CLINICAL RECYCLING AT STANFORD HOSPITAL AND CLINICS:
A HEALTHCARE PLASTICS RECYCLING COUNCIL PILOT STUDY (2013)

STANFORD
HOSPITAL & CLINICS

Stanford University Medical Center

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Executive Summary

Stanford Hospital & Clinics launched its first clinical recycling initiative in the Main Operating Room, in September 2011. The Ambulatory Surgery Center followed suit in November of that year. Preparing to further expand the recycling program throughout a number of clinical settings, Stanford Hospital & Clinics partnered with the Healthcare Plastics Recycling Council in Summer 2012 to conduct a pilot study documenting the following:

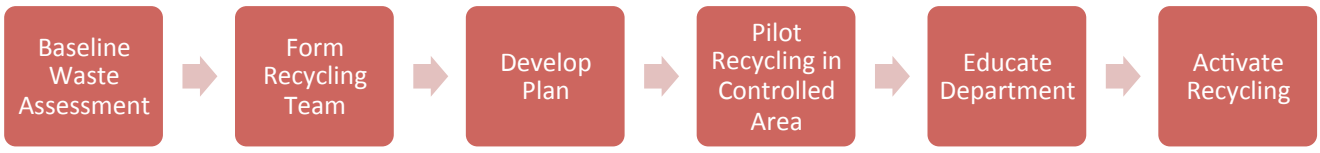
- Recyclable material type, volume, and flow through target departments in the hospital
- Clinical recycling process, including lessons learned and process recommendations
- Process of establishing a recycling program within the clinical setting

The pilot study, lasting six months, documented the waste profiles of nine target departments as well as recommendations for quality recycling in each setting. The departments evaluated, (three procedural areas, three patient care areas, and three ancillary care areas) are highlighted below:

Procedural Areas	Patient Care Areas	Ancillary Clinical Areas
• MOR • ASC • Cath-Angio	• CAPR • ASC/IR Pre-op and PACU • MOR SAU/PACU	• MOR Pre-Anesthesia Clinic • Pharmacy • Radiology

The clinical recycling program in target areas will divert more than 110 tons of packaging material from landfill annually. Of these materials, 75 percent by weight, representing 89 tons annually, are generated in procedural areas, generally during sterile field set-up before procedures. Although patient care areas generated a significantly smaller volume of recyclables, annual combined diversion in target departments will exceed three tons. Ancillary clinical areas varied in material type and volume by clinical function, with target areas diverting a combined 22 tons annually. Plastics represented nearly 70 percent of all recyclable materials analyzed during the pilot study.

Stanford Hospital & Clinics refined the well-established model for rolling out clinical recycling throughout the study. The process of establishing a recycling program in the clinical setting is highlighted in the following chart:



The clinical recycling process should maximize cost and labor savings by complementing existing waste management practices. By folding clinical recycling into existing workflow from point of generation by clinicians, to collection by environmental services, to processing by the contracted recycler, Stanford Hospital & Clinics developed an economically viable recycling program.

Process recommendations for efficient, high quality clinical recycling include:
1. *Minimize additional processing during recycling.* Each participant in the waste management process is performing a time sensitive task. Successful recycling programs complement existing workflow.
2. *Collect waste at point of generation.* By assessing recyclable waste source, volume, and flow in the clinical setting, recycling can be strategically collected in limited areas, providing convenience for recyclable waste generators while limiting bin access to non-recyclable waste generators.
3. *Provide visual cues at every step of the process.* Visual cues such as signage, blue bins, and specialty collection bags signal recycling to each participant in the waste management process, maximizing quality through ongoing awareness.

Stanford Hospital & Clinics has realized significant financial benefit associated with clinical recycling, as recycling collection offers a 75% savings compared with municipal waste collection. These savings will continue to grow as the program scales. The pilot study concluded in March 2013, but the data and knowledge collected during the study continue to be utilized as Stanford Hospital & Clinics expands the clinical recycling program throughout the hospital. The pilot study data is used to estimate diversion projections, and to inform smart program planning and rollout.

Clinical recycling is one part of a comprehensive sustainable waste management strategy, exercising positive ecological and financial stewardship, and maximizing human health outcomes through protection of environmental health.

Stanford Hospital & Clinics & HPRC: History and Overview

Stanford Hospital & Clinics conducted a six-month pilot study to better understand recycling collection potential and process in the clinical setting. The following document describes the effort, including history of sustainability efforts at Stanford Hospital & Clinics, study findings, and process recommendations.

About Stanford Hospital & Clinics

Stanford Hospital & Clinics, located in Palo Alto, California, with multiple facilities throughout the region, is internationally renowned for leading edge and coordinated care in cancer care, neurosciences, cardiovascular medicine, surgery, organ transplant, medicine specialties, and primary care. Throughout its history, Stanford has been at the forefront of discovery and innovation, as researchers and clinicians work together to improve health, alleviate suffering, and translate medical breakthroughs into better ways to deliver patient care. Stanford Hospital & Clinics is…healing humanity through science and compassion, one patient at a time.

Stanford Hospital is a 613-bed, academic medical institution with over 7,000 staff annually supporting 26,000 inpatient visits and 600,000 ambulatory care visits. The hospital is part of a 2 million square foot medical center and is renovating and expanding its facilities to accommodate new medical technology, increase capacity needs, and meet seismic safety requirements. The future Stanford Hospital Project includes the construction of a new 820,000 square foot hospital building, including private patient rooms, an enlarged Level-1 trauma center and Emergency Department, as well as new surgical, diagnostic and treatment rooms.

Stanford Hospital & Clinics, Palo Alto, CA

Pioneering Medical Advances

Throughout its history, Stanford Hospital & Clinics has pioneered medical advances that save lives and protect against disease. For example, the first successful adult human heart transplant in the country and the first combined heart-lung transplant in the world were both performed at Stanford Hospital.

As part of Stanford Medicine, Stanford Hospital & Clinics has a close relationship with both Stanford University School of Medicine, the oldest medical school in the Western United States, and Lucile Packard Children's Hospital, an adjacent pediatric teaching hospital providing general acute and tertiary care.

Stanford Hospital & Clinics is consistently top-ranked nationally, in the U.S. News & World Report, and named the top hospital in the San Jose region. The Leapfrog Group has recognized the organization

for four consecutive years as a top hospital in the nation for performance in patient safety, quality and efficiency. Stanford Hospital & Clinics and Lucile Packard Children's Hospital are each designated as a Magnet Hospital by the American Nurses Credentialing Center, a distinction awarded to less than seven percent of all U.S. hospitals. Stanford Hospital is the only Level-1 Trauma Center between San Francisco and San Jose, recognition by the American College of Surgeons of the Emergency Department team's ability to treat the most severe and complex cases. Additionally, Stanford was the first hospital in the nation to be certified as a Comprehensive Stroke Center by the Joint Commission. Finally, the hospital was among one of the first four in the U.S. to achieve "Stage 7" designation, the highest possible distinction in electronic medical records implementation.

Stanford Hospital & Clinics has a strong history of leadership in innovation, quality and sustainability.

History of Sustainability Efforts

The vision of Stanford Hospital & Clinics is, "Healing humanity through science and compassion, one patient at a time." It could be stated that through sustainability programs, Stanford Hospital & Clinics is also striving to help heal the environment…one patient at a time. A strong commitment to stewardship of the environment and allowing for empowerment of staff has led to the early adoption of several sustainable healthcare initiatives, well ahead of the mainstream progress underway today. Examples include:

- Credit given to Dr. David P. Feldman, clinical professor of Endocrinology in Stanford University School of Medicine, for discovery in 1992 of Bis-Phenol A as an endocrine disrupting, leaching agent from plastics
- Becoming one of the first 17 hospitals in 2003 to be awarded for "Making Medicine Mercury Free" by Practice Greenhealth, formerly Hospitals for a Healthy Environment (H2E)
- One of the first U.S. customers of Daniels™ Sharpsmart to adopt reusable sharps containers in 2004
- Adopting microfiber mop systems in 2004
- Switching to Green Seal® Certified cleaning products in 2005
- Implementing reusable suction canisters in the Ambulatory Surgery Center in 2005 and in remaining O.R.s in 2009
- The organization takes pride in their long history of donating unused medical supplies and equipment to charitable organizations
- Achieved 37% landfill diversion rate in calendar year 2012

History of Stanford Hospital's Recycling Efforts

Stanford Hospital & Clinics' location on Leland Stanford University land, adjacent the City of Palo Alto, bring two additional, strong community partners to the medical center's commitment to sustainable operations, where stewardship of the land and its natural resources are of great importance. The safe and compliant management of 25 waste streams and improving the organization's recycling efforts through landfill diversion, date back almost three decades, when a partnership was born with the Stanford University waste hauler and recycler, Peninsula Sanitary Service, Inc. (PSSI). The partnership was

initiated to collect the first major recycling effort to hit the U.S., aluminum soda cans. Stanford University students asked that aluminum cans be gathered throughout the campus, and the request flowed over to the medical center. The small, private firm with the City of Palo Alto waste franchise, at the time could not accommodate the request. The medical center was granted permission to have the soda cans handled by PSSI. This partnership grew over 30 years to include cardboard, mixed paper and rigid containers of glass, plastics, and of course aluminum. The source-separated recyclables grew to an average of 370 tons per year diverted from landfill disposal.

Stanford University's recycling service, PSSI, has partnered with Stanford Hospital & Clinics to divert waste for over 30 years.

Although measurably successful, challenges existed with the existing recycling program:

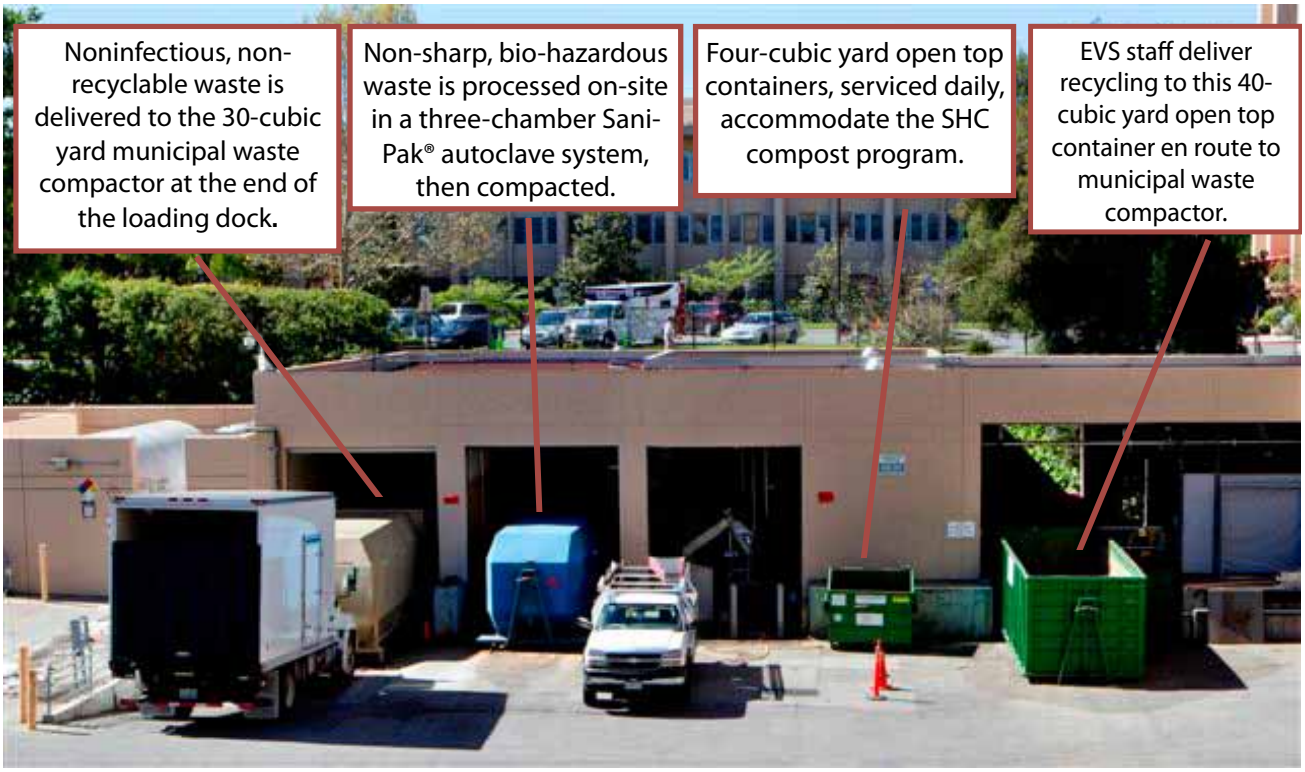
- This large-scale recycling collection was completed via zone-based containers, strategically placed throughout the institution, supporting voluntary recycling by staff who would gather their own recyclables and deliver to the large containers (ranging from 19-gallon Slim Jims® to 96-gallon Toters®), before their weekly emptying.
- These containers were typically placed in corridors to provide access to all staff, presenting a challenge for regulatory compliance. Additionally, some of the sizes were too large for current fire regulations when not located in designated Hazard Areas.
- The weekly, campus-wide collection process was completed by PSSI drivers, bringing a third-party deep into the organization - successfully completed without fail or concern over the years. However as awareness has arisen regarding limiting outside access to patient care areas, an opportunity to bring the recycling process in-house began to carry some importance.
- The containers could not be cleaned regularly by the PSSI drivers, creating potential Infection Control concerns in heavily used beverage container recycling locations.
- PSSI's processing location was landlocked in the center of the university and, although highly successful at diverting nearly 70% of Stanford University's waste stream, would always require source-separation of mixed paper, cardboard, and rigid containers. Expansion into the organization, including a vision for clinical and patient care area recycling, would always require two recycling containers be placed next to each trash container, competing for already limited floor space.

