are unsure about what is and what is not recyclable at work. Specifically, employees are unsure whether or not they can recycle glass pipettes and their boxes, clean chemical bottles, and headphone cases at work.

Our team's second interview was with an employee in surgical services. This interview provided insight into recycling practices at Beaumont within a high-paced clinical workspace where recycling bins can fill up every 1-2 surgeries. This interviewee also mentioned being curious about the fate of the materials after they leave the hallway. In the surgical suites, the accessibility of the bins was not so much of an issue; rather, inadequate time to devote to recycling was the main barrier our interviewee identified. The interviewee believed that time should not be a barrier to recycling because employees can pile materials on the floor during demanding times (such as during surgeries) and collect the recyclables during turnovers.

The biggest challenge that the second interviewee faced was correcting peers' misconceptions about the recycling program. The interviewee, a highly engaged steward, lacked the correct data to utilize to motivate skeptical peers. Specifically, the interviewee lacked information about the financial benefits of recycling for Beaumont RO, the importance of separating materials because it does not all go to the same place, and whether or not cardboard and paper were considered the same recycling stream.

This interviewee was also not aware that there was another highly engaged recycling champion in the same department. Our team is aware of these two departmental recycling champions, but they were not aware of each other. More than one champion within a department is valuable because they can coordinate their communications with employees, convey more messages from the Green Team, and work together on initiatives. Formalizing battery recycling in the operating suites was something the interviewee wanted to work on, and our Masters Project team recommended that the interviewee team up with the other departmental champion and establish battery-recycling protocols.

The final interviewee submitted thoughts about recycling in surgical services via email. Taking time to recycle came up again as a challenge in that department. The response highlighted gaps in surgical services employees' involvement with the Green Team, such as not always having a surgical services employee present at Green Team meetings or Town Halls. This interviewee suggested having GO-like

training as part of an annual in-service training for the department and at orientation for new surgical services employees.

6.6 Summary of Survey Findings

The survey taught us that the Green Team should focus on engaging GOs because they practice more environmentally friendly behaviors at work and are more likely to encourage their colleagues to do the same. General attitudes towards the hospital's commitments to stewardship are positive; therefore, there is ample opportunity for and employee interest in the Green Team's development of new programs and continuation of existing programs.

The survey and post-survey interviews brought many barriers to recycling to light, especially the need for greater communication about how the recycling program works and how the hospital is performing over time. Although many employees recycle properly, lack of information on what, where, and how to recycle, seem to cause frustration in employees who want to better stewards and encourage their peers. This leads us to think that more education on how the recycling program works is needed. The physical infrastructure of the recycling bins also needs greater standardization, while still keeping unique needs for different types of workspaces in mind. Based on our findings from the survey, we believe that regularly re-administering an abridged survey on stewardship behavior and attitudes would be a valuable way to stay abreast of employee preferences and identify gaps in current stewardship programming. Recommendations from our research are described further in the next section.

7. Step Three: Identify Strategies to Address Barriers and Increase Recycling

7.1 Overview of Recommendations

Our recommendations to address the major barriers we identified in our research encompass three major themes: convenience, awareness and knowledge, and motivation. We created six recommendations, two within each theme, which we organized as follows:

Convenience	Awareness & Knowledge	Motivation
1. Increase Bin Availability	3. Inform How and Where to Recycle	5. Renew Commitments Regularly
2. Standardize Bin Appearance	4. Use Effective Communication Channels	6. Recognize Recycling Leaders

Recommendation 1: Increase the number of recycling bins throughout the campus

To reduce the physical barriers to recycling, our team recommends that Beaumont RO invest in additional recycling bins to increase the number of bins in both clinical and non-clinical locations throughout the hospital. Based on our visits and interviews it appears that many departments do not have recycling bins, so employees have resorted to making their own. We also saw that recycling bins are sometimes tucked away in corners because of limited space. The Environmental Services Director reported that she receives weekly calls asking for bins so being proactive with bin purchasing and placement will address this excess demand from employees, especially in non-clinical areas where demand seems to be the greatest. This is the first recommendation because research shows that eliminating physical barriers to recycling is more important for determining recycling rate than changing attitudes (Young, 2013; Lo, Peters, & Kok, 2012).

Because this recommendation requires significant financial resources, we suggest starting by conducting an inventory of existing bins by department to understand the difference in availability across the campus. After an inventory, it will be easier to set a standard or benchmark for bin availability in public, clinical, and non-clinical areas and prioritize which departments have the greatest need.

Recommendation 2: Standardize the bins' appearance

In addition to increasing the number of recycling bins, our team recommends that Beaumont create standardized recycling bins with specialized lids and clear labels with a picture of the appropriate items commonly found in that workspace that an employee could recycle. The labels should be placed on the top of the bins in addition to the labels that currently exist on the sides of the bins to help people once they have approached the bin. Such labels need not detract from aesthetics in public areas. These labels can also include a short message describing the importance of recycling. Standardizing bins and labels helps employees recycle more quickly and reduces confusion for the recycler and environmental services staff (Recycle Across America, 2014). Standardizing bins helps to create the habit to recycle at work as it simplifies the process of recycling, which is especially important for clinical departments where wasting time to figure out recycling comes at a higher cost. The ultimate advantage of standardizing is to meet people's expectations for clear labels, reduce contamination of wrong materials in the recycling bins, and increase the recycling rate.

Purchasing a different liner for recycling bins in a different color than the white liners in waste bins is a potentially cheaper way to distinguish recycling bins from trash. At the University of Michigan, recycling liners are blue and trash liners are white; at Stanford Health Care, recycling liners are mint green. Examples of standard bins and liners similar to the ones used by Stanford Health Care are shown in Figure 13.

Although survey respondents reported low levels of confusion regarding bin labels in the recycling barriers section, results from the recycling knowledge and behavior sections show that there is confusion about the bins. Studies have found that recycling containers with specialized lids (shaped to fit specific items) increase recycling rate (of beverage containers) by 34% compared to non-specialized lids (Duffy, 2009).

Figure 13.Rubbermaid Slim Jim® Recycling Containers and Heritage Mint Green Recycling Liner

Recommendation 3: Disseminate Information on How and Where to Recycle

Knowledge about how multi-stream recycling program works at Beaumont RO seems to have waned since the program expanded beyond paper and cardboard. In our project, we found that employees need a way to look up information about how and what to recycle. This could come in the form of a comprehensive website that lists which materials found in clinical and non-clinical workplaces are suitable for recycling and where to recycle those specific items. The city of Ann Arbor has a sophisticated version of this kind of resource, shown below in Figure 14 (Recycle Ann Arbor, 2016) and also available at this link: http://www.recycleannarbor.org/a-z-recycling-guide. Because the healthcare workplace has specialized materials, including photos in the guide could be helpful. In terms of other model websites, an example of a comprehensive sustainability website for a healthcare setting comes from UCSF Medical Center (http://sustainability.ucsf.edu/greening_the_medical_center).