The City of Palo Alto also set a goal to significantly reduce landfill waste and in 2005, passed a Zero Waste Ordinance. To support this vision, the city entered into a franchise waste partnership with Greenwaste, Inc., in 2009. Greenwaste is a waste processor born out of the new business model of "commodity miners", versus simply trash haulers, and with a state-of-the-art MRF (Materials Recovery Facility) in San Jose, allowed for single-stream recycling. Greenwaste's sister companies, Z-Best Recovery and Zanker's Road Fill, respectively, provided commercial composting and large-scale C&D waste recovery. With a 10-year waste agreement, Greenwaste is supporting the City of Palo Alto's movement toward zero-waste, from vision to action.

History of Clinical Area Recycling Efforts

With decades of successful zone-based, voluntary recycling in place throughout offices and business settings, the forward thinking Ambulatory Surgery Center team first evaluated clinical recycling in 2007. PSSI was open to the idea of increasing their recycling volumes and helping their customers to achieve increased diversion goals. PSSI evaluated samples of pre-case packaging materials with their brokers; determining 90%-95% could be recycled. The materials, which consisted of mixed paper, film and rigid plastics, and some foil, would still require source-separation by the clinicians, requiring two additional containers be placed inside already cramped surgical suites. Thus the program stalled out.

In 2010, clinicians from the Main Operating Room (MOR) at Stanford Hospital & Clinics formed a Green Team and expressed interest in recycling their surgical case packaging waste. Armed with the knowledge the materials had been identified as recyclable, and with the arrival of Greenwaste as a single-stream



Designing Waste Diversion into Dock Space

vendor, the Sustainability Department supported another exploration of this opportunity. Greenwaste concluded that 90%-95% of the pre-case packaging material could be recycled. Thus the march to implement a recycling program in the surgery setting began.

The Green Team was expanded to include Environmental Services, EH&S, and two engaged physicians. A plan for the new process was underway. The planning took almost a year to implement, as the hospital dock waste equipment had to be realigned to free up space for the large-scale collection of single-stream recycling by the EVS department. Dock redesign included:

- Installing a 30-yard compactor for trash
- Keeping a 40-cubic yard compactor attached to the three-chamber Sanipak® (regulated medical waste autoclave) system
- Purchasing and placing a used, 40-cubic yard open-top container for single-stream recycling
- Tucking in 4-cubic yard open top compost collection bins to support the hospitals' wish to compost cafeteria and production kitchen waste from both hospitals

These capital investments and operational adjustments were completed in June of 2011. The first clinical recycling program thus began in the Main OR, September of 2011. In November of 2011, with the dock operations and housekeeping team gaining comfort and familiarity with the process, the Ambulatory Surgery Center team also began their single-stream program.

Stanford Hospital & Clinics' goal of growing commingled recycling collection throughout the hospital is one part of a multifaceted approach to clinical waste reduction. Additional efforts to reduce waste include the following:

- Employing reusable hard cases for 60% of surgical instrument processing
- Donating unused supplies to medical charities
- Custom surgical pack review process
- Reprocessing single use, disposable supplies and devices

Stanford Hospital & Clinics donates unused medical supplies to charity Vida USA

While Stanford Hospital & Clinics is early in use of reprocessed and reusable devices, the hospital has a robust donation program that has significantly curbed the hospital's waste footprint by sharing needed supplies and equipment globally. The hospital also prevents waste at the source by performing regular reviews of custom pack supply lists, eliminating unnecessary components. These measures not only carry environmental and social benefits, they directly reduce waste management costs.

Partnership with the Healthcare Plastics Recycling Council

In May of 2012, while attending CleanMed in Phoenix, Arizona, Krisanne Hanson, Director of Sustainability for Stanford University Medical Center, spoke with Tod Christenson, Executive Director of the Healthcare Plastics Recycling Council (HPRC). Tod was presenting a poster outlining the vision and goals of the HPRC to support increased recycling of medical plastics in the healthcare setting. Krisanne shared the current program underway in two primary surgical areas at Stanford Hospital & Clinics; and invited HPRC to Palo Alto to see the program. HPRC subsequently realized that as a technical coalition of medical companies, waste haulers and plastics engineering firms, they would benefit from including the voice of the customer on their team. They approached Stanford Hospital & Clinics and Kaiser Permanente, who became founding members of the Healthcare Facility Advisory Board.

This partnership led to an agreement for Stanford to complete a pilot study that would conduct waste audits of the current recycling programs underway and audit other clinical areas before activating recycling in those clinical settings. The pilot study centered on nine areas in total; the Main OR, Ambulatory Surgery Center, Cath-Lab and Interventional Radiology, pre-and post-anesthesia settings for

Plastics Recycling in the Clinical Setting: HPRC Study

The Stanford Hospital & Clinics/HPRC study focused on clean, dry, recyclable packaging material collected from target clinical areas. For the purposes of the study, 'Recyclable Waste' refers to this subset of the waste profile. Municipal waste and bio-hazardous waste (items soiled with blood or body fluid) are categorized together as 'Non-recyclable Waste'. Major outcomes of the clinical recycling pilot study are:

- Document recyclable material types, volumes, source and flow through the hospital.
- Document the recycling process in the hospital setting.

These outcomes were achieved while expanding the clinical recycling program in target departments, conducting waste audits, and documenting process and lessons learned along the way.

Waste Audit Process

Waste audits were conducted as part of maintenance or initiation of hospital clinical recycling programs (noted in data as either 'Quality Waste Audit', or, 'Initial Waste Audit', respectively). The audits, performed over a specific time-frame in each department, between 24 and 48 hours, offer a snapshot in time of departmental waste profile.

Clean, dry, recyclable items were sorted and weighed by category (Paper, Film & Rigid Plastics, Foil, Blue Wrap, Tyvek®, and Trash). Film and Rigid plastics were further separated by specific plastic type. All waste streams were weighed using a balance beam scale with precision to 10 grams.

There are inherent limitations in such a study. The short time frame of each departmental audit limits waste sample size and profile to clinical activities occurring during that period. As waste profiles differ according to clinical activity, the Stanford Hospital & Clinics/HPRC waste audit data represents a small sample of total recyclable waste streams for each department. Waste diversion projections are based on this small sample, offering an estimate of total annual waste profiles. A second limitation involves the analysis of waste volume by weight. Clean, dry, recyclable packaging materials are relatively lightweight in comparison to non--recyclable waste. Materials such as gauze, disposable linen, and paper towels absorb moisture. When these materials go into the waste bin wet, the weight of waste multiplies in comparison to dry recyclables, skewing diversion rates towards waste.

Acknowledging these limitations, the study achieved its stated goals of providing analysis of the recyclable waste profiles of target clinical areas, while documenting the recycling process. Our findings follow.

Waste Audit Findings

The clinical recycling pilot study results are significant. In the hospital's nine target areas alone, approximately 110 tons of clean, dry packaging material will be diverted from landfill in one year, representing a 29% diversion rate. Plastics account for roughly 75% of all recyclables studied in the nine target clinical areas.

The majority of recyclable plastics generated in the clinical setting flow from procedural areas. Of all plastics analyzed in the pilot study, 90% were generated in the three target procedural areas (Main

Operating Room, Ambulatory Surgery Center, and Cath-Angio Lab), representing nearly 70 tons of plastic packaging annually. The plastics are generated largely during case setup in sterile environments, offering pristine materials for collection as recyclables. These materials can be collected efficiently by facilitating sorting of recyclables within the existing waste management process. Finally, a high quality sort at point of generation is achieved by optimizing for two major factors: control (over recycling bins) and awareness (of program and sort basics). Let's take a closer look at study findings by target areas.

Clinical Recycling Pilot Project: Target Clinical Areas

The departments selected for the Stanford Hospital & Clinics / HPRC waste study sampled three functional divisions: hospital procedural areas, supporting patient care areas, and ancillary clinical areas. The variety and volume of departments in the study provided a wide assessment base while allowing for refinement of implementation strategy.

Procedural Areas	Patient Care Areas	Ancillary Clinical Areas
• MOR • ASC • Cath-Angio	• CAPR • ASC/IR Pre-op and PACU • MOR SAU/PACU	• MOR Pre-Anesthesia Clinic • Pharmacy • Radiology

Procedural Areas

Clinical recycling originated in procedural areas for a number of reasons:

- Initial recycling champions were based in our Main O.R. and Ambulatory Surgery Center.
- Procedural areas generate a significantly higher volume of packaging waste than other clinical areas.
- Procedural areas provide a controlled setting, with limited access to recycling bins reducing risk of contamination.

The recycling pilot study includes analysis of the following procedural areas:

1. Main Operating Room (MOR)
2. Ambulatory Surgery Center (ASC)
3. Cath-Angio Lab (Cath-Angio)

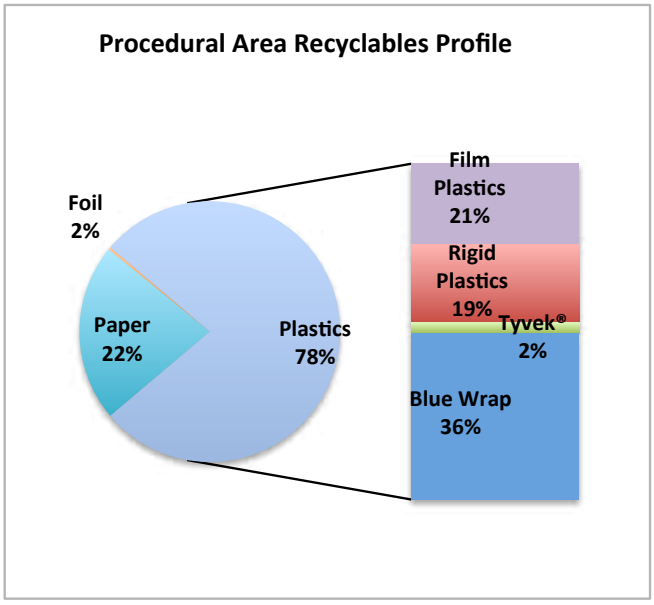
Serving a combined 33,000 patients annually, Stanford Hospital and Clinics' Main OR, Ambulatory Surgery Center and Cath-Angio Lab generate approximately 90 tons of recyclable packaging material.

The three target areas are highlighted as follows:

Department	MOR	ASC	Cath-Angio
Clinical Work Overview	MOR specializes in adult surgical procedures including Cardiac, Thoracic, Vascular, Neurosurgery, Orthopedics, Otolaryngology, Head and Neck, Plastics, General, Gynecology, Urology, Transplants, and Robotics.	Ambulatory Surgery Center (ASC) performs adult and pediatric outpatient and inpatient procedures, including General, Head and Neck, Orthopedics, Gynecology, Plastics, Otolaryngology, Urology, Neurology, Ophthalmic Plastic Surgeries and Pain Clinic procedures. ASC also assists patients with Electroconvulsive Therapy (ECT)	The Cath-Angio Lab specializes in adult and pediatric Interventional Cardiology, Electrophysiology, Neuroradiology, and Interventional Radiology procedures.
Number of Suites	21	12	14
Total Cases / Year (FY12)	12,980	9,140	11,140
Date Recycling Initiated	9/1/11	11/1/11	8/8/12
Total Projected Waste Diversion Rate (%)	23%	11%	15%
Projected Plastics Diversion Rate (%)	**18%**	**9%**	**12%**
Most Commonly Recycled Item	Blue Wrap	Blue Wrap	Film Plastic and Tyvek®

Recyclable Material Generation in Procedural Areas

As noted in the following chart, plastics accounts for almost 80% of the recyclable materials generated in procedural areas, with Blue Wrap accounting for the greatest volume by weight. Film and rigid plastics account for 20% of plastics each, attributed to rigid trays and film plastic sterile pouches. The small representation of Tyvek® in the recyclables profile reflects the material's light weight, and underrepresents the prevalence of Tyvek® in procedural supply film and rigid plastic peel packs. Recyclable paper generated in procedural areas includes paper backing, supply boxes, and booklets. Below, we expand on procedural area recyclables by material type, listed by weight.



Blue Wrap: 36% of total recyclables. Projected annual diversion: 34 tons.

Blue Wrap, the dense, polypropylene, sterile wrap generated primarily in surgical suites, is easily captured as sterile kits are opened during case setup. At an average of three pounds per procedure, Stanford Hospital & Clinics' Main Operating Room generates nearly 30 tons of Blue Wrap annually. The ubiquity of this large volume, single material plastic in hospital waste streams nationwide presents a steady source of valuable recyclables. Opportunities for Blue Wrap recycling, however, have historically been limited. Stanford Hospital & Clinics' contracted recycler, Greenwaste, collects Blue Wrap as part of the service provided to the hospital, but passes the material along to a specialty film plastics recycler. Blue Wrap is collected at point of generation in a separate bag for easy retrieval by Greenwaste. While Stanford Hospital & Clinics works to effectively collect and recycle Blue Wrap, the institution has also minimized Blue Wrap use through a source waste reduction initiative.

Blue Wrap

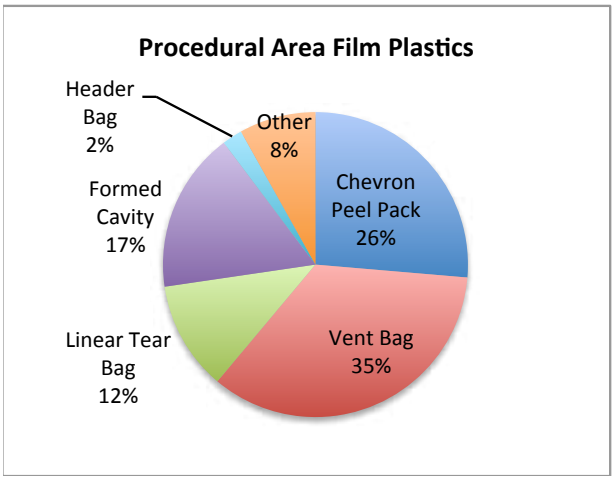
The Stanford Hospital & Clinics' Blue Wrap management strategy follows the progression of sustainable waste management protocol: reduce, reuse, and then recycle. This strategy includes use of durable stainless steel hard cases to house sterile surgical kits whenever possible. 60% of all surgical kits use hard cases, reserving Blue Wrap for kits containing delicate tools that require delicate encasement, and in heavy kits that would pose a lifting hazard for sterile processing and procedural area staff when housed in a heavy stainless steel case.

Paper: 22% of total recyclables. Projected annual diversion: 18 tons.

Recyclable paper in procedural areas includes surgical grade paper backing from peel packs, supply insert instruction manuals, and supply boxes. These materials are easily collected and processed.

Film Plastics: 21% of total recyclables. Projected annual diversion: 17 tons.

The large volume of individually wrapped, sterile supplies used during procedures drive the film plastic clinical recycling profile. Film plastics were categorized in the study as vent or header bags, chevron or 3D formed cavity peel packs, linear tear bags, and other film plastics. Procedural area film plastics by category follow.



Vent Bag

Vent Bags and Header Bags

Vent bags are large, dense film plastic tear bags with a Tyvek® breather patch, commonly used as outer packaging of sterile surgical packs. While only two to three of these bags are generated during each case setup, vent bags represent 35% of procedural area film plastics by weight. These bags are easily collected during sterile field setup for recycling. Similar to vent bags, header bags feature a film

plastic body, sealed with a Tyvek®header strip. A relatively small number of header bags were assessed in the procedural area setting, as packaging for sterile supplies.

Header Bag

Chevron and 3D-Formed Cavity Peel Packs

Film plastic peel packs are sterile supply pouches with film plastic, surgical grade paper or Tyvek® backing. Individually packaged sterile supplies are largely contained in film plastic peel packs. During analysis of film plastics, these sterile packaging materials were further categorized as 'chevron peel pack' and '3D--formed cavity' packaging. While chevron peel packs comprise 25% of film plastic packaging by weight, it should be noted that film plastic peel packs were separated into their disparate parts during analysis (i.e.: film plastic was separated from the Tyvek® or paper backing, and weighed by individual material type). While there were a limited selection of film/film plastic peel packs, most peel packs are one half Tyvek® or paper.

Chevron Peel Pack

3D-formed cavity peel packs are denser by design, as film plastic is molded in the shape of the sterile supply it encases. The Stanford Hospital & Clinics waste analysis found a variety of flexible plastic formed cavity material, Tyvek® and paper peel packs. While 3D-formed cavity packaging represents a relatively smaller number of film plastic peel packs, Stanford Hospital & Clinics' three procedural areas will divert approximately three tons of these items in the next year.

3D-Formed Cavity Peel Pack

This brings up a decision point in waste management protocol. We know that a large number of film plastics generated in the clinical setting are peel packs being opened during the rapid and efficient process of sterile field setup in procedural areas. Separation of peel packs into disparate parts (i.e.: Tyvek®, film plastic, paper) may produce a higher value material on the recyclables market. However, peel pack separation adds unwelcome complexity to the clinical waste management process at point of generation. Stanford Hospital & Clinics worked extensively with Greenwaste to establish a film plastic peel pack collection program that was feasible for both parties. This work is highlighted under 'process recommendations' in this document.

Linear Tear Bag

Linear Tear Bags

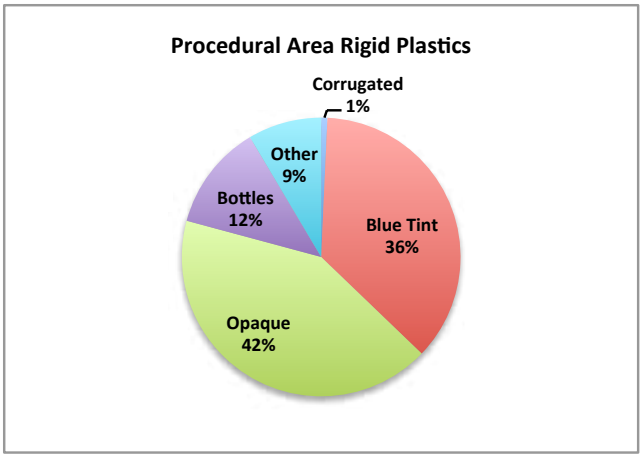
Linear tear bags are film plastic bags with a notched opening along the side. This packaging type varies in size and density in procedural areas, from the thin film plastic sleeves covering non-sterile products to the dense HDPE packaging of IV solution bags, to large tear bag over-wrap on sterile kits. These items are easily collected, easily processed, and free of contamination.

Other Film Plastics

The remainder of film plastics includes 'zip-lock' bags that carry medication deliveries from pharmacy, film over-wrap, unused sterile equipment covers, and film backing from adhesive pads. Again, these plastics are easily sorted into commingled recycling. This collection of various film plastics does comprise 8% of the film plastic recyclables by weight in procedural areas.

Rigid Plastics: 19% of total recyclables.
Projected annual diversion: 16 tons.

Rigid plastics in procedural areas make up the inner trays of sterile packs, rigid peel packs and sterile water bottles. While this category represents one-fifth the weight of procedural area recyclables, these dense materials represent a smaller number of packaging materials than film plastics. For our analysis, we categorized rigid plastics as follows: opaque (including white and dye-colored plastics), blue tint (PET), bottles, corrugated and other.



Opaque Rigid Plastic

Opaque Rigid Plastics

This broad category of plastics includes opaque, or dye--colored, caps, lids and trays, accounting for almost one half of rigid plastics by weight. The high diversion rate, however, is attributed to one particular recyclable product in procedural areas. Weighing 0.4 lbs. each, light blue rigid plastic (polypropylene, #5) trays form the base of sterile packs commonly used in Cath-Angio, as well as other procedural areas. Cath-Angio alone will divert more than 3 tons of opaque rigid plastics over the next year, primarily due to recycled sterile blue trays.

Blue Tint

Rigid PET packaging was identified by label (#1, PET), or by visual identification as a clear rigid material with characteristic blue tint. These materials were present throughout all three procedural areas as protective rigid product trays. PET trays are found in rigid peel packs (these are a common packaging item for sterile orthopedic surgical supplies), requiring processing at point of generation, as clinicians must separate Tyvek® or paper backing from packaging. The relatively small number of Blue Tint (PET) Rigid Plastic these peel packs as well as the sturdy frame of rigid packaging makes this process much easier compared with separation of film plastic peel packs.

Blue Tint (PET) Rigid Plastic

Bottles

An average of one to two, one-liter bottles of sterile water are used per surgical procedure. Bottles are easily sorted into the recycling bag at case end. Stanford Hospital & Clinics keeps other recyclables clean and dry by emptying bottles of fluid or replacing the bottle cap before recycling.

Corrugated and Other Rigid Plastics

Few packaging materials in the study feature corrugated plastics. The material registered at 1% of total rigid plastics due to density versus prevalence. 'Other Plastics' largely represents clear or translucent rigid plastic trays, holding single use disposable supplies in surgical areas, including rigid inner trays and peel packs.

Tyvek®: 2% of total recyclables. Projected annual diversion: 2 tons.

Tyvek® is a lightweight plastic barrier made from high-density polyethylene fibers, commonly used in medical packaging. Its durability, light weight, and moisture barrier properties make it an important part of the medical supply packaging profile. The Stanford Hospital & Clinics' Cath-Angio department primarily uses supplies packaged in Tyvek®/film plastic peel packs. While the material is an ever-present part of the clinical recycling stream, it represents just 2% of procedural area recyclables by weight.

Tyvek®

Foil

Foil: 2% of total recyclables. Projected annual diversion: 2 tons.

Foil is featured primarily as suture packaging in procedural areas. The small volume of foil packaging generated is easily sorted and processed.

Patient Care Areas

Pre- and post-procedure patient care areas were our next area of focus, as we began collection of lower volume, smaller packaging materials. These areas represent a relatively small portion of the hospital waste stream, but collectively generate over three tons of recyclable materials annually. Other factors that make these departments favorable targets for recycling programs include:

- Fairly consistent workflow and supply stream allow for good process and logistical planning.
- While offering less control than procedural areas, pre- and post- procedure patient care areas still have a limited visitor, staff and physician traffic profile.
- Patients in these care settings are typically noninfectious.

When establishing recycling in patient care areas, team members should consider where recyclable materials are generated, and limit recycling bin placement to specific points of generation. During the recycling pilot study, we analyzed the following patient care areas:

1. Cath-Angio Pre-op and Recovery(CAPR)
2. Ambulatory Surgery Center & Interventional Radiology Pre-op and Post Anesthesia Care Unit (ASC/IR Pre-op&PACU)
3. Main Operating Room Surgical Admission Unit and Post Anesthesia Care Unit (MOR SAU/PACU).

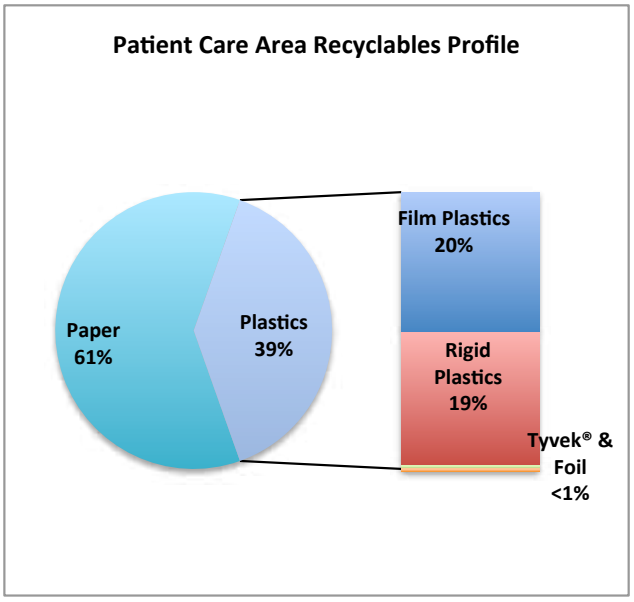
The next focus of the pilot study included the pre-and post-procedure patient care areas for Cath-Angio, Ambulatory Surgery Center, and Main OR.

The three target areas are highlighted as follows

Department	CAPR	ASC/IR Pre-op & PACU	MOR SAU/PACU
Clinical Work Overview	CAPR provides patient care before and after Cath-lab procedures.	ASC/IR Pre-op & PACU geographically houses two departments, providing patient care before and after procedures in both Ambulatory Surgery Center and Interventional Radiology.	MOR Surgical Admission Unit (SAU)/PACU provides patient care before and after procedures in the Main Operating Room.
Number of Beds	20	40	34
Total Cases / Yr. (FY12)	6,500	11,700	11,150
Date Recycling Initiated	3/1/12	10/15/12	1/24/13
Total Projected Waste Diversion Rate (%)	7%	6%	12%
Projected Plastics Diversion Rate (%)	**2%**	**5%**	**9%**
Most Common Recycled Item	Brown Paper 'Patient Belonging' Bags	Film Plastic Linear Tear Bags, Rigid Trays	Film Plastic Linear Tear Bags, Rigid Trays

Recyclable Material Generation in Patient Care Areas

Below, a chart shows the distribution of recyclable materials in selected patient care areas. A brief overview of most prominent material types follows:



Paper: 61% of total recyclables.
Projected diversion: 2 tons.

The paper-dominant recyclables profile in pre- and post-procedure patient care areas is largely due to brown paper patient belonging bags that store personal effects during 'day procedures', and are recycled at time of discharge. While Stanford Hospital & Clinics proudly recycles brown paper patient belonging bags, this item is a target for replacement with a reusable product, offering patients a free reusable tote while eliminating waste at the source.

Film Plastics: 20% of total recyclables.
Projected Diversion: 1300lbs.

Film plastics in the patient care settings studied are comprised of small peel packs and linear tear bags generated as products such as IV solution bags and tubing, patient care items, and sterile gloves are opened.

Rigid Plastics: 19% of total recyclables. Projected Diversion: 1200lbs.
The rigid plastics collected in pre- and post- procedure areas generally include trays, lids and caps. Both Anesthesia and Clinical Specialty teams operating in target patient care areas generate a relatively larger proportion of rigid plastics in these areas as they open sterile supply and procedure trays during minor procedures such as spinal block or chest tube insertion.

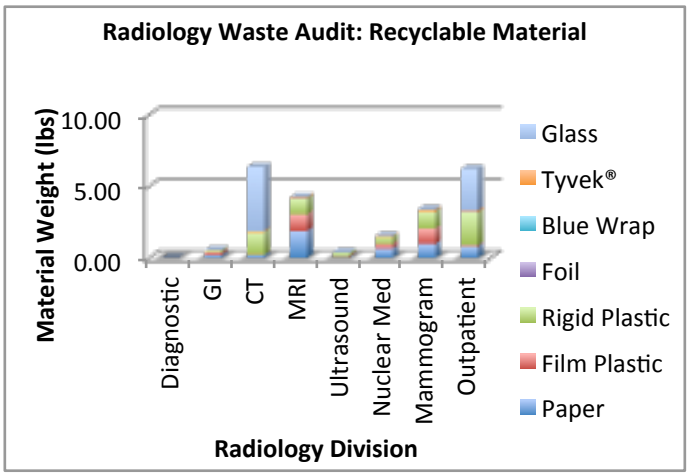
Tyvek® and Foil: <1%. Projected Diversion: Negligible.
While small amounts of Tyvek® and Foil are generated in patient care areas, these materials are an insignificant part of this clinical area recycling profile.

Ancillary Clinical Settings

We strategically targeted three additional clinical areas: Radiology, Pharmacy, and Main OR Pre-Anesthesia Clinic. We analyzed these departments individually.

Radiology

Radiology has a broad presence throughout the hospital, performing a variety of diagnostic and interventional imaging services, for both inpatient and outpatient clients. The department waste analysis took place over the same twenty-four hour period for each functional area. Waste generated varies by clinical function. As radiology exams are conducted in small exam room settings,control over clinical recycling bins remains high, favoring a higher quality sort.