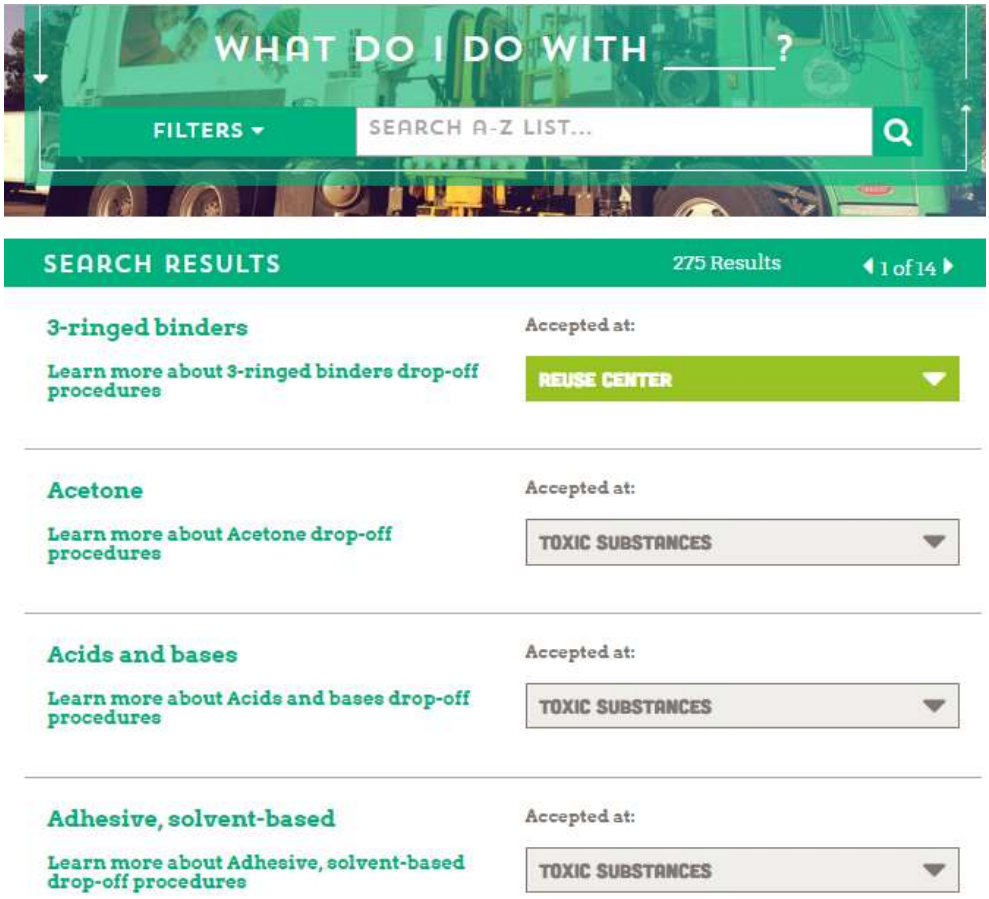


Figure 14. Recycle Ann Arbor's Item-by-Item Guide

The second part of our recommendation is to provide a photo or video series that follows recyclable materials from the bin in which their placed, to the shipping dock, to the facility where they are recycled. Many employees reported that they have no understanding of how environmental services staff process recycling at Beaumont RO in the "off-stage" areas of the hospital so increasing visibility in the process will help with awareness. This series can also demonstrate what happens when inappropriate materials are placed in the recycling bins and follow the inappropriately sorted materials to the local landfill. Part of the photo or video series can also explain that the recycler provides Beaumont RO with rebates.

Third, publishing a list of GOs by department will greatly help GOs find each other and work together to promote recycling in their departments. This list can accompany a GO-branded email signature for GOs to identify themselves as GOs when communicating with their peers.

Addressing awareness of how and where to recycle is important because our survey found that 60% of survey respondents were not able to distinguish non-recyclable Styrofoam and chip bags from recyclable items. Because of response bias (people who took the survey were perhaps more likely to be interested in environmental issues and recycling), this number may actually underrepresent the scale of misinformation regarding these items. GOs' training may help explain why their average quiz score was higher than non-GOs (83% vs 73%). Addressing how to recycle is supported by literature that shows that promoting procedural knowledge is more effective in behavior change than exclusively promoting attitude change (Holland RW, 2006).

Recommendation 4: Use Effective Communication Channels

This recommendation refers to effectively using communication channels to promote awareness and knowledge, in addition to the website discussed in Recommendation 3. In our project, we found that weekly staff meetings are an avenue for periodic messages from the Green Team. Short messages from the Green Team can be shared at these staff meetings monthly or bimonthly. Offering the task of bringing up the Green Team message at a staff meeting to a GO or manager is one way to engage employees. We see a need to tailor these messages to clinical versus non-clinical departments. From our experience in using the Daily Dose as a communication avenue, we see that it can be used periodically to share short stories from GOs or messages from the Green Team about why stewardship is important. Ultimately, a physical or digital dashboard that tracks the hospital's recycling rate compared to the annual target placed in a public place would be an ever-present reminder of the hospital's commitment to stewardship.

An important person-to-person communication channel is the one between GOs and their peers in their daily work. We see a gap in GOs' ability to encourage their peers to adopt recycling and other stewardship behaviors, especially with colleagues who are skeptical about the value of recycling at work. It is important to support GOs' ability to encourage their peers, so training for GOs on how to have conversations about recycling and stewardship with their peers is important. This is also called "training the trainers," a step beyond teaching someone how to perform a behavior.

Multiple communication channels that push information to employees helps reduce the need for interested employees to seek out information. Communication from the Green team about the recycling program is important because it shapes employee perceptions of the value of recycling as a social norm. We have found that Beaumont RO employees see recycling as a personal norm that they perform at home, thus it important to communicate that stewardship should be no different at work. Communication about the hospital's environmental initiatives and employees' roles in those initiatives helps reduce ignorance and mistaken beliefs of Beaumont RO's stewardship programs. According to the literature, communication about environmental initiatives could potentially both change culture and enhance the visibility of environmental infrastructure (Onkila, 2013).

Recommendation 5: Renew Commitments to Action

This recommendation calls for greater emphasis on the GO Job Description. Although GOs already perform recycling and stewardship behaviors more than non-GOs, we find that GOs have a hard time remembering all of GO Job Description (or that it exists) so periodically renewing GOs' commitment to action (shown in Figure 15) would be helpful.

We also recommend asking non-GOs to sign commitment pledges to recycle. This would enable interested non-GOs to still feel engaged without committing the time to become a GO. A simplified commitment for non-GOs is shown in Figure 16. Beaumont RO can leverage trained GOs to collect commitments from non-GOs and/or from new employees in their department. This campaign for GOs to collect commitments can be part of pre-Earth Day activities. A list of employees who have signed the pledge can be periodically posted in the Daily Dose to promote the social norm around environmental stewardship. The opportunity for any employee to pledge to as few as one and as many as all of the parts of the commitment to environmental stewardship could also be presented on the proposed stewardship website to automate the process.

There are a number of studies that have shown that commitments alone or combined with other interventions are more effective in promoting environmental behavior compared to controls (Lokhorst, Werner, Staats, van Dijk, & Gale, 2013). One study found that asking for formal, signed commitments

was more effective than offering monetary rewards in motivating people to improve recycling rates (Katzey & Pardini, 1987). Commitments accompanied by feedback on progress towards the commitment have been found to be more effective than helpful commitments alone (Leon & Fuqua, 1995).

According to Robert Caialdini (2001), there are four components of an effective commitment:

- The commitment should be active rather than passive, such as writing a statement or putting one's signature on an official form.
- The commitment should be made in public or have the potential to be publicized.
- The commitment should be effortful or difficult.
- The commitment should be perceived by the individual to be voluntary or internally motivated, and therefore indicative of one's true desires. This makes it more likely that the individual will internalize responsibility for the behavior.

We recommend the Green Team to keep these features of an effective commitment in mind when re-examining the use of the GO job description and designing a way for non-GOs and GOs to regularly renew their commitments to recycling and other behaviors.