Major highlights from the radiology waste audit follow:

Glass: 33% of total recyclables. Projected diversion: 1 ton.
This marks the first inclusion of glass in the recyclable waste stream. Empty, clean, glass bottles that contained radiopaque contrast media made up a significant portion of recyclables in both inpatient and outpatient CT and MRI suites. Radiopaque contrast media is taken orally, or administered intravenously during some exams. The contrast media is made of inert materials such as barium and iodine, and empty containers may be safely recycled. An estimated 70% of outpatient CT and MRI exams performed at the hospital's Outpatient Clinic involve radiopaque contrast media.

Rigid Plastics: 31% of total recyclables. Projected diversion: 1 ton.
Rigid plastics are widely generated in sterile product trays and kits throughout the department. G.I. (gastrointestinal) imaging generates a steady stream of plastic bottles from oral radiopaque barium contrast. Approximately one half of intravenous radiopaque contrast media bottles audited from CT and MRI were small plastic bottles. These empty containers are part of the rigid plastic profile in these

departments, including the Outpatient Clinic. The ultrasound suite generates approximately two to three conductive gel bottles daily. Nontoxic, water based conductive gel is used to conduct ultrasonic waves during imaging. Empty containers are completely safe for recycling.

Film Plastics: 13% of total recyclables. Projected diversion: 1000 lbs.

Film plastics were primarily generated in two key areas: MRI and Mammogram. Both areas generated packaging from sterile procedures and minor clinical interventions, including film plastic and 3D-formed cavity peel packs from sterile supplies and kits.

Pharmacy

While pharmacy conducts no direct patient care, the department performs supportive clinical work and generates a large amount of packaging materials in the process. With one main pharmacy and ten satellite branches throughout the hospital, the waste assessment provided a broad analysis of the pharmacy packaging profile. The pharmacy was a logical next step in the pilot study due to the following considerations.

- Access is limited to pharmacy staff only, offering a high level of control over recycling sort.
- Assessment of satellite pharmacies provided an overview of pharmacy packaging according to clinical specialty of the satellite branch.

The pharmacy waste assessment did reveal some minor variation according to clinical specialty, but the waste profile is fairly consistent overall. The pharmacy waste findings were most significant for the following reasons:

- An impressive 70% of the pharmacy waste profile is recyclable.
- 80% of this material is paper (i.e.: boxes and medication package inserts).
- The majority of plastics generated in pharmacy were categorized as 'Other Film Plastics'. Film overwrap from pharmacy boxes, and 'zip-lock' bags were the most commonly assessed plastic items.

Main OR Pre-Anesthesia Clinic

This outpatient clinical area conducts pre-operative assessment and education for patients who have upcoming procedures in the Main OR. This clinical area was originally assessed as part of the MOR SAU/ PACU, but the clear delineation of clinical function and patient profile led us to audit the area separately. A brief overview of the waste generated per patient assessment follows:
Each fully clothed, outpatient client is seated on a paper-lined exam table and assessed by a clinician. An EKG and/or lab draw is generally obtained. These services are reflected in the waste generation chart

Pre-Anesthesia Clinic Recycling Projections		
Waste Generated per Patient Visit	**Weight (lbs.)**	
Items:	**Recyclable**	**Municipal**
Paper Table Liner, Tear Pack Tops	0.04	
Gloves, Tourniquet		0.04
Rigid Blue Tint Packaging	0.01	0.00
3D Formed Cavity Packaging	0.01	0.00
Total	**0.07**	0.04
Percentage	**60%**	**40%**

above. As noted, exam gloves and tourniquet are the only non- recyclable waste generated during most visits. With approximately 50 patients served in the pre-anesthesia clinic daily, at a 60 percent diversion rate, a projected 850 pounds of recyclable waste will be diverted from this small clinic over the next year.

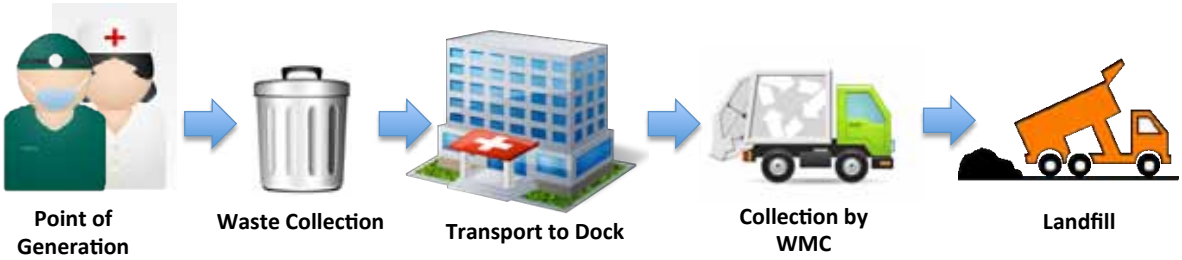
Waste audits conducted during the recycling pilot study worked backwards, analyzing waste to understand department workflow and key points of generation. Conversely, the Main OR Pre-anesthesia Clinic waste assessment analyzed the waste profile of one patient visit and extrapolated daily diversion potential. This methodology omits some infrequently used recyclable items (i.e.: glove boxes, film backing from EKG tabs, and rigid plastic sanitary wipe containers) and non-recyclable items (i.e.: paper towels, metallized paper EKG tab packaging). The most significant material here is the paper exam table liner. One clean, fully clothed patient may be seen every five minutes at the clinic, providing a large volume of clean recyclable paper.

This clinical area represents Stanford Hospital & Clinics' first recycling efforts in the outpatient clinical setting. It also represents the highest diversion rate among all target patient care areas in the pilot study.

Clinical Recycling Process Overview

Clinical Waste Management

The economics of recycling are based on the value of recyclable commodities versus the cost of processing these materials. An economically viable clinical recycling program, therefore, facilitates both quality and ease of sorting. Recyclables are a subset of the municipal waste profile, and successful clinical recycling builds upon well-established hospital waste management protocol. Smart process design complements existing protocol, from point of generation to final processing of waste.
Stanford Hospital & Clinics designed the recycling process from endpoint (commercial waste processor) and worked backwards to point of generation, building collection capacity and designing in-house



The Clinical Waste Management process is well established and highly effective. Smart recycling process design builds upon this current system.

collection processes before bringing recycling to the clinical setting. Key elements that support quality and ease of sorting on the hospital side of waste management include the following:

Commingled Recycling

A crucial step in the hospital's clinical recycling program was building a relationship with local waste

1) image credit: http://www.dapino-colada.nl

management company, Greenwaste. The Greenwaste materials recovery facility (MRF) efficiently processes paper, film plastic, rigid plastic, glass and metal.

Building a working relationship with a local waste management company entails education, outreach, partnership and accountability. Stanford Hospital & Clinics invited Greenwaste to tour the hospital campus, providing samples of recyclable items, and education on the quality and cleanliness of hospital recyclables. Both Stanford Hospital & Clinics and Greenwaste strive to maintain highest quality sort with greatest processing efficiency. As Greenwaste supports efficient hospital recycling collection by accepting commingled recycling, the hospital supports Greenwaste's business model by working to provide high-quality, clean, dry recyclable materials free of contamination.

The Green Recycling Bag

Stanford Hospital & Clinics' ability to fold recycling into current waste management processes hinged on collection of clinical recyclables in specialty colored, mint green bags. By providing a visual cue from point of generation all the way to the loading dock, this simple step allowed for collection of commingled recycling in the same collection bins as municipal waste. Clinical support staff and environmental services therefore carry out established waste collection processes, delivering now two different waste streams to the same end-point.

A 40 cubic yard, open top container was placed along the dock between the hospital and municipal waste compactor. As environmental services staff walk their established route along the dock, they now make a preliminary stop at the recycling container, and toss the lightweight recycling collection bags into the container, allowing for safe, easy handling of recycling as part of normal waste management cycles.

The Green Bag provides a visual cue along the entire recycling process.

Identifying Process Efficiencies

By examining waste generation and collection processes Stanford Hospital & Clinics identified efficiencies that would accommodate recycling collection. Examples of such efficiencies include:
In procedural areas:

- Collection of recycling occurs during room turnover in between cases.

In nonprocedural areas:

- Recycling separation decreases municipal waste container volume, allowing for decreased collection frequency.
- Preliminary waste assessments identified opportunities to right-size waste bins, reducing unnecessary waste collection rounds.
- Recyclable material is clean, dry, and lightweight, and does not necessitate a frequent collection schedule.

Planning recycling with environmental services (EVS) allowed for focus on and refinement of current waste collection process, optimizing EVS time and effort. Engaging the entire recycling team, from sorting to collection, is key to successful implementation.

Clinical Waste Management Team

Each waste processor is a member of the clinical waste management team, each team member an expert in their part of the process. Successful recycling engages the entire team in planning, education and implementation. As Stanford Hospital & Clinics is dedicated to waste prevention and diversion, the Sustainability Department is an integral team member.

With the establishment of seamless collection of commingled recycling by environmental services staff, Stanford Hospital & Clinics was ready to begin the process of clinical recycling collection at the point of generation. We recruited representatives of the clinical waste management team to serve on the departmental recycling team, building a working group in each department. The recycling team is composed of the following members:

Managerial Program Sponsor

- Advises recycling champions on program design.
- Represents the initiative among department leadership.
- Sets and enforces recycling standards among staff.

Recycling Champions

- Serve as department recycling experts.
- Provide a link between clinical staff and recycling team.

Clinicians lead recycling charge at Stanford Hospital & Clinics

Clinicians in the Main OR and Ambulatory Surgery Center spearheaded clinical recycling at Stanford Hospital & Clinics. As major generators of packaging waste, they saw first-hand the waste footprint of hospital activities. Clinicians are key drivers of recycling efforts because waste diversion begins at the point of generation. Clinical recycling requires a change in process for every team member who handles waste, from clinician to recycling processor. The more engaged clinicians are around sorting recyclables at point of generation, the stronger the clinical recycling program becomes.

As a Magnet Recognized Hospital, Stanford Hospital & Clinics has a strong demonstrated commitment to professional development and nursing excellence. The clinical recycling project saw the first use of sustainability implementation for professional development, as a procedural area nurse led departmental recycling efforts as part of her Magnet Professional Nurse Development Project. This combination of nursing excellence and sustainability draws the logical connection between effective patient care and care of the environment. It also rightfully places waste reduction along side other key hospital quality initiatives. Reduction of unnecessary waste during patient care is sustainable patient care, quality patient care, and excellent patient care. As clinician involvement in hospital sustainability initiatives expands, so should the opportunities for recognition and professional development in this space.

Environmental Services

- Contributes to design of collection process from bin to dock.
- Implements new collection plan.
- Advises on process and quality improvement.

Sustainability Department

- Coordinates and supports recycling initiative process.
- Provides education, equipment, supplies, and signage.
- Conducts baseline and quality audits and provides feedback to departments.

Sorting at Point of Generation

The initial clinical recycling sort directly impacts the economics of a hospital's recycling program. The process must facilitate ease of sorting, complementing existing mission-critical clinical work, while facilitating a quality sort, preventing contamination of recycling bound for the materials recovery facility. The basis for smart process design at point of generation is engagement of departmental recycling champions, assessment of waste type and flow, and integration of quality sort into current workflow.

Baseline Waste Assessment

The expert insight into clinical waste flow provided by recycling champions is complemented by the initial waste assessment, as departmental municipal waste is collected over a given period of time and assessed for recycling potential. The assessment identifies recyclable material type and quantity, source of materials, and variation in volumes during workday. This information forms the basis of logistical planning, including recycling bin type and placement, and collection plan.

Designing Quality into Sort Process

Clinical recycling sort quality is a factor of control and awareness. The number of waste generators with access to recycling bins determines level of control. The number of those waste generators that are familiar with the recycling program and sorting guidelines determines awareness. Designing sort process for quality optimizes both of these factors.

Control:

Clinical areas with limited access enjoy higher levels of control over sorting of recyclables, as waste is processed by a small number of skilled clinicians and support staff. In the clinical recycling study, these areas include procedural areas and hospital pharmacy. Conversely, patient care areas in the recycling pilot represent areas of low control, as high volumes of visitors, patients, physicians, and clinical staff stream through departments throughout the day. The more people that dispose of waste in a given area, the higher the risk of contamination by non-recyclable waste.

In procedural areas, the recycling bin is pushed away from the bedside before start of case.

Control is built into logistical planning as the goal of bin selection and placement is to balance ease of recycling with prevention of contamination. Stanford Hospital & Clinics has taken the following steps to maximize control in recycling areas:

- Recycling bins in procedural areas are pushed away from bedside at the beginning of each case, limiting access to circulating staff only.
- Placing lids on centralized recycling bins in high traffic areas creates a barrier to contamination and provides a visual cue to direct correct sorting.
- Providing small, individual recycling bins on each nurse's Computer on Wheels (CoWs) workstation maximizes control and convenience in high-traffic patient care areas.

In patient care areas, personal recycling bins on nurses' CoWs offer control and convenience.

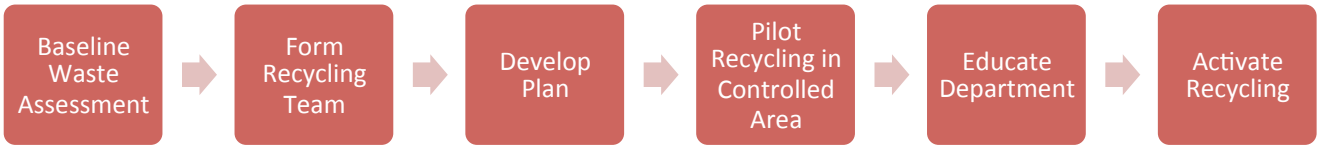
Awareness:

Awareness depends on successful education of every waste generator on proper recycling procedure. This becomes a challenge in areas with high traffic such as patient care areas, as the number of target recipients of recycling education increases exponentially. The challenge is to draw awareness to the recycling program while providing highly visual cues that facilitate successful sorting for physicians passing through the department, newly hired employees, or a patient's visitor disposing of waste. Our awareness campaign included the following:

The Procedural Area Recycling Guide provides highly visual, visible waste management instructions for clinicians and support staff, maximizing awareness.

- Recruitment of recycling champions in each department to serve as knowledge experts
- Education of every team member in the department, including new hires
- Highly visible signage on and around recycle bins
- Regular mention in staff meetings, newsletters, and daily huddles
- Physician and support staff outreach

While control and awareness inform logistic and process design, initiating clinical recycling is a holistic process, tailored to individual department workflow, layout, and culture. The following steps round out the process of recycling initiation in each department.



The process of establishing a clinical recycling program.

Logistical Planning

Bin Type and Placement

Along with planning container placement to balance ease of recycling while preventing contamination, collection containers should meet the following needs:

- Provide ample collection volume
- Minimize clutter in the clinical workspace
- Include barriers to contamination, such as lids and/or highly visible, visual signage

Collection Plan

Consider the following points while planning collection:

- Find process efficiencies that can make room for recycling collection
- Consider ergonomics and workflow for clinicians and environmental services

Recycling Pilot

The recycling pilot allows departmental recycling champions to trial setup for ease of use, optimal bin placement, collection capacity, and prevention of contamination. The pilot should include the following elements.

- Two day minimum test run of recycling
- Conducted only in work areas of recycling champions
- Real time assessment of process and sort quality
- Refinement of recycling process plan as needed
- Pilot continues until recycling team finalizes departmental recycling process

Education

Stanford Hospital & Clinics includes the following elements in a comprehensive recycling education program, blending direct in-service, visual cues, and regular reminders to increase retention and awareness.

- 'Recycling 101' in-service education for every team member who handles recyclable waste.
- Touch board featuring recyclable and non-recyclable items collected specifically from departmental waste stream.
- Regular inclusion of recycling updates in department communications.
- 'MD Recycling Guides' – one page quick guide to clinical recycling for physicians and advanced clinicians who generate waste in the department.

Rollout

Once the clinical recycling process is finalized and education is complete, the program is activated. The sustainability department works closely with the departmental recycling team during rollout to ensure a smooth transition, address problems that arise, and perform real-time quality assessment.

- Distribute bins.
- Announce to department and recycling team.
- Activate environmental services.

Containment of Recyclables in Clinical Areas

As Stanford Hospital & Clinics refines the recycling process in procedural areas, clinicians have trialed a variety of containers for material collection. The following features make a better containment system:

- Small profile to prevent clutter
- Wheels for easy mobility in room
- Ample containment capacity
- Lightweight flip lid to provide barrier

The best bin for recycling in procedural areas remains the standard triangle hamper stand, due to large containment capacity and level of mobility. However, a lightweight, durable, plastic lid for such stands would be ideal to ensure prevention of contamination.

In patient care areas, volume is not the major concern. The challenge, rather, is providing bins at point of generation to provide convenience while preventing contamination and clutter. Two patient care areas have addressed this challenge in different ways:

In the ASC/IR Pre-op, each patient is prepared for surgery in individual patient care bays. In these small, walled bays, small blue (desk-side) recycling bins collect materials.

The Main OR SAU/PACU has a much more open floor plan. Patients, physicians, and support staff pass quickly through the open patient care areas separated only by privacy curtains. In this department, convenient, quality sorting is achieved while maximizing for control. A small 'saddle' bin labeled with a recycling symbol (chasing arrows) is mounted on each nurse's personal Computer on Wheels (CoW), for collection of small recyclable packaging at point of generation. The clean, dry, recyclable packaging is easily contained in the saddle bin at the workstation. While a recycling bin in patient care areas may collect contaminants from an unaware waste generator, the nurse's computer workstation is not a target for waste disposal. Control and convenience maximize quality.

Program Stability

Clinical Recycling involves a process change and implementation of a new waste management policy. The clinical recycling program at Stanford Hospital began at a grass-roots level, grew with administrative support, achieved structure through the partnership with support services, and has been refined based on learning and leadership at the department level. As with any organizational change management initiative, quality control and continuity must be built into the plan. The following steps should be included in a hospital recycling plan to ensure continued high quality, high volume collection.

- Regular quality audits by recycling team and management
- Inclusion of recycling efforts in existing quality improvement measures
- Waste diversion tracking by administration
- Recycling leadership as professional development opportunity

The combined efforts of the entire recycling team ensure maximum waste diversion, high quality recycling sort, and long-term program success.

Process Recommendations for Successful Recycling

During the recycling pilot, through ongoing expansion of the program with a sharp focus on best practices, we developed a number of process recommendations for promotion of quality, efficient clinical recycling. Considering lessons learned from the Stanford Hospital & Clinics clinical recycling program, we recommend the following:

1. Minimize additional processing at each step of waste management.

Minimize labor demands associated with recycling along each step of the waste management process. Stanford Hospital & Clinics makes recycling convenient for each waste processor in the following ways:

- Folding recycling into existing waste management process
- Reducing number of environmental services waste collection rounds necessary in recycling zones once activated
- Negotiating collection of film plastic peel packs whole (un-separated)

Stanford Hospital & Clinics' original clinical recycling standards included separation of all film and rigid plastic peel packs, and sorting of Tyvek® into a separate collection bag. While Greenwaste is an expert handler of film plastics, the company passes both high-density polyethylene Tyvek® and polypropylene Blue Wrap along to a specialty plastics recycler. Despite ongoing education and outreach to clinical staff regarding separation of peel packs, this step in the recycling process was the most common omission error. Upon further investigation of the issue, we uncovered the multiple reasons for lack of compliance.

There are three additional steps in the peel pack separation and sort. Clinicians must completely separate the peel packs, differentiate quickly between Tyvek® and paper, and then sort into correct bags. This becomes problematic during case setup, as opening supplies now takes more time and effort. In some areas such as Cath-Angio, peel packs are up to six feet in length. Separation of this packaging is not practical. The high number of film plastic peel packs also makes separation a repetitive task, setting up clinicians for stress injuries. Last, rapid separation of peel packs in high volumes quickly becomes a noisy task. Given the level of focus required and time sensitivity of tasks, additional noise in procedural areas generates stress and distraction.

With a high volume of sterile supplies in peel packs, separation of peel packs into disparate parts becomes a repetitive task.

Stanford Hospital & Clinics worked together with Greenwaste on this challenge, receiving valuable stakeholder support, as HPRC-member packaging specialists from DuPont participated in discussions between the hospital and Greenwaste. Additional outreach came from clinicians, as a Clinical Recycling Champion shared the challenges of peel pack separation directly with Greenwaste during a hospital tour of the recycling facility. Greenwaste has now agreed to process intact film plastic peel packs. Using this processing method, high-density polyethylene Tyvek® is recycled with its mixed film plastic pouch. Paper backing on film plastic peel packs is processed as an allowable level of (non-plastic material) contamination. This process highlights the value of maintaining positive relationships and strong engagement among all waste processors to maximize outcomes.

2. Collect waste at point of generation.

In procedural areas, collecting recyclables at point of generation entails providing a wheeled collection bin that is placed by the sterile field during case setup, then rolled away at start of case. In patient care areas, collecting at point of generation involves identification of geographical or functional waste source, and strategically collecting that waste. For example, in the Main OR Surgical Admission Unit, the majority of plastics originated in two key areas: in changing rooms (where patients open a package of non-slip socks and have their temperature taken), and in the anesthesia bay, (where surgical spinal blocks are performed throughout the day). By assessing waste flow and placing collection bins in these areas, we capture valuable recyclables while limiting access to recycling bins in this high-traffic department, minimizing contamination.

In procedural areas, bag color signals waste stream

3. Provide visual cues at every step of the process.

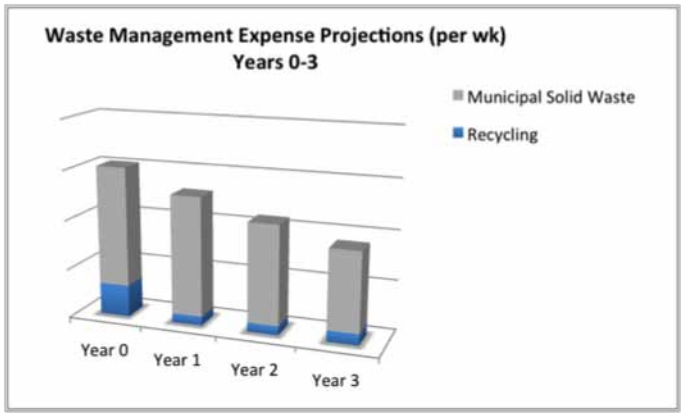
Stanford Hospital & Clinics has established collection bins (blue with chasing arrows) and bags (mint green specialty bags) that visually cue recycling along each step of the clinical waste management process. Visual recycling guide posters and labels are placed in highly visible areas on or near recycling bins. In the fast-paced flow of hospital clinical and operations setting, increased visibility establishes and maintains awareness, maximizing quality.

The chasing arrows clear bag signals Blue Wrap collection along the entire waste management process.

As noted earlier in the report, Blue Wrap is collected in a separate bag at point of generation, allowing Greenwaste to easily retrieve the material at the beginning of their materials recovery process, for delivery to a specialty plastics recycler. To offer a visual cue for the Blue Wrap collection process, the hospital added a clear specialty bag with chasing arrows printed on the side. Collection of Blue Wrap in the procedural area setting adds an additional step to the recycling process, and adds an additional waste stream to an already complex medical waste management system. Adding complexity to any system creates room for error. To simplify this process for each waste processor from point of generation to materials recovery facility, the addition of a secondary specialty bag for Blue Wrap collection visually differentiates the material as a separate, recyclable material. The bag provides a visual cue in fast-paced procedural areas, along the environmental services collection path, and upon arrival at the materials recovery facility, where Blue Wrap bags can be quickly retrieved.

Financial Benefits of Waste Diversion

Stanford Hospital & Clinics' comprehensive waste minimization program directly reduces operational expenses, benefitting the organization's bottom line. The commingled recycling program developed in partnership with Greenwaste offers a 75% cost savings per open-container pull, compared with municipal waste disposal costs. Plans are underway to add a second 30 cubic-yard recycling compactor, which will accommodate higher volumes and increase per-pull savings to 88% (reflected in the chart below in Year 1). Recycling costs will further decrease, as recycling at full scale reduces the frequency of municipal solid waste compactor pulls.



Forward Towards a Zero Waste Future

The Stanford Hospital and Clinics, Clinical Recycling Pilot has been very successful through the engagement of green leaders throughout the hospital, the knowledge gained during targeted expansion of the program, and the ever-increasing diversion of waste from landfill. The official recycling pilot ended at the beginning of 2013. Stanford has continued to expand the Clinical Recycling Program since this time, conducting the following:

- Establishing recycling in the Endoscopy Department
- Conducting initial waste audits for select inpatient care units in preparation for our first recycling pilots in these areas
- Utilizing the per-case waste diversion projections to estimate diversion potential and establish initial plans for our Outpatient Surgery Center.

The detailed data gathered for this report is included in the attached appendix as well as a glossary of terms.

Acknowledgements

Many thanks to the Clinical Recycling Team Members who have supported the development and continued growth of the Stanford Hospital & Clinics recycling program.

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Ray Pickett, RN CPAN: Assistant Patient Care Manager
Rosemary Raymond, RN
Jerrold Hopkins, RN
Daphnee Russo, RN
Alex Valverde, ORA
Don Combs, ORA

Ambulatory Surgery Center Pre-Operative / Post Anesthesia Care Unit Green Team

Jonathan Villagracia, RN BSN CAPA:
Assistant Patient Care Manager
Daniel Bomar, RN
Brian Watts, RN

Cath- Angio Pre-Operative and Recovery Unit Green Team

Anna Ciaravino, RN: Assistant Patient Care Manager
Dani Martin, RN: Assistant Patient Care Manager
Colleen Bonnett, RN BC: Unit Educator
Leah Birkett, RN
Gilda Ara, RN
Brett Yonally, RN
Daniel Red-Elk, RN

Radiology Green Team

Claudia Cooper: Radiology Clinical Director
Kevin Vantrees: Radiology Clinical Director
Janis Troeger: Tech Supervisor, Diagnostics
Anita Angelotti:
Lead Radiology Tech, Diagnostics
Zee Ivanova, RT: Diagnostics
Daisha Marsh: Tech Supervisor, CT
Eilbret Betoushana: Radiology Tech, CT
Teresa Nelson: Tech Supervisor, MRI
Harmandeep Madra, RN:
Patient Care Manager, Nuclear Medicine
Carol Walters: Tech Supervisor, Ultrasound
Alexander Karanany: Senior Sonographer
Ida Walworth: Tech Supervisor, Mammogram
Audrey Strain: Tech Supervisor, Outpatient Radiology

Pharmacy Green Team

Michael Brown, PharmD: Director of Pharmacy
Bruce Lepley, PharmD: Assistant Director
Julie Newton, PharmD: Clinical Pharmacist

Stanford Hospital & Clinics thanks our internal and external partners that have provided organizational and infrastructure support to the Clinical Recycling Program.

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Appendix 1: Glossary of Terms

Materials

Blue Wrap: Dense, blue, polypropylene (plastic #5) fabric over-wrap that encases sterile surgical kits.

Film Plastics:

- 3D-Formed Cavity Peel Packs: Film plastic, paper/film plastic, or Tyvek®/film plastic packaging molded in the shape of the supply that it encases.
- Chevron Peel Packs: Flat film-plastic, paper/film plastic, or Tyvek®/ film plastic peel packs, with characteristic chevron seal at top of packaging.
- Header Bags: Dense film plastic bags with a Tyvek® header strip. Used as outer packaging of sterile supply packs.
- Linear Tear Bags: Film plastic bags with a notched tear strip along the side of packaging for opening.
- Vent Bags: Dense film plastic bags with a Tyvek® breather pouch, generally used in procedural areas as the outer packaging of sterile supplies or packs.