Green Officer Job Commitment

I pledge to model, educate, and advocate for environmental stewardship at Beaumont

- ❑ Use revolving doors
- ❑ Turn off lights
- ❑ Power down computer and printers
- ❑ Bring reusable mugs and bottles
- ❑ Recycle paper, plastic, cardboard
- ❑ Use reusable containers for food if you are not carrying out
- ❑ Look for ways to reduce, reuse, and recycle goods
- ❑ Look for ways to reduce water and power consumption
- ❑ Share ideas with the Green Team. Share ideas on the Green Blog
- ❑ Recruit more Green Officers
- ❑ Stay current on news from the Green Team

Date_____ Name_____ Department_____

Figure 15. GO Job Description Reformatted into a Commitment

Beaumont Employee

Commitment to Environmental Stewardship

I commit to doing the following to contribute to environmental stewardship at Beaumont:

- ❑ Use revolving doors
- ❑ Turn off lights
- ❑ Power down computer and printers
- ❑ Bring reusable mugs, bottles, and food containers
- ❑ Recycle paper, plastic, cardboard
- ❑ Look for ways to reduce, reuse, and recycle goods
- ❑ Look for ways to reduce water and power consumption
- ❑ Share ideas with the Green Team or on the Green Blog
- ❑ Stay current on news from the Green Team

Date_____ Name_____ Department_____

Figure 16. General Employee Commitment to Stewardship Behaviors

Recommendation 6: Recognize Recycling Leaders

Lastly, we find that employees engaged in environmental stewardship dedicate considerable time and energy so recognition is warranted for these engaged employees. Public recognition from managers or other GOs helps cultivate a social norm that stewardship is valued and expected and research by Hebelein (2012) suggests that social norms help to influence behavior change. One way to recognize leaders is to ask them to be department representatives at Town Halls, creating accountability for Town Hall attendance and an avenue for communication from the Green Team to individual departments.

Another way to recognize recycling leaders is to share their stories of why they recycle or care about stewardship. In our project, we also found many GOs and non-GOs have opinions and stories to share so launching a story-sharing campaign via email is something to consider. At CleanMed 2015, an organization presented their experience with a campaign to collect employee stories of why they care about stewardship and how they engage in stewardship at work. These employee stories were six words or less for simplicity. See Appendix F for other ideas regarding employee engagement from CleanMed 2015. Limiting the length of stories increases the likelihood of someone participating compared to writing a blog piece or attending an in-person session (Carrico, 2011).

Literature suggests that social recognition or feedback is more effective at motivating people to conserve energy in the workplace than monetary rewards. It was encouraging to see the audience at the Town Hall presentation suggest that recycling rebates should not go back to rewarding individual GOs but to a fund for mandatory recycling training for everyone.

7.2 Summary of Recommendations

Our recommendations offer a broad menu of options to address barriers to recycling and stewardship behaviors at Beaumont RO and a summary is shown in the table Section 7.3. There are multiple ways to combine the recommendations to increase both recycling and employee engagement. One simple way to achieve better recycling access and engagement example is to ask GOs to help conduct a bin inventory in their department as part of Recommendation 1. A second way example is to use staff meetings as an opportunity to collect commitments to recycling and stewardship from their peers. As a

third example, would be to use the proportion of commitments in each department as a way to recognize recycling champions since the hospital does not collect data on recycling volume on a department level. The number or proportion of commitments by department would be a good piece of feedback for Beaumont RO's community of engaged stewards. This feedback can be shared through staff meetings, the Daily Dose, or a physical display board.

7.3 Summary Table of Recommendations

	Convenience	Awareness & Knowledge	Motivation
	1. Increase Bin Availability	**3. Inform How and Where to Recycle**	**5. Renew Commitments Regularly**
Details	• Conduct inventory of bins by department • Compare differences in availability across departments • Set standard for bin availability • Prioritize departments with greatest need • Purchase additional bins	• Demonstrate how multi-stream recycling works • Create lists of specific items for each waste stream • Create visuals that show where materials go after leaving departments and the hospital • List GOs by department for networking	• Renew GOs' commitment to the GO job description annually • Ask GOs to collect commitments from non-GOs • Administer a short feedback survey every 3 years, focusing on perceived barriers and benefits
Masters Project Support	• Not all departments have bins • Some departments have created their own bins • Non-clinical areas seem to have the biggest gaps in bin availability • EVS Director receives weekly calls from depts. asking for recycling bins	• Staff take materials home to recycle because they are unsure if they're recyclable at work • 60% of respondents were not able to tell non-recyclable items from recyclable items • GOs scored higher than non-GOs on our knowledge quiz (85% vs 73%)	• GOs lose engagement over time and annual personal pledges can reignite interest • Non-GOs show interest in contributing but attending GO training is a large barrier • Key parts from this survey need to be repeated to uncover new barriers
Literature Support	• [i]Eliminating barriers to recycling is more important for determining recycling rate than changing attitudes. • [ii]Employees use recycling bins in high visibility areas more frequently due to social pressures.	• [iii]Programs that promoted procedural knowledge were more effective than programs exclusively aimed to change attitudes. • [iv]Conscious planning of 'where, when, and how to recycle' improves the habits of employees	• [v]Commitments with feedback are more effective than commitments without feedback and monetary incentives • [vi]Effective commitments are active, public, require effort, and voluntary
	2. Standardize Bin Appearance	**4. Use Effective Communication Channels**	**6. Recognize Recycling Leaders**
Details	• Use consistent style in all signs for bins • Add signs to top of bins when possible • Add prompts that describe why and how • Segment public, clinical, and non-clinical zones and provide identical bins in each zone • Provide different color liner for recycling bins	• Create monthly messages for staff meetings • Tailor messaging to clinical vs non-clinical departments • Set up a physical dashboard of hospital-wide progress and goals • Use Daily Dose as a communication channel	• Cultivate a social norm that stewardship is valued and expected • Ask for volunteers to represent department at Town Halls and/or Green Team meetings • Recognize highly engaged stewards' motivations and contributions in short stories
Masters Project Support	• Clinical departments recycle less than non-clinical for some items, which may necessitate department-specific training/messaging & recycling infrastructure • Non-GOs are often confused by bin signage	• GOs model and encourage their peers to engage in stewardship, yet feel some burden to seek out the most up-to-date information • [vii]Peer institutions empowered champions and launched the "six-word story" campaign	• Employees strongly support stewardship efforts so managers should strive to meet employee expectations • GOs think leaders take environmental stewardship more seriously than do non-GOs
Literature Support	• [viii]Culture is insufficient for behavior change; recognition of subcultures is necessary and obtainable through employee engagement. • [ix]Containers with lids shaped to fit specific items increase recycling rate by 34%.	• [x]Environmental communication could potentially both change culture and enable the visibility of environmental infrastructure. • [xi]Email or digital feedback is effective at promoting environmental behaviors.	• [xii]Coworkers' and supervisors' endorsements and involvements in sustainability promote stewardship more than monetary rewards. • [xiii]Continuing communication and feedback are more effective than a standalone educational

			or training event.

i. Young, W. D. (2013). Changing Behaviour: Successful Environmental Programmes in the Workplace. *Business Strategy and the Environment*.
Lo, S., Peters, G., & Kok, G. (2012). A Review of Determinants of and Interventions for Proenvironmental Behaviors in Organizations. *Journal of Applied Social Psychology*, 2933-2967

ii. Tudor, T. L., Barr, S. W., & Gilg, A. W. (2008). Tudor, T. L., Barr, S. W., & Gilg, A. W. (2008). A novel conceptual framework for examining environmental behavior in large organizations a case study of the cornwall national health service (nhs) in the united kingdom. Environment and Behavior, 40(3), 426–450.

iii. Lingard, H., Gilbert, G., & Graham, P. (2001). Improving solid waste reduction and recycling performance using goal setting and feedback. . *Construction Management and Economics, 19*(8), 809–817.

iv. Holland RW, Aarts H, Langendam D. 2006. Breaking and creating habits on the working floor: a field-experiment on the power of implementation intentions. Journal of Experimental Social Psychology 42(6): 776–783.

v. Leon, I. G., & Fuqua, R. W. (1995). The effects of public commitment and group feedback on curbside recycling. *Environment and Behavior*.
Katzey, R., & Pardini, A. (1987). The Comparative Effectiveness of Reward and Commitment Approaches in Motivating Community Recycling. Journal of Environmental Systems, 93-113.

vi. Cialdini, R. (2001). Influence: Science and Practice. Boston, MA: Allyn & Bacon.

vii. Lingard, H., Gilbert, G., & Graham, P. (2001). Improving solid waste reduction and recycling performance using goal setting and feedback. *Construction Management and Economics*, 19(8), 809–817.

viii. Johnson and Johnson. (2015) *CleanMed Conference*

ix. Linnenlueck, M., Russell, S., & Griffiths, A. (2009). Subcultures and sustainability practices: the impact on understanding corporate sustainability. *Business Strategy and the Environment*, 432-452.

x. Duffy, S., & Verges, M. (2009). It matters a whole lot: Perceptual affordances of waste containers influence recycling compliance. *Environment and Behavior*, 41(5), 741-749.

xi. Onkila T. (2013). Pride or embarrassment? Employees' emotions and corporate social responsibility. *Corporate Social Responsibility and Environmental Management*.

xii. Carrico, A. R., & Riemer, M. (2011). Motivating energy conservation in the workplace: An evaluation of the use of group-level feedback and peer education. *Journal of Environmental Psychology*, 31(1), 1-13.

xiii. Robertson, J. L., & Barling, J. (2013). Greening organizations through leaders' influence on employees' pro-environmental behaviors. *Journal of Organizational Behavior*

8. Next Steps in the Community-Based Social Marketing Framework

Completing Steps 4 and 5 of the Community-based Social Marketing framework was beyond the scope of our team's project. We concluded Step 3 with recommendations to implement behavior change strategies based on our data collection and literature reviews. Here, we provide Beaumont guidelines for completing Step 4 (Piloting and Evaluating) and Step 5 (Broad-scale Implementation) of the CBSM framework.

8.1 Step Four: Pilot, Evaluate and Adjust Strategies

The idea of CBSM Step 4 is to pilot strategies that improve one behavior at a time. Beaumont RO should first implement one of the recommendations from CBSM Step 3 as a small-scale pilot. The pilot serves to bring unforeseen obstacles to light without requiring the hospital to invest in full-scale implementation. For example, the pilot program could materialize in the form of an intervention where clearer and more streamlined recycling bins are installed in one department (see Recommendation 1). After measuring the baseline recycling rate, Beaumont should install the new bins and then compare data on the recycling rates within that department and a control department without new bins over time to measure effectiveness. Beaumont may need to utilize outside expertise to install and evaluate the pilot program. One option could be student interns or future University of Michigan masters project student teams. Once Beaumont pilots a strategy that it finds effective and appropriate, it can decide whether to alter the strategy, choose a different strategy, package the strategy with other strategies, or implement the strategy hospital-wide.

If the pilot program is unsuccessful or does not meet Beaumont's expectations and/or desires for strategy effectiveness, Beaumont should select a different strategy, using our recommendations as guidelines. Beaumont should then initiate a new pilot program, using the same steps applied to a different recommendation, and subsequently measure the effectiveness of the new strategy. Though seemingly tedious, Beaumont will save its limited resources and valuable time while narrowing in on the recommendations and behavior change strategies that best fit within its organizational culture. Beaumont can apply the outlined procedure to any of the recommendations.

8.2 Step Five: Hospital-wide Strategy Implementation

After piloting a behavior change intervention strategy or group of strategies, Beaumont will be ready to initiate Step 5 of the CBSM framework, broad-scale implementation. Step 5 takes the form of hospital-wide implementation, where the strategy should still be conscious of specific departments and/or job statuses (clinical/non-clinical and green officer/non-green officer). At this stage, the Green Team should heavily publicize its interventions using channels such as the Green Blog/website, Green Town Halls, Daily Dose emails, or posters throughout the hospital.

When scaling-up, Beaumont should have a plan to collect data on employee engagement in the new programs to be sure that they are reaching a broad group of employees and communicating with them effectively. Providing employees with ongoing feedback and encouragement based on the data collected will help ensure employees' continued cooperation and participation. Beaumont should continually evaluate its implemented strategies and programs in an attempt to identify complications and program problems before these complications invalidate the intervention's success or become very costly and timely to remove. Our team recommends that Beaumont regularly distribute employee surveys on a much smaller and less time-demanding scale every one to three years. An abridged version of our survey

is listed below. Such a survey could also be hosted on the stewardship website and will provide insight for the Green Team.
Example Abridged Survey:

1. Department name (select from list)
2. It is easy to recycle in my department. (Scale of 1 strongly disagree to 5 strongly agree)
3. I encourage my co-workers to recycle. (Scale of 1 strongly disagree to 5 strongly agree)

Our project focused on recycling behavior, but Beaumont can use our project and guidelines as a model to apply the CBSM framework to other specific stewardship behaviors that it wishes to address in the future. Beaumont can use the CBSM framework to identify barriers to the behavior and strategies for overcoming them, and then piloting those strategies and eventually scaling them up. Our analysis identified many of the barriers to environmental stewardship that Beaumont employees face and gauged their level of engagement with and interest in sustainability. Beaumont can use this data to launch programs and initiatives to address environmental behaviors beyond recycling. For example, if the next area of focus for employee engagement was to increase sustainable food in the hospital, the Green Team can collect information about barriers to employees' intake of local, plant-based food through a simpler survey, Town Halls, or staff meetings.

9. Conclusion

In the field of environmental studies, there has been little research on healthcare professionals' opinions on environmental issues. This project contributes to the understanding of how healthcare institutions can increase their stewardship practices through employee engagement. This is an important contribution because healthcare professionals are trusted members of the community and can be strong environmental leaders with the right support and direction.

Our project found that most employees agreed that "by promoting environmental stewardship, Beaumont RO is also promoting population health (4.2 on a scale of 1-5) and that "environmental stewardship is directly relevant to the health of our patients (3.9 on a scale of 1-5)." This is strong evidence for leaders to incorporate environmental stewardship into the organization's strategic plan, an idea voiced at our Town Hall presentation. Employees also agreed that Beaumont RO can do more to decrease its environmental impacts, and that Beaumont should prioritize decreasing its impact on the environment (4.0 on a scale of 1-5). One suggestion they had was for the Green Team to promote that GO training is available to everyone. These are strong indicators of employees' appetite for future stewardship programs at Beaumont RO.

Defining workplace sustainability is difficult and many organizations progress through stages of corporate sustainability, a process that often leads organizations to refine the concept repeatedly (Linnenlueck, Russell, & Griffiths, 2009). Since Beaumont RO has built a large community of GO and GOs report that they're want to encourage their peers, it is a natural progression to now ask GOs to emphasize encouraging their peers in addition to modeling stewardship behaviors. By using CBSM as a method to focus on one behavior, in this case recycling, and its barriers, the Green Team has a roadmap for future engagement in environmental stewardship.

10.Appendices

Appendix A: Green Office Duties

Appendix B: Sample Version of Survey

Beaumont Royal Oak Stewardship Survey_10.12.15

Q1 Welcome to our survey. First, please tell us a little about yourself. Are you a current employee at the Beaumont Hospital - Royal Oak Campus?

- ❍ Yes (1)
- ❍ No (2)

Q2 Approximately how long have you worked at Beaumont Royal Oak?