Rigid Plastics:

- Blue Tint: PET (plastic #1) blue tinted clear rigid packaging.
- Bottles: Rigid plastic bottles, which, in the clinical setting,contain substances such as sterile water, and contrast media.
- Corrugated: Rigid plastic trays reinforced with inner panel of fluting between two flat outer sheets.[1]
- Opaque Rigid: Rigid white or dye colored plastics, included in sterile supply trays, caps, and lids.

Tyvek®: High density polyethylene, printable, moisture resistant, lightweight material used in medical packaging such as peel pack backing.

3-D Formed Cavity

Chevron Peel Pack

Header Bag

Linear Tear Bag

Vent Bag

Blue Tint

Bottle

Opaque

Tyvek®

Waste Management Terms

Bio-hazardous Waste: Waste contaminated by blood or bodily fluids.
Commingled (Single-Stream) Recycling: Recycling that accommodates mixed collection of separate recyclable waste streams.
Materials Recovery Facility (MRF): Waste management facility where recyclables are sorted and processed for sale as commodities.
Municipal Waste: Non-infectious, non-regulated waste, delivered to local landfill.
Recyclable Commodity: The basic unit of the recycling market. Materials are sorted, bundled, and sold for processing back to raw materials of production.
Recyclable Waste: Clean, dry, non-infectious, waste, processed for sale as a commodity.
Most recyclable waste generated in the hospital clinical setting is composed of packaging materials.
Source-Separated Recycling: Recycling that requires the sorting of each material type into separate containers, by waste generator, at time of disposal.

Clinical Terms

Ancillary Care: Diagnostic and/or supportive services such as outpatient care, radiology, physical therapy, pharmacy or laboratory work.[2]
Patient Care Areas: Non-procedural inpatient and outpatient clinical care areas, such as pre- and post-procedural care units, medical surgical, and critical care units.
Pre-case (packaging materials): In procedural areas, recyclable material generated during set-up of sterile field for surgical procedure.
Procedural Areas: Clinical areas such as operating room, endoscopy, and cath-lab where invasive procedures are performed.
Radiopaque Contrast Media: Oral or IV contrast, made of inert materials such as barium or iodine, that stops radiation passing through the body to create an outline of internal structures under exam.[3]
Room Turnover: Linen removal and waste collection, cleaning and disinfection, conducted following end of case to prepare for next procedure.

1 Source: Corrugated Packaging Alliance website: 'What is Corrugated?' http://www.corrugated.org/corrugated-basics Accessed September 10, 2013

2 Source: Blue Cross/Blue Shield website: BlueLinks for employers, webpage. http://www.bluecrossma.com/bluelinks-for-employers/glossary.html#p Accessed September 10, 2013

3 Source: McGraw-Hill Concise Dictionary of Modern Medicine. 2002. The McGraw-Hill Companies, Inc. Radiopaque Contrast. The Free Dictionary. http://medicaldictionary.thefreedictionary.com/radiopaque Accessed September 10, 2013

Appendix 2: Waste Audit Data

Stanford Hospital & Clinics conducted waste audits in departments targeted for expansion of the Clinical Recycling Program. A complete description of the waste audit process is on the next page in Appendix 2a. Appendix 2a contains data collected during the HPRC Pilot Study, and Appendix 2b contains post-pilot study data, collected in next target clinical areas.

Pilot Summary Pages

HPRC Pilot Summary and Departmental Overviews show annual waste diversion projections by department and by functional areas, estimating annual waste diversion rate, plastics diversion rate, and diversion in tons by material type. Departmental overviews review clinical activities and annual productivity of each target area.

Data Summary Sheets

Data Summary Sheets contains the following information:

- Total weight of recyclable material, non-recyclable material, and diversion rate
- Weight & percentage of recyclables by material type (Paper, Film Plastics, Rigid Plastics, Tyvek®, Foil, Blue Wrap, and Glass)
- Per-case weight of recyclable materials

Audit Data Sheets

Data sheets contain waste generation by case type in procedural areas, and by time of audit in non-procedural areas, allowing further analysis of materials source and flow. Recyclable plastic packaging is further analyzed according to the scope of the HPRC study.

Utility of Data

While the study is limited in scope to clinical activities that occurred during the time-frame of each audit, the data should provide insight into the waste profiles of related departments in other clinical facilities. One could assess similarity of clinical functions in departmental overview, and extrapolate waste diversion projections based on per-case (per-patient, per-exam, etc.) waste estimates. As data summary sheets contain percentage of recyclables by material type, diversion projections can be customized according to specific recyclables accepted in various regions. These waste diversion projections can be used to provide volume estimates for recyclers, to guide a facility recycling collection plan, and to right-size containment in specific departments.

Stanford Hospital & Clinics used pilot study data in such a manner to create waste diversion projections for the Outpatient Surgery Center, documented in Appendix 2b.

Appendix 2a: Stanford Hospital & Clinics / HPRC Pilot Study

The Stanford Hospital & Clinics / HPRC plastics recycling pilot took place between July 2012 and March 2013, evaluating the recyclable waste profiles of nine target clinical areas: three procedural areas, three patient care areas, and three ancillary service areas. The pilot study collected and analyzed non-regulated, non-infectious waste generated over a specified time-frame, providing a brief, comprehensive assessment of clinical recyclables. Waste audits were conducted either as part of initiation of recycling (noted as 'Initial Waste Audit') or during quality assessments (noted as 'Quality Waste Audit'). Over 110 tons of clean, dry packaging material will be recycled from target clinical areas annually.

Methodology

Recyclable items were sorted and weighed by category (Paper, Film & Rigid Plastics, Foil, Blue Wrap, Tyvek®, and Trash). Peel packs were separated into disparate parts for analysis. Recyclable items that were stained or wet were categorized as trash. Film and Rigid plastics were further separated by specific plastic type (Rigid Plastics: Corrugated, Blue Tint, Opaque, Bottles, Other. Film Plastics: Chevron Peel Pack, Vent Bag, Linear Tear Bag, 3D-Formed Cavity, Header Bag, and Other). All waste streams were weighed using a balance beam scale that weighs to precision of 10 grams. Waste measurements are reported in pounds.

Waste was analyzed per-case in procedural areas. In non-procedural areas, waste was collected during scheduled trash pulls over a period of 24 hours. Clean, dry, recyclable packaging materials were sorted by material type and weighed per pilot study guidelines. Quick weights of municipal and bio-hazard waste (recorded together as 'non-recyclable waste') were obtained for diversion rate calculations.

Waste measurements for each target area are summarized on individual 'Departmental Summary' worksheets. "Per-case Weight' is total material type divided by 'Number of Cases Represented'. In procedural areas, this number equals the total number of cases audited. In patient care areas, this number equals the total number of cases performed during the waste audit time-frame. 'Number of cases' becomes 'number of orders (filled)' in Pharmacy, and 'number of exams (performed)' in Radiology, reflecting each department's business productivity metrics.

Adjustments

Minor weight adjustments were made for bagged waste. Waste was contained in one of two bag types. To correct for bag weight, .07 lbs was subtracted from waste contained in lightweight plastic bags, and .18 lbs was subtracted from waste contained in the more dense plastic bags.

Waste diversion projections

Each department's unit measure (i.e.: weight of recyclables per case) was extrapolated by FY 2012 department productivity numbers to project annual waste diversion. Projected diversion, by the ton, is featured on the HPRC Pilot Summary page.

Data Variables and Limitations

This pilot study was designed to provide an overview of clinical recyclables generated over a brief time-frame in the hospital setting. The outcome is a clear, comprehensive, 'snapshot in time' of clinical waste in target areas during a typical day at Stanford Hospital & Clinics. Given the fairly consistent waste profiles of each clinical area, and the level of detail with which waste was analyzed, Stanford Hospital & Clinics confidently presents study data and diversion projections. However, multiple variables such as clinical productivity, actual supply stream, and recycling sort quality directly affect diversion rate. Waste diversion projections should be noted as such; simple projections based on a small sample size.

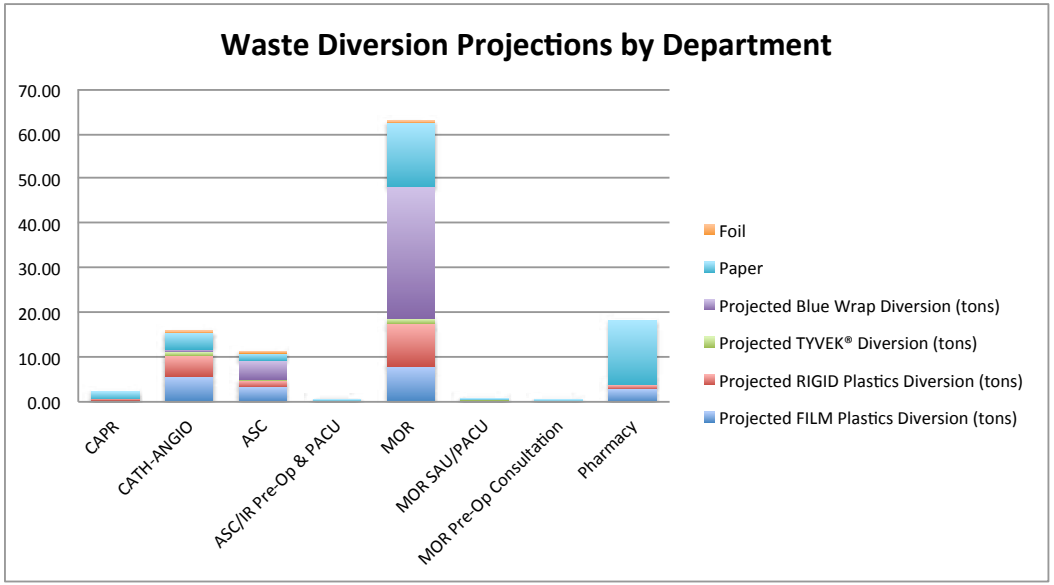
The small sample size is a limitation in data analysis, considering, for example, that ten cases were audited in the Ambulatory Surgery Center, a department that performs more than 11,000 cases per year. Another limitation noted in the waste assessment process is that municipal and biohazard waste streams may be wet following procedures, or even simple hand washing. This results in a relatively lower reported recycling rate of clean, dry, packaging materials when evaluating by weight. For example, a stack of four disposable sterile towels weighs approximately .25kg, while a damp stack of the same towels weighs .65kg.

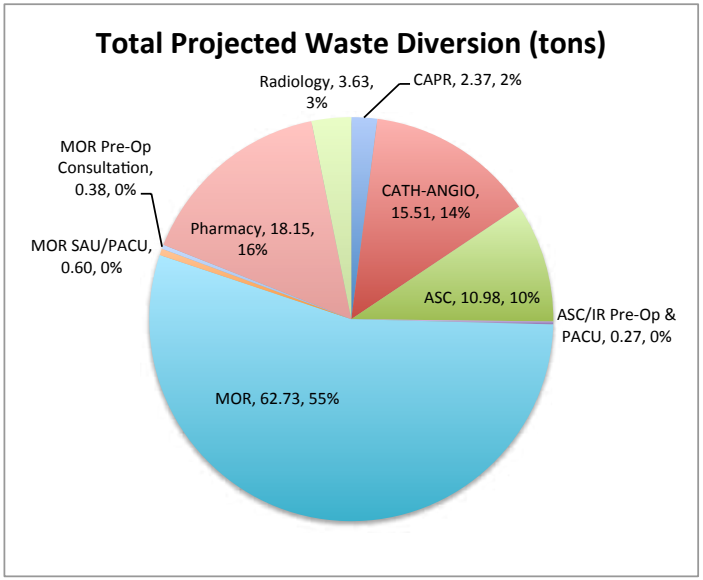
Stanford Hospital / HPRC Plastics Recycling Pilot

HRPC Pilot Waste Audit Data Summary

Departmental Waste Diversion Summary	CAPR	CATH-ANGIO	ASC	ASC/IR Pre-Op & PACU	MOR	MOR SAU/PACU	MOR Pre-Op Consultation	Pharmacy	Radiology	Total	*Total Procedural Areas*	*Total Patient Care Areas*
Waste Audit Date	7/10/12	8/1/12	8/20/12	9/19/12	3/28/13	12/12/12	12/12/12	2/12/13	2/27/13	-	-	-
Date Recycling Initiated	3/1/12	8/8/12	11/1/11	10/15/12	9/1/11	1/22/12	1/22/12	pending	pending	-	-	-
Productivtiy Unit	Cases/Year	Cases/Year	Cases/Year	Cases/Year	Cases/Year	Cases/Year	Cases/Year	Orders / Year	Exams/Year	-	Cases/Year	Cases/Year
Total Cases / Year (FY12)	6500	11140	9140	11700	12980	11150	11590	4800000	165280	-	33260	29350
Average Recyclables / Case (lbs)	0.73	2.79	2.40	0.05	9.67	0.11	0.07	0.01	0.05	-	4.95	0.88
Average Recyclable Plastics / Case (lbs)	0.20	2.12	2.04	0.03	7.41	0.08	0.02	0.00	0.02	-	3.86	0.31
Projected Waste Diversion (lbs)	4739.43	31027.13	21957.94	534.11	125451.70	1193.79	764.94	36296.94	7255.71	229221.68	178436.76	6467.33