- ❍ Less than 1 year (1)
- ❍ 1-5 years (2)
- ❍ 6-10 years (3)
- ❍ 11+ years (4)

Q3 What would best classify your role at Beaumont Royal Oak?

- ❑ Clinical (1)
- ❑ Non-Clinical (2)

Q4 What is the name of your department?

Q5 What is your age?

- ❍ 18-25 (1)
- ❍ 26-35 (2)
- ❍ 36-45 (3)
- ❍ 46-55 (4)
- ❍ 56-65 (5)
- ❍ 66+ (6)

Q6 What is your gender?

- ❍ Female (1)
- ❍ Male (2)
- ❍ Other (3)
- ❍ Prefer not to respond (4)

Q7 Which statement best describes your awareness of Beaumont Royal Oak's Green Officer Certification Program?

- ❍ I did not know we had such a program at Beaumont. (1)
- ❍ I have heard of the program but I do not know what Green Officers do. (2)
- ❍ I know that Beaumont has a Green Officer program and I know what Green Officers do, but I am not a certified Green Officer. (3)
- ❍ I am a certified Green Officer. (4)

If I am a certified Green Offi... Is Not Selected, Then Skip To End of Block

Q8 How did you become a Certified Green Officer?

- ❍ I attended the Green Team's in-person training program, independent of my department. (1)
- ❍ I completed the in-person training program along with co-workers in my department. (2)
- ❍ I filled out a questionnaire at one of Beaumont's sustainability events (e.g., Earth Day 2015). (3)
- ❍ I completed the on-line version of the Certified Green Officer training. (4)
- ❍ Other, please specify: (5) _____

Q9 In which year did you complete your Certified Green Officer training? (please provide your best estimate)

- ❍ 2015 (1)
- ❍ 2014 (2)
- ❍ 2013 (3)
- ❍ 2012 (4)
- ❍ 2011 (5)
- ❍ I don't remember (6)

Q10 Can you tell us in a few sentences what motivated you to become a Green Officer?

Q11 How often do you do each of the following while at work?

	Never (1)	Rarely (2)	Sometimes (3)	Often (4)	All of the Time (5)
When I have ideas about environmental stewardship and employee engagement, I share them with the Green Team. (6)	❍	❍	❍	❍	❍
I bring reusable bottles and containers. (7)	❍	❍	❍	❍	❍
I help keep up the recycling system in my department. (8)	❍	❍	❍	❍	❍
I turn off the lights when not in use. (9)	❍	❍	❍	❍	❍
I attend Green town halls. (10)	❍	❍	❍	❍	❍
I read the Green Blog. (11)	❍	❍	❍	❍	❍
I encourage my co-workers to bring reusable bottles	❍	❍	❍	❍	❍

and containers. (1)					
I encourage my co-workers to recycle. (2)	❍	❍	❍	❍	❍
I encourage my co-workers to turn off the lights. (3)	❍	❍	❍	❍	❍
I encourage my co-workers to attend town halls. (4)	❍	❍	❍	❍	❍
I encourage my co-workers to become Green Officers. (5)	❍	❍	❍	❍	❍

Q12 Do you engage in any other environmental stewardship activities that you would like to tell us about? By environmental stewardship, we mean efforts to reduce waste, conserve resources, and generally minimize the hospital's environmental impact.

Q13 To what extent do you agree with the following statements?

	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)
Beaumont should prioritize decreasing its impact on the environment. (1)	❍	❍	❍	❍	❍
Beaumont should not invest in environmental stewardship initiatives. (2)	❍	❍	❍	❍	❍
Beaumont should designate a full-time staff member to promoting environmental stewardship. (3)	❍	❍	❍	❍	❍
4 (4)	❍	❍	❍	❍	❍
The leaders at Beaumont take environmental stewardship issues seriously. (5)	❍	❍	❍	❍	❍
Beaumont can do more to decrease its environmental impacts. (6)	❍	❍	❍	❍	❍

Environmental stewardship is directly relevant to the health of our patients. (7)	❍	❍	❍	❍	❍
By promoting environmental stewardship, Beaumont is also promoting population health. (8)	❍	❍	❍	❍	❍
Green Officers play an important role in promoting environmental stewardship. (9)	❍	❍	❍	❍	❍

Q14 We would like to get a sense of how well Beaumont has communicated its recycling program to employees. Please tell us what you know about how Beaumont handles waste in the hospital. We'll share the answers in a future edition of the Daily Dose.

Q15 Is the item below recyclable at Beaumont? (paper)

- ❍ Yes, I can put it in a recycling bin at Beaumont. (1)
- ❍ No, Beaumont does not recycle this item. (3)
- ❍ I don't know. (4)

Q16 Is the item below recyclable at Beaumont? (aluminum can)

- ❍ Yes, I can put it in a recycling bin at Beaumont. (1)
- ❍ No, Beaumont does not recycle this item. (2)
- ❍ I don't know. (3)

Q17 Is the item below recyclable at Beaumont? (chip bag)

- ❍ Yes, I can put it in a recycling bin at Beaumont. (1)
- ❍ No, Beaumont does not recycle this item. (2)
- ❍ I don't know. (3)

Q18 Is the item below recyclable at Beaumont? (cardboard box)

- ❍ Yes, I can put it in a recycling bin at Beaumont. (1)
- ❍ No, Beaumont does not recycle this item. (2)
- ❍ I don't know. (4)

Q19 Are the items below recyclable at Beaumont?

- ❍ Yes, I can put them in a recycling bin at Beaumont. (1)
- ❍ No, Beaumont does not recycle these items. (2)
- ❍ I don't know. (3)

Q20 Is the item below recyclable at Beaumont? (Styrofoam cup)

- ❍ Yes, I can put it in a recycling bin at Beaumont. (1)
- ❍ No, Beaumont does not recycle this item. (2)
- ❍ I don't know. (3)

Q21 Is the item below recyclable at Beaumont? (battery)

- ❍ Yes, I can put it in a recycling bin at Beaumont. (1)
- ❍ No, Beaumont does not recycle this item. (2)
- ❍ I don't know. (3)

Q22 Beaumont has single stream recycling where all recyclable materials (e.g., paper, plastic, cardboard, etc.) are mixed together before they are sent to a recycling facility.

- ❍ True (1)
- ❍ False (2)

Q23 Beaumont Royal Oak recycles the blue kimwrap used in the OR.

- ❍ True (1)
- ❍ False (2)

Q24 If some trash is found in a recycle bin, the entire contents of the bin will be considered trash and not recycled.

- ❍ True (1)
- ❍ False (2)

Q25 Beaumont Royal Oak generates revenue from recycling.

- ❍ True (1)
- ❍ False (2)

Q26 How confident would you say you are in your answers to the previous questions about recycling at Beaumont Royal Oak?

- ❍ Not at all (1)
- ❍ A little (2)
- ❍ Somewhat (3)
- ❍ Very (4)
- ❍ Extremely (5)

Q27 How often do you recycle the following items at Beaumont?

	Never (1)	Occasionally (2)	Sometimes (3)	Often (4)	Almost always (5)	I don't use this item (6)
Paper (1)	❍	❍	❍	❍	❍	❍
Cans (2)	❍	❍	❍	❍	❍	❍
Cardboard (4)	❍	❍	❍	❍	❍	❍
Plastic (5)	❍	❍	❍	❍	❍	❍
Styrofoam (6)	❍	❍	❍	❍	❍	❍
Batteries (7)	❍	❍	❍	❍	❍	❍

Q28 To what extent do you agree or disagree with the following statements?

	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)
It's worth my time and effort to recycle at work. (1)	❍	❍	❍	❍	❍
I don't think recycling at work makes a significant difference in protecting the natural environment. (2)	❍	❍	❍	❍	❍
My manager encourages recycling. (3)	❍	❍	❍	❍	❍
There is at least one person in my department who encourages others to recycle. (4)	❍	❍	❍	❍	❍
My colleagues rarely recycle. (5)	❍	❍	❍	❍	❍
Separating items into different bins for paper, plastic, cans, etc. is too time consuming. (6)	❍	❍	❍	❍	❍
I often forget to recycle. (7)	❍	❍	❍	❍	❍
Recycling interferes with my job responsibilities. (8)	❍	❍	❍	❍	❍
I would recycle more if there	❍	❍	❍	❍	❍

were more bins. (9)					
It easy to recycle in my department. (10)	❍	❍	❍	❍	❍
Recycling bins are easy to find. (11)	❍	❍	❍	❍	❍
Recycling bins aren't in convenient locations. (12)	❍	❍	❍	❍	❍
It is not always clear which type of bin is for recyclables and which is for trash. (13)	❍	❍	❍	❍	❍
The labels on the recycling bins are confusing. I'm not sure what should go in each bin. (14)	❍	❍	❍	❍	❍
I need more information on how to recycle at work. (15)	❍	❍	❍	❍	❍

Q29 How interested would you be in participating in any of the following efforts to improve recycling at Beaumont?

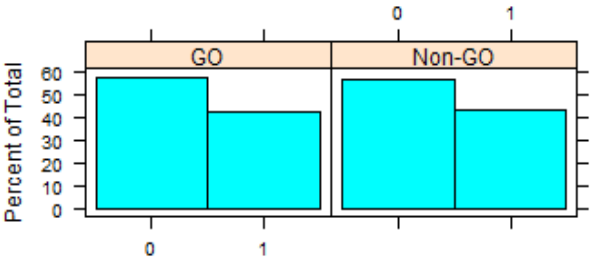
	Not at all (1)	A little (2)	Somewhat (3)	Very (4)	Extremely (5)
Join a Task Force focused on finding ways to improve recycling throughout the hospital. (1)	❍	❍	❍	❍	❍
Become a recycling champion in my department and communicate with Materials Handling and Environmental Services. (2)	❍	❍	❍	❍	❍
Attend a brief training on recycling and then lead similar trainings within my department. (3)	❍	❍	❍	❍	❍
Participate in a recycle competition with other departments (4)	❍	❍	❍	❍	❍

Q30 Do you have any other comments you would like to share with us?

[END OF SURVEY]

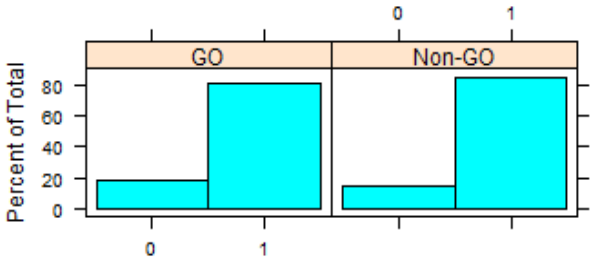
Appendix C: Distributions of Demographic Characteristics of GOs and non-GOs in Survey Sample

Chart 1 - The distribution of clinical staff



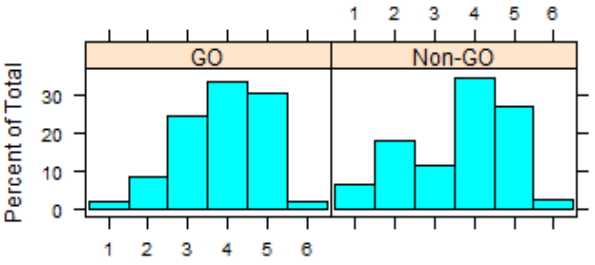
o is non-clinical, 1 is clinical

Chart 2 - The distribution of gender



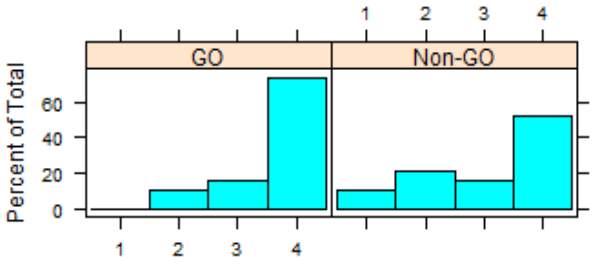
1 is female, 0 is male

Chart 3 - The distribution of age



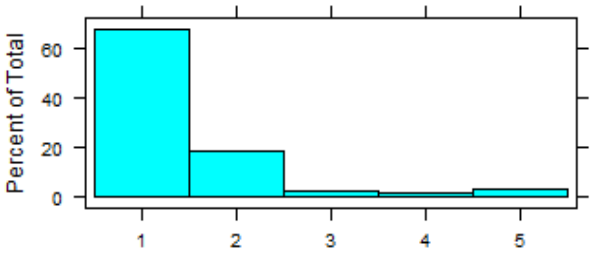
1:18~25, 2:26~35, 3:36~45, 4:46~55, 5:56~65, 6: >65years

Chart 4 - The distribution of tenure



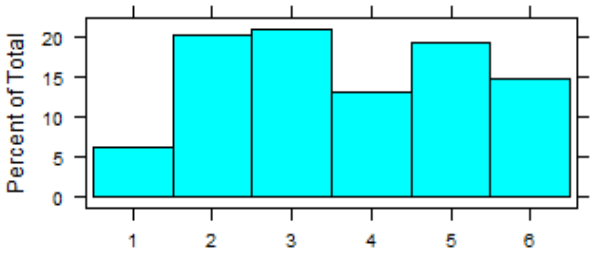
1-< 1 year, 2-1~5years, 3-5~10years, 4- > 11years

Chart 5 - The distribution of Ways to become GO



ndependently, 2-department, 3-questionnaire, 4- online traing, 5-others

Chart 6 - The distribution of years certified



1-2015, 2-2014, 3-2013, 4-2012, 5-2011, 6-others

Appendix D: Additional Data Tables from Survey Analysis

Table 1A. Comparison of stewardship behaviors between GOs and Non GOs

	Non-Green Officers		Green Officers		Significance		95% CI
How often do you do each of the following while at work?	Mean	SD	Mean	SD	*p*-value		Mean difference
I encourage my co-workers to bring reusable bottles and containers.	2.256	1.300	3.640	1.182	$p < .001$	***	[-1.682, -1.088]
I encourage my co-workers to recycle.	3.319	1.371	4.369	0.800	$p < .001$	***	[-1.307 -0.793]
I encourage my co-workers to turn off the lights.	2.777	1.400	4.063	1.012	$p < .001$	***	[-1.571, -1.000]
I encourage my co-workers to attend town halls.	1.759	1.140	3.046	1.100	$p < .001$	***	[-1.558, -1.018]
I encourage my co-workers to become Green Officers.	n/a		3.342	1.210	n/a		
When I have ideas about environmental stewardship and employee engagement, I share them with the Green Team.	1.738	1.074	3.028	1.150	$p < .001$	***	[-1.561, -1.018]
I bring reusable bottles and containers.	3.976	1.167	4.482	0.808	$p < .001$	***	[-0.740, -0.272]
I help keep up the recycling system in my department.	3.569	1.390	4.423	0.826	$p < .001$	***	[-1.117, -0.592]
I turn off the lights when not in use.	4.200	0.892	4.734	0.464	$p < .001$	***	[-0.696, -0.372]
I attend Green town halls.	1.228	0.556	2.927	1.007	$p < .001$	***	[-1.908, -1.490]
I read the Green Blog.	2.479	1.307	3.658	1.074	$p < .001$	***	[-1.461, -0.896]