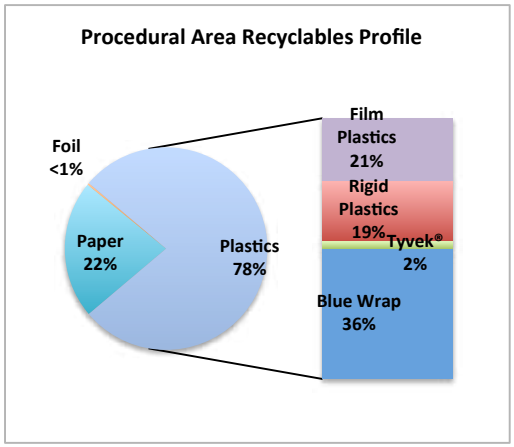
Projected Waste Diversion Summary	CAPR	CATH-ANGIO	ASC	ASC/IR Pre-Op & PACU	MOR	MOR SAU/PACU	MOR Pre-Op Consultation	Pharmacy	Radiology	*Total*	*Total Procedural Areas*	*Total Patient Care Areas*
Total Projected Waste Diversion (tons)	2.37	15.51	10.98	0.27	62.73	0.60	0.38	18.15	3.63	114.61	89.22	3.23
Total Projected Waste Diversion Rate (%)	0.07	0.15	0.13	0.06	0.31	0.12	0.60	0.70	0.24	0.32	0.26	0.08
Total Projected Plastics Diversion (tons)	0.65	11.82	9.32	0.19	48.12	0.42	0.13	3.87	1.69	76.22	69.26	1.27
Projected Plastics Diversion Rate (%)	0.02	0.11	0.11	0.05	0.24	0.09	0.20	0.15	0.11	0.19	0.20	0.05
Projected FILM Plastics Diversion (tons)	0.37	5.59	3.33	0.16	7.83	0.11	0.06	2.89	0.48	20.83	16.75	0.64
Projected RIGID Plastics Diversion (tons)	0.28	4.81	1.48	0.03	9.70	0.30	0.06	0.96	1.12	18.74	15.99	0.61
Projected TYVEK® Diversion (tons)	0.00	0.85	0.20	0.00	1.14	0.01	0.00	0.03	0.09	2.31	2.18	0.01
Projected Blue Wrap Diversion (tons)	0.00	0.58	4.31	0.00	29.45	0.00	0.00	0.00	0.00	34.34	34.34	0.00
Paper	1.72	3.67	1.60	0.07	14.42	0.17	0.25	14.27	0.76	36.94	19.69	1.97
Foil	0.00	0.02	0.06	0.00	0.19	0.00	0.00	0.00	0.00	0.27	0.27	0.00
Glass	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.18	1.18	0.00	0.00



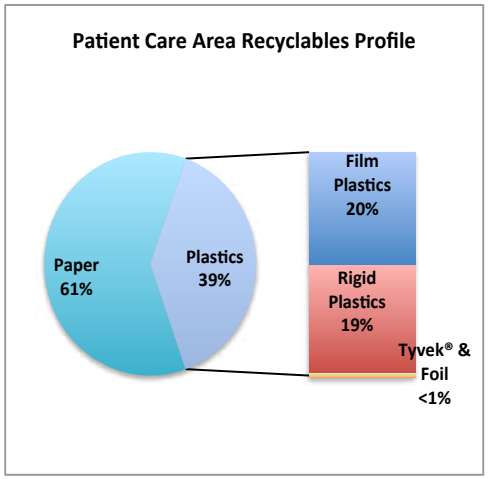


Plastics Diversion Projections by Functional Area

Procedural Areas					
Projected Rigid Plastics Diversion (tons)	**CATH ANGIO**	**ASC**	**MOR**	**Total**	**% by Weight**
Corrugated	0.00	0.00	0.12	0.12	0.01
Blue Tint	0.49	0.07	5.27	5.83	0.36
Opaque	3.74	0.62	2.35	6.71	0.42
Bottles	0.08	0.61	1.27	1.96	0.12
Other	0.50	0.17	0.69	1.36	0.09
Total	4.81	1.48	9.70	15.99	
Projected Film Plastics Diversion (tons)	**CATH ANGIO**	**ASC**	**MOR**	**Total**	**% by Weight**
Chevron Peel Pack	1.02	0.85	2.14	4.02	0.26
Vent Bag	2.16	1.71	1.43	5.30	0.35
Linear Tear Bag	0.61	0.48	0.67	1.76	0.12
Formed Cavity	0.85	0.23	1.52	2.60	0.17
Header Bag	0.03	0.00	0.30	0.33	0.02
Other	0.92	0.05	0.26	1.24	0.08
Total	5.59	3.33	6.33	15.24	



Patient Care Areas					
Projected Rigid Plastics Diversion (tons)	**CAPR***	**ASC IR Preop/PACU**	**MOR SAU PACU**	**Total**	**% by Weight**
Corrugated	0.00	0.00	0.00	0.00	0.00
Blue Tint	0.18	0.00	0.22	0.40	0.66
Opaque	0.06	0.00	0.06	0.12	0.20
Bottles	0.00	0.00	0.00	0.00	0.00
Other	0.04	0.03	0.02	0.08	0.14
Total	0.28	0.03	0.30	0.60	
Projected Film Plastics Diversion (tons)	CAPR*	ASC IR Preop/PACU	MOR SAU PACU	Total	% by Weight
Chevron Peel Pack	0.06	0.01	0.03	0.10	0.15
Vent Bag	0.00	0.00	0.00	0.00	0.00
Linear Tear Bag	0.24	0.12	0.05	0.41	0.64
Formed Cavity	0.07	0.03	0.02	0.12	0.19
Header Bag	0.00	0.00	0.00	0.00	0.00
Other	0.01	0.00	0.00	0.01	0.02
Total	0.37	0.16	0.11	0.64	

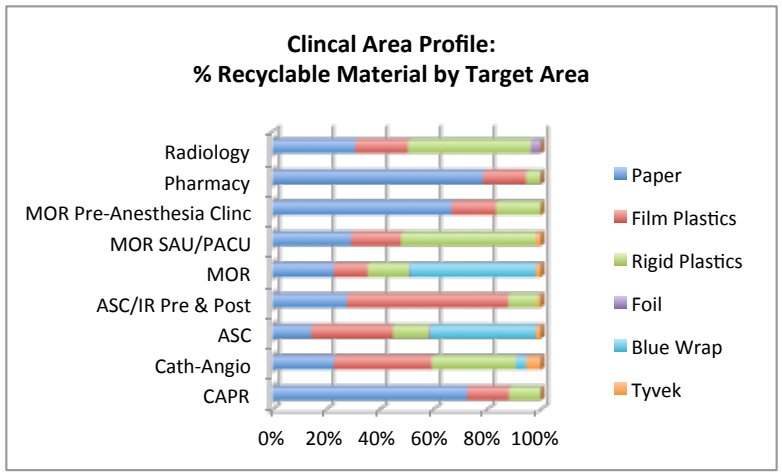


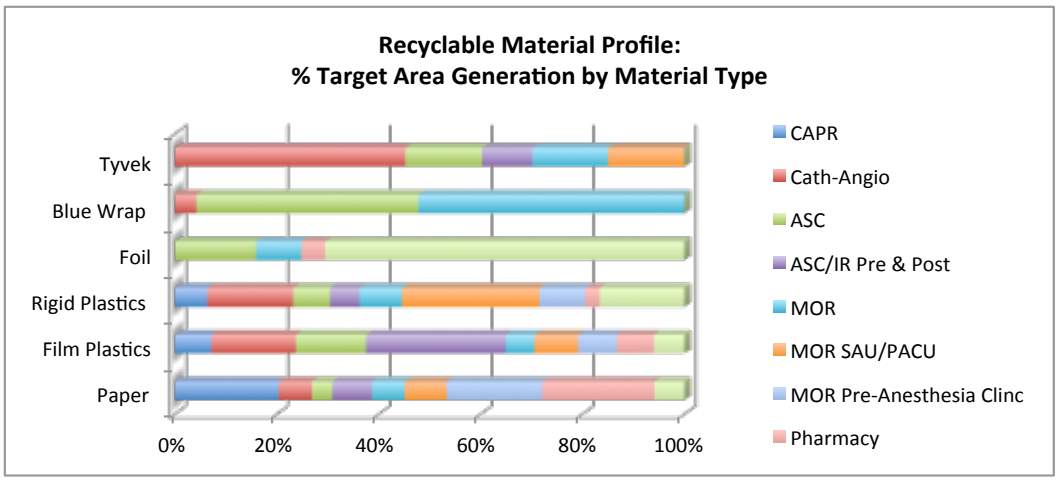
** data is estimated based on procedural area audits*

Stanford Hospital / HPRC Plastics Recycling Pilot

HRPC Pilot Recycling Overview by Department

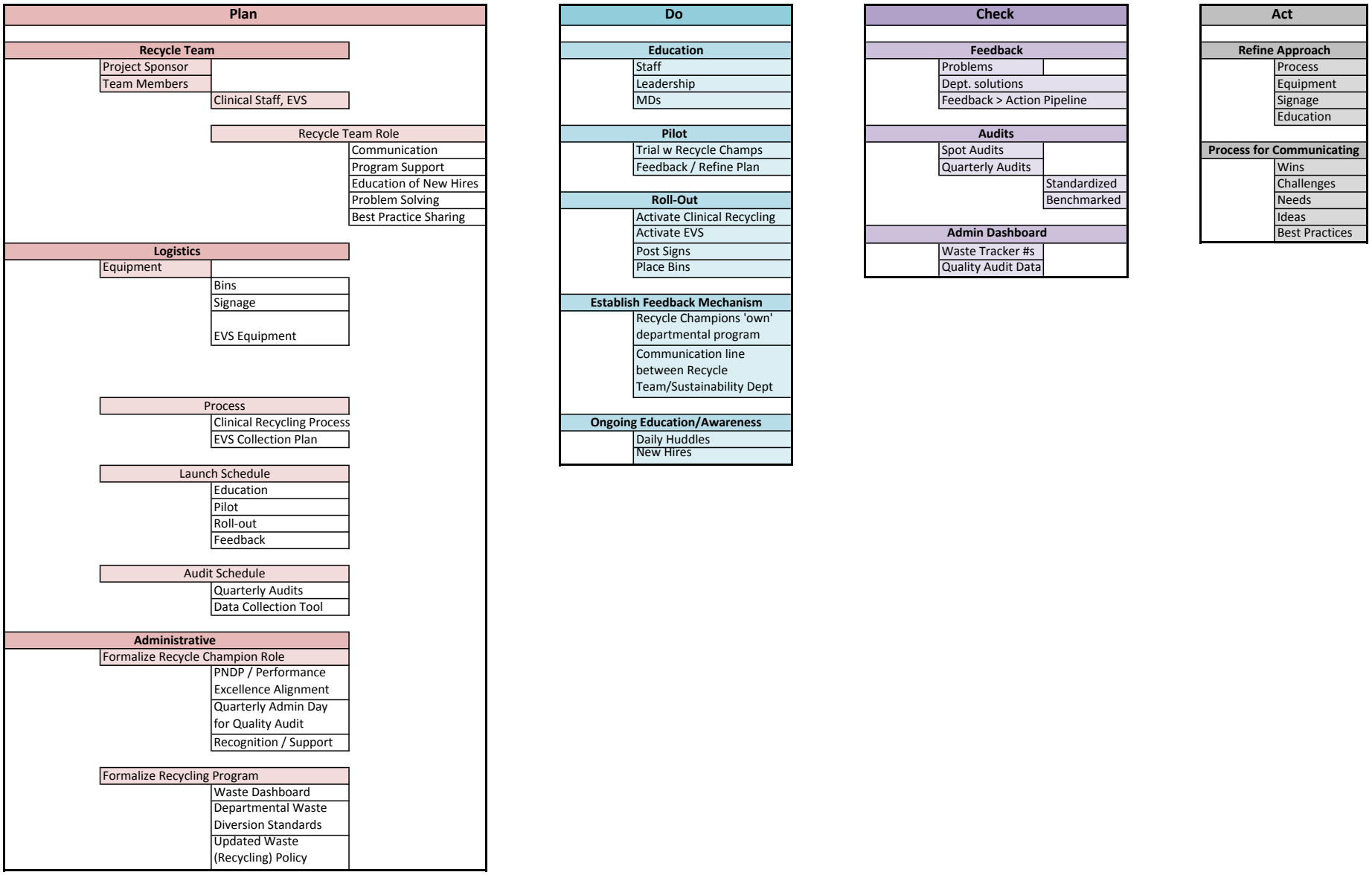
Department	CAPR	CATH-ANGIO	ASC	ASC/IR Pre-Op & PACU	MOR	MOR SAU/PACU	MOR Pre-Anesthesia Clinc	Pharmacy	Radiology
Clinical Work Overview	CAPR provides patient care before and after procedures in Cath Angio Lab.	The Cath Angio Lab specializes in adult and pediatric interventional cardiology, electrophysiology, neuroradiology, and interventional radiology.	Ambulatory Surgery Center (ASC) performs adult and pediatric outpatient and inpatient procedures, including General, Head and Neck, Orthopedics, Gynecology, Plastics, Otolaryngology, Urology, Neurology, Ophthalmic Plastic Surgeries and Pain Clinic procedures. ASC also assists patients with Electroconvulsive Therapy (ECT).	ASC/IR Pre-Op and PACU provides patient care before and after procedures in the Ambualtory Surgery Center and Interventional Radiology.	Main Operating Room specializes in adult surgical procedures including cardiac, thoracic, vascular, neurosurgery, orthopedics, otolaryngology, head and neck, plastics, general, gyn, urology, transplants, and robotics.	MOR Surgical Admission Unit (SAU)/PACU provides patient care before and after procedures in the Main Operating Room.	Main OR Pre-Anesthesia clinic evaluates and educates outpatients who have upcoming scheduled surgeries in MOR.	The Pharmacy Department provides pharmaceutical services for the hospital, including medication delivery,therapeutic recommendations, and promotion of optimal drug therapy.	The Radiology Department provides state of the art imaging services for inpatient and outpatient clients.
Number of Beds	20	14	12	40	21	34	5	N/A	N/A
Total Cases / Year (FY12)	6500	11140	9140	11700	12980	11150	11590	4800000	165280
Date Recycling Initiated	3/1/12	8/8/12	11/1/11	10/15/12	9/1/11	1/24/13	1/25/13	TBD	TBD
Total Projected Waste Diversion Rate (%)	7%	15%	11%	6%	23%	12%	60%	70%	24%
Projected Plastics Diversion Rate (%)	2%	12%	9%	5%	18%	9%	20%	15%	11%
Most Common Recycled Item	Brown Paper 'Patient Belonging' Bags	Film Plastic and Tyvek® peel packs	Blue Wrap	Film Plastic Linear Tear Bags	Blue Wrap	Film Plastic Linear Tear Bags, Rigid Trays	Paper exam table liner	Product boxes and protective film wrap	Rigid plastic sterile product trays
% Recycled by Material Category	CAPR	Cath-Angio	ASC	ASC/IR Pre & Post	MOR	MOR SAU/PACU	MOR Pre-Anesthesia Clinc	Pharmacy	Radiology
Paper	73%	23%	15%	28%	23%	29%	67%	79%	21%
Film Plastics	16%	36%	30%	60%	12%	19%	17%	16%	13%
Rigid Plastics	12%	31%	13%	11%	15%	50%	17%	5%	31%
Foil	0%	0%	1%	0%	0%	0%	0%	0%	2%
Blue Wrap	0%	4%	39%	0%	47%	0%	0%	0%	0%
Tyvek	0%	6%	2%	1%	2%	2%	0%	0%	0%
Glass	0%	0%	0%	0%	0%	0%	0%	0%	33%