Table 2A. Comparison of stewardship attitude between GOs and Non GOs

To what extent do you agree with the following statements?	Non-Green Officers		Green Officers		Significance		95% CI
	Mean	SD	Mean	SD	P-value		Mean difference
Support for future environmental stewardship programming	2.950	0.643	3.215	0.535	$p < .001$	***	[-0.411, -0.111]
Belief that leadership that GOs helping to improve environmental stewardship behavior	3.553	0.777	4.216	0.615	$p < .001$	***	[-0.829, -0.482]

Table 3A Comparison of quiz scores between GOs and Non-GOs

Is the item below recyclable at Beaumont?	Non-Green Officers		Green Officers		Significance		95% CI
	Mean	SD	Mean	SD	P-value		
paper	0.961	0.195	1.000	0.000	0.014		[-0.071, -0.008]
aluminum can	0.789	0.409	0.835	0.373	0.359		[-0.143, 0.052]
chip bag	0.576	0.496	0.577	0.496	0.990		[-0.125, 0.124]
cardboard box	0.822	0.383	0.971	0.167	$p < .001$	***	[-.218, -0.080]
plastic cup and bottle	0.862	0.346	0.962	0.192	0.003	*	[-0.167, -0.034]
Styrofoam cup	0.601	0.491	0.638	0.483	0.551		[-0.158, 0.085]
Battery	0.822	0.383	0.933	0.251	0.005431	.	[-0.189, -0.033]
Beaumont has single stream recycling where all recyclable materials (e.g., paper, plastic, cardboard etc.)	0.761	0.428	0.833	0.375	0.1601		[-0.176, 0.029]

Beaumont Royal Oak recycles the blue wrap used in the OR.	0.504	0.502	0.847	0.362	$p < .001$	***	[-0.454, -0.232]
If some trash is found in a recycle bin, the entire contents of the bin will be considered trash.	0.568	0.497	0.660	0.476	0.151		[0.217, 0.034]
Beaumont Royal Oak generates revenue from recycling.	0.676	0.470	0.892	0.312	$p < .001$	***	[-0.315, -0.117]
How confident would you say you are in your answers to the previous questions about recycling?	2.815	0.902	3.667	0.736	$p < .001$	***	[-1.057, -0.646]
Percentage of Questions GOs & non-GOs got correct (average of 11 questions)	0.724	0.166	0.830	0.121	$p < .001$	***	[-0.143, -0.068]

Table 4A Comparison of recycling behaviors between clinical and non-clinical staff

How often do you recycle the following items at Beaumont?	Clinical		Non-clinical		Significance		95% CI
	Mean	SD	Mean	SD	P-value		Mean difference
Paper	4.819	0.633	4.760	0.794	0.5256		
Cans	4.653	1.391	4.510	1.405	0.4307		
Cardboard	4.708	1.115	4.689	1.039	0.8907		
Plastic	4.674	0.981	4.288	1.334	0.01344	**	[0.081, 0.690]
Batteries	4.853	1.051	4.567	1.305	0.0685		[-0.022, 0.591]

Table 5A Comparison of barriers to recycling across clinical and non-clinical staff

To what extent do you agree with the following statements?	Non-clinical		Clinical		Significance		95% CI
	Mean	SD	Mean	SD	P-value		Mean Difference
Inconvenience	2.722	1.000	2.850	0.978	0.327		
label confusion	2.580	1.000	2.269	0.988	0.019	*	[-0.538 -0.022]
recycling is not worthwhile	1.723	0.641	1.633	0.568	0.269		
encouragement	3.467	0.907	3.673	0.766	0.067	.	[0.007 0.442]

Table 6A Correlation table for regression model 3

	Tenure	Inconven-ience	Label confusion	Worth-while	Encour-agement	Quiz score	behavior
Tenure	1.00	-0.26	-0.18	-0.07	0.32	0.34	0.17
Inconvenience	-0.26	1.00	0.49	0.28	-0.50	-0.26	-0.27
Label confusion	-0.18	0.49	1.00	0.43	-0.40	-0.25	-0.32
Worthwhile	-0.07	0.28	0.43	1.00	-0.31	-0.13	-0.38
Encouragement	0.32	-0.50	-0.40	-0.31	1.00	0.37	0.33
Quiz score	0.34	-0.26	-0.25	-0.13	0.37	1.00	0.38
Average-behavior	0.17	-0.27	-0.32	-0.38	0.33	0.38	1.00

Appendix E. Free Response Results & Support for Proposed Activities

We included three open-ended questions in our survey to allow participants' to voice their opinions. The first question asked GOs what motivated them to become GOs. Of the 135 people who answered the question, 23% reported that they chose to become a GO because they care about the environment and 18% reported that they did it because they think their efforts to practice environmental stewardship make a difference (Table 7). Other reasons that respondents frequently listed as reasons to become a GO were to help the Beaumont and to learn how to contribute to environmental stewardship.

Table 7. Motivation to Become a Green Officer

	Percent
Care for planet/environment	23%
Strong sense of self-efficacy	18%
Desire to help organization	14%
Desire to learn how to engage and contribute	12%
Sees that dept. generates a lot of waste	9%
Create better world for future generations	7%
I recycle at home	5%
Awareness since youth	4%
Other	7%

The second open-ended question asked employees to share other stewardship activities they engaged in at Beaumont. Respondents reported participating in unique activities, including: starting a lab coat donation program in medical administration; taking research lab plastics home to recycle them; converting single-use isolation gowns into re-useable ones; and starting Styrofoam collection in the CCS department. Many respondents used this question to provide Beaumont with recommendations such as: add recycling to the medical office spaces; turn off sprinklers in the rain; and, provide more hazardous waste disposal education, specifically to microbiology department employees.

The third open-ended question was a solicitation for respondents' additional comments. Respondents praised the Beaumont's recycling program and expressed their desires to engage with the program. Respondents' suggestions for improvement and the respondent's affiliated department are listed below:

- Decrease transparency regarding where recycling goes after it leaves the floor and add battery recycling – Quality
- Include training for new employees – Emergency
- Have a Green Team member reenergize the team at staff meeting, more education, and help finding space for bins – Endoscopy
- Add can recycling – Hospitality
- Add plastics recycling – Outpatient pharmacy
- Provide more help with improving recycling – CCS
- Swap Styrofoam with biodegradables – Hospitality

Unfortunately, 19 of the 188 data points were corrupted or incomplete because of Qualtrics software errors. However, we found that providing employees a survey as an outlet to share their ideas and accomplishments was an effective and fruitful way to gauge employees' engagement with workplace environmental stewardship and receive their feedback on organizational programs.

Appendix F: Employee Engagement Topics at CleanMed 2015

Team members attended the CleanMed 2015 conference in Portland, Oregon to better understand the national landscape of environmental stewardship in the healthcare sector and to engage with leaders and advocates for environmental stewardship in healthcare from organizations nationwide. Our team members learned how other organizations approach ongoing environmental engagement from attending this event. The takeaways from three presentations are below.

Inova Health System, located in Northern Virginia, described a four-step evolution of employee engagement: 1) green team of leaders, 2) stewardship advisor board of employees, 3) ambassadors, and 4) scale up the number of ambassadors. It seemed like Beaumont started with the first step and jumped to step four of this model. Inova's program starts with a one-hour in-person course and employees choose one topic or project to enact after training. Employees have access to specialized training materials for the topic that they choose. Stewardship engagement is also tied to wellness benefits for employees—attendance in sustainability webinars and completing a quiz for understanding earns credit towards lower health insurance premiums. At Inova, the green ambassadors use a uniform email signature with the ambassador brand to help communicate their role to their peers. Inova surveyed its organization and found that staff prefer communication about sustainability via email, leaders prefer communication in-person, and the public prefer communication via social media. A final take-away from the Inova presentation is that "satisfied employees know where to access information." This need was also highlighted in our team's interviews with Beaumont RO employees.

At Johnson and Johnson (J&J), sustainability leaders also surveyed staff and found that their employees had high awareness of sustainability behaviors but low perceived efficacy, or the feeling that their actions make a difference. The J&J education strategy was to focus sustainability messages to the workplace and not the home or community. J&J named their communication campaign "I care, I do" in an effort to simplify the message to who cares about sustainability, why they care, and an action that a sustainably-committed employee can undertake. They also collected six-word stories from sustainably committed employees, which made it easy for employees to share their perspectives in regular newsletters. J&J is also targeting only the top 20% of engaged staff and investing heavily in that subset of employees instead of everyone. Targeting the top 20% of engaged staff at Beaumont RO would amount to 2,000 employees.

Gundersen Health System, located in Wisconsin, presented its findings that its mandatory sustainability training program has been shown to be more effective at promoting sustainable behavior than its previous voluntary training event. Gundersen ties its stewardship closely to their version of the nursing professional framework. At one of their green town halls, the audience crowd-sourced the five characteristics of a stewardship champion as a way to gain buy-in for sustainability programs. Gundersen aims to recruit all employees in their hospital into being a stewardship champion.

Citations

Austin, J., Hatfield, D. B., Grindle, A. C., & Baily, J. S. (1993). Increasing recycling in office environments: The effects of specific informative cues. *Journal of Applied Behavior*, 243-253.

Baudains, C., Dingle, P., & Styles, I. (2002). *Greening Commuter Mode Choice through Workplace Intervention: Comparative Effectiveness of Three Behavior Change Strategies and Implications for Reducing Car Dependency in Perth, Westen Austrailia.* Association for European Transport.

Beaumont. (2015, February 20). *About Beaumont Health System.* Retrieved from http://www.beaumont.edu/Global/Beaumont_Fact_Sheet_022015.pdf

Brothers, K., Krantz, P., & McClannahan, L. (1994). Office Paper Recycling: A Function of Container Proximity. *Journal of Applied Behavior Analysis*, 153-160.

Carrico, A. R. (2011). Motivating energy conservation in the workplace: An evaluation of the use of group-level feedback and peer education. . *Journal of Environmental Psychology*.

Cialdini, R. (2001). *Influence: Science and Practice.* Boston, MA: Allyn & Bacon.

De Young, R. (1990). Recycling as appropriate behavior: a review of survey data from selected recycling education programs in Michigan. *Resources, Conservation & Recycling*, 253-266.

Dillman, D. (2007). *Mail and Internet Surveys: The Tailored Design Method.* Hoboken: John Wiley & Sons, Inc.

Duffy, S. &. (2009). It matters a hole lot: Perceptual affordances of waste containers influence recycling compliance. *Environment and Behavior*.

Harvard Office of Sustainability. (2015). *Resource Efficiency Program (REP) Recycling Challenge*. Retrieved September 1, 2015, from Harvard University Sustainability: http://green.harvard.edu/tools-resources/rep-recycling-challenge

Heberlein, T. (2012). *Navigating Environmental Attitudes.* New York: Oxford University Press.

Holland RW, A. H. (2006). Breaking and creating habits on the working floor: a field-experiment on the power of implemen-. *Journal of Experimental Social Psychology*.

Hornik, J., Cherian, J., Madansky, M., & Narayana, C. (1995). Determinants of Recycling Behavior: A Synthesis of Research Results. *The Journal of Socio-Economics, 24*(1), 105-127.

Humphrey, C., Bord, R., & Hammond, M. (1977). Attitudes and Conditions for Cooperation in a Paper Recycling Program. *Environment and Behavior*, 107.

Katzey, R., & Pardini, A. (1987). The Comparative Effectiveness of Reward and Commitment Approaches in Motivating Community Recycling. *Journal of Environmental Systems*, 93-113.

Leon, I. G., & Fuqua, R. W. (1995). The effects of public commitment and group feedback on curbside recycling. *Environment and Behavior*.

Liebman, A., & Harper, S. (2011, May). Environmental Health Perceptions Among Clinicians and Administrators Caring for Migrants. *MCN Streamline: the migrant health news source*.

Lingard, H., Gilbert, G., & Graham, P. (2001). Improving solid waste reduction and recycling performance using goal setting and feedback. . *Construction Management and Economics, 19*(8), 809–817. doi:10.1080/01446190110070952

Linnenlueck, M., Russell, S., & Griffiths, A. (2009). Subcultures and sustainability practices: the impact on understanding corporate sustainability. *Business Strategy and the Environment*, 432-452.

Lo, S., Peters, G., & Kok, G. (2012). A Review of Determinants of and Interventions for Proenvironmental Behaviors in Organizations. *Journal of Applied Social Psychology*, 2933-2967.

Lokhorst, A., Werner, C., Staats, H., van Dijk, E., & Gale, J. (2013). Commitment and Behavior Change: A Meta-Analysis and Critical Review of Commitment-Making Strategies in Environmental Research. *Environment and Behavior*, 3-34.

McKenzie-Mohr, D. (2000). Promoting Sustainable Behavior: An Introduction to Community-Based Social Marketing. *Journal of Social Issues, 56*(3), 543–554.

McKenzie-Mohr, D. (2011). *Fostering sustainable behavior: An introduction to community-based social marketing* (3rd ed.). Gabriola City, British Columbia, Canada: New Society Publishers.

National Environmental Education & Training Foundation. (2004). *Position Statement: Helath Professionals and Environmental Education.* Retrieved from http://www.aacn.nche.edu/education-resources/NEETFPosStat.pdf

Onkila, T. (2013). Pride or embarrassment? Employees' emotions and corporate social responsibility. *Corporate Social Responsibility and Environmental Management*.

Pike, L., Shannon, T., Lawrimore, A., McGee, T. M., & Lamoreaux, G. (2003). Science Education and Sustainability Initiatives. *International Journal of Sustainability*, 218-229.

Practice Greenhealth. (2016). *Why Less Waste.*

Recycle Across America. (2014). *Top 10 Reasons for Standardized Labels*. Retrieved from http://recycleacrossamerica.org/10-reasons-for-standardized-labels

Recycle Ann Arbor. (2016). *A-to-Z recycling guide*.

Robertson, J. L., & Barling, J. (2013). Greening organizations through leaders' influence on employees' pro-environmental behaviors. *Journal of Organizational Behavior, 34*(2), 176–194. doi:10.1002/job.1820

Sustainability Roadmap for Hospitals. (2015). *Waste*. Retrieved December 17, 2015, from http://www.sustainabilityroadmap.org/topics/waste.shtml#.VnN8SkorLDc

Tonglet, M., Phillips, P. S., & Read, A. D. (2004). Using the Theory of Planned Behavior to Investigate the Determinants of Recycling Behaviour: A Case Study from Brixwoth, UK. *Resources, Conservation and Recycling*, 191-124.

Tools of Change. (2016). *Case Studies*. (J. Kassirer, Editor, & CullbridgeTM Marketing and Communications) Retrieved 2016, from Tools of Change: http://www.toolsofchange.com/en/case-studies/

Valle, P. O., Rebelo, E., Reis, E., & Menezes, J. (2005). Combining Behavioral theories to Predict Recycling Involvement. *Environment and Behavior*, 364-396.

Wan, C., Cheung, R., & Shen, G. Q. (2012). Recycling Attitudes and Behavior in University Campus: A Case Study in Hong Kong. *Facilities*, 630-646.

Young, W. D. (2013). Changing Behaviour: Successful Environmental Programmes in the Workplace. *Business Strategy and the Environment*.