Stanford Hospital / HPRC Plastics Recycling Pilot

HRPC Pilot Recycling Internal Process Overview



CAPR Quality Audit Data Summary

Audit Date	10-Jul-12
Department	CAPR
# of Beds	20
Average # Patients / Day	25
Total # of Audits	3
Total # Cases Represented	21

Audit Results Summary

Waste Type	Weight (lbs)	Per Case Weight (lbs)
Recyclable	15.31	0.73

Recyclables by Category

Category	Weight (lbs)	Per Case Weight (lbs)	% by Weight
Paper	11.11	0.53	73%
Film Plastic	2.40	0.11	16%
Rigid Plastic	1.80	0.09	12%
Foil	0.00	0.00	0%
Tyvek®	0.00	0.00	0%
Blue Wrap	0.00	0.00	0%
Total Plastics	4.20	0.20	27%

Department Overview:

The Cath-Angio Pre-op and Recovery Department (CAPR) provides patient care before and after procedures in Cath Angio Lab. (A small number of minor invasive procedures are performed in the unit as well.)

Audit Notes:

The CAPR quality waste audit evaluated recycled waste for diversion rate and separation quality, over the course of one full work-day. The pre- and post-procedure areas in the target study generated a relatively small volume of recyclable waste. As the very first waste audit, recycled waste was evaluated by material category, but no weights were obtained for total waste volume, nor were film and rigid plastics further categorized by plastic type. We assumed a 7% diversion rate based on analysis of similar departments.

Note: CAPR has been recycling since March, 2012.

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Cath-Angio Initial Waste Audit Data Summary

Date	1-Aug-12 - 2-Aug-12
Department	Cath-Angio
# of Procedure Rooms	14
Total # of Audits	14

Audit Results Summary			
Waste Type	Weight (lbs)	Per Case Weight (lbs)	% by Weight
Non-recyclable	10.15	0.73	32%
Recyclable	21.79	1.56	68%

Recyclables by Category			
Category	Weight (lbs)	Per Case Weight (lbs)	% by Weight
Film Plastic	7.85	0.56	36%
Rigid Plastic	6.75	0.48	31%
Paper	5.16	0.37	24%
Tyvek®	1.19	0.08	5%
Blue Wrap	0.81	0.06	4%
Foil	0.02	0.00	0%
Total Plastics	16.61	1.19	76%

Department Overview:
The Cath Angio Lab specializes in adult and pediatric Interventional Cardiology, Electrophysiology, Neuroradiology, and Interventional Radiology.

Audit Notes:

The Cath-Angio inital waste audit evaluated pre-case waste for recyclable potential. The audit data denotes two functional areas of Cath Angio: Cath-Lab and Interventional Radiology. The original diversion rate is a percentage of pre-case waste only, indicating that 68% of pre-case waste is recyclable. A corrected diversion rate (15%) was obtained by weighing total waste (recyclable and non-recyclable) during a series of follow-up quick audits detailed on the 'Cath-Angio Progress Report' page.

Note: Cath-Angio launched clinical recycling in August 2012.

Stanford Hospital / HPRC Plastics Recycling Pilot

Cath-Angio Waste Audit Data

Waste Audit	Cath-Lab										Interventional Radiology			
Audit Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Date	8/1/12	8/1/12	8/1/12	8/1/12	8/1/12	8/1/12	8/1/12	8/1/12	8/1/12	8/1/12	8/1/12	8/2/12	8/2/12	8/2/12
Case Type	Biopsy	Device Implant (Pacemaker)	Cardiac Catheterization	Upper Extremity Angiography	Right Heart Catheterization & Biopsy	Electro-physiology Intervention	Cardiac Catheterization	(Pediatric) Cardiac Catheterization & Biopsy	Fistulagram	Biopsy	Radio-embolization	Transjugular Biopsy	(IVC) Venous Filter Placement	Thrombolysis, Deep Vein Thrombosis
Total Pre-case collection (lbs)	1.98	4.31	2.40	1.21	1.69	4.00	1.58	1.56	2.18	1.91	1.54	2.35	2.90	2.64
Non-Recyclable Waste (lbs)	0.43	1.56	1.56	0.46	0.70	0.99	0.92	0.18	0.70	0.04	0.66	0.51	0.99	0.44
Recyclable Waste (lbs)	1.49	2.68	0.77	0.68	0.92	3.014	0.66	1.386	1.474	1.87	0.88	1.85	1.91	2.20
% Recyclable Waste by Weight	75%	62%	32%	56%	55%	75%	42%	89%	68%	98%	57%	79%	66%	83%
Material Category	**Material Weight (lbs)**													
Paper	0.39	1.08	0.09	0.02	0.33	0.70	0.22	0.44	0.55	0.40	0.09	0.31	0.33	0.22
Film Plastic	0.62	0.84	0.40	0.31	0.44	0.51	0.40	0.33	0.42	0.75	0.40	0.59	1.25	0.62
Rigid Plastic	0.20	0.59	0.24	0.31	0.09	1.65	0.02	0.15	0.46	0.66	0.31	0.62	0.18	1.28
Foil	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Blue Wrap	0.22	0.13	0.00	0.00	0.00	0.00	0.00	0.37	0.00	0.00	0.00	0.09	0.00	0.00
Tyvek®	0.07	0.02	0.04	0.04	0.07	0.15	0.02	0.09	0.04	0.07	0.09	0.24	0.15	0.09
Rigid Plastics	**Material Weight (lbs)**													
Corrugated	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Blue Tint	0.00	0.00	0.00	0.04	0.04	0.11	0.00	0.04	0.04	0.22	0.00	0.00	0.07	0.11
Opaque	0.20	0.59	0.24	0.26	0.04	1.19	0.02	0.11	0.42	0.22	0.20	0.59	0.00	1.17
Bottles	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00
Other	0.00	0.00	0.00	0.00	0.00	0.35	0.00	0.00	0.00	0.22	0.00	0.02	0.11	0.00
Film Plastics	**Material Weight (lbs)**													
Chevron Peel Pack	0.13	0.15	0.09	0.00	0.09	0.09	0.07	0.07	0.07	0.09	0.07	0.22	0.15	0.15
Vent Bag	0.26	0.26	0.20	0.20	0.20	0.26	0.20	0.20	0.20	0.26	0.26	0.26	0.26	0.00
Linear Tear Bag	0.09	0.09	0.00	0.00	0.07	0.02	0.02	0.02	0.04	0.04	0.02	0.04	0.22	0.18
Formed Cavity	0.13	0.18	0.07	0.02	0.07	0.07	0.07	0.04	0.07	0.20	0.04	0.04	0.18	0.02
Header Bag	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other	0.00	0.15	0.04	0.09	0.02	0.07	0.00	0.00	0.04	0.15	0.00	0.02	0.44	0.26

Cath-Angio Progress Report

Initial Waste Audit Summary: 1 Aug 2012 - 2 Aug 2012	
Average Pre-Case Total Waste (lbs)	2.28
Average Recyclable / Case (lbs)	1.56

'Quick Weights' - Post Case Waste Volumes: 24 Aug 2012					
Room *(1st case in each room)*	Room 5	Room 6	Room 8	Room 9	Room 10
Post-Case Waste (lbs)	14.63	18.018	12.32	13.244	21.45
Total Recycled (lbs)	2.75	3.06	2.16	2.99	2.97

'Quick Weights' - Data Summary: 24 Aug 2012		
Average Post-Case Waste (lbs)	15.93	**% of Total Case Weight Recycled**
Average Post Case Recyclables (lbs)	2.79	15%

The Cath-Angio waste audit analyzed pre-case waste for recyclability. While this study provided the detailed information desired on recyclable material type and volume, non-recyclable waste was not initially weighed, offering no diversion weight. At the completion of clinical recycling launch, a series of quick weights were obtained on recyclable and non-recyclable waste generated during procdures, providing an average diversion rate.

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Ambulatory Surgery Center (ASC) Quality Waste Audit Data Summary

Date	20-Aug-12
Department	Ambulatory Surgery Center (ASC)
# of Procedure Rooms	12
Total # of Audits	10

Audit Results Summary

Waste Type	Weight (lbs)	Per Case Weight (lbs)	% by Weight
Non-Recyclable	158.60	15.86	87%
Recyclable	24.02	2.40	13%

Department Overview:

Ambulatory Surgery Center (ASC) performs adult and pediatric outpatient and inpatient procedures, including General, Head and Neck, Orthopedics, Gynecology, Plastics, Otolaryngology, Urology, Neurology, Ophthalmic Plastic Surgeries and Pain Clinic procedures. ASC also assists patients with Electroconvulsive Therapy (ECT)

Recyclables by Category

Category	Weight (lbs)	Per Case Weight (lbs)	% by Weight
Blue Wrap	9.44	0.94	39%
Film Plastic	7.28	0.73	30%
Paper	3.50	0.35	15%
Rigid Plastic	3.23	0.32	13%
Tyvek®	0.44	0.04	2%
Foil	0.13	0.01	1%
Total Plastics	20.39	2.04	85%

Audit Notes:

The ASC quality waste audit evaluated recyclable waste for diversion rate and separation quality. Quick weights were obtained on non-recyclable waste. The ASC audit reflects a relatively low diversion rate, compared with the Main OR. This reflects a difference in case type, versus sort quality. For example; the cases audited in ASC feature a smaller percentage of Blue Wrap, and a larger percentage of film plastics, compared with cases audited in MOR.

Note: ASC has been recycling since November, 2011.

Stanford Hospital / HPRC Plastics Recycling Pilot

ASC Waste Audit Data

Waste Audit	Ambulatory Surgery Center									
Audit Number	1	2	3	4	5	6	7	8	9	10
Date	8/20/12	8/20/12	8/20/12	8/20/12	8/20/12	8/20/12	8/20/12	8/20/12	8/20/12	8/20/12
Case Type	Soft Palate Biopsy (Endoscopic)	Endoscopic Sinus Surgery with Balloon Dilation	Eye Tube Shunt	Cochlear Implant, Skin Graft, Muscle Flap	Upper Airway (Nose and Throat) Resection & Repair	Mastectomy, Lymph Node Dissection	Dental Surgery: Xrays, Fillings, Crowns, Extractions	Revision of Artifical Urinary Sphincter	Hand Flap Revision, Skin Graft Fingers	Open Reduction Internal Fixation - Finger Fractures
Total Waste Volume (lbs)	11.48	12.74	9.50	23.30	25.81	22.99	13.13	15.05	26.00	22.62
Non-Recyclable Waste (lbs)	10.54	11.86	8.91	19.84	22.42	18.96	12.34	13.46	22.42	17.84
Recyclable Waste (lbs)	0.95	0.88	0.59	3.45	3.39	4.03	0.79	1.58	3.59	4.77
% Recycled by Weight	8%	7%	6%	15%	13%	18%	6%	11%	14%	21%

Material Category	Material Weight (lbs)									
Paper	0.04	0.22	0.11	0.55	0.40	0.51	0.15	0.33	0.77	0.42
Film Plastic	0.55	0.40	0.22	0.99	1.32	1.21	0.35	0.64	0.99	0.62
Rigid Plastic	0.00	0.02	0.09	0.09	0.75	0.53	0.00	0.15	0.55	1.06
Foil	1 wrapper	0.00	1 wrapper	0.02	1 wrapper	0.02	0.02	1 wrapper	0.07	1 wrapper
Blue Wrap	0.33	0.22	0.15	1.74	0.88	1.69	0.24	0.40	1.14	2.64
Tyvek®	0.02	0.02	0.02	0.07	0.04	0.07	0.02	0.07	0.07	0.04

Rigid Plastics	Material Weight (lbs)									
Corrugated	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Blue Tint	0.00	0.00	0.04	0.04	0.04	0.02	0.00	0.00	0.00	0.00
Opaque	0.00	0.00	0.02	0.00	0.40	0.51	0.00	0.00	0.00	0.44
Bottles	0.00	0.00	0.00	0.00	0.29	0.00	0.00	0.11	0.40	0.55
Other	0.00	0.02	0.02	0.04	0.02	0.00	0.00	0.04	0.15	0.07

Film Plastics	Material Weight (lbs)									
Chevron Peel Pack	0.07	0.07	0.07	0.31	0.31	0.35	0.11	0.18	0.24	0.18
Vent Bag	0.26	0.26	0.13	0.55	0.95	0.44	0.00	0.35	0.44	0.35
Linear Tear Bag	0.20	0.04	0.00	0.09	0.00	0.33	0.22	0.09	0.07	0.02
Formed Cavity	0.02	0.02	0.02	0.02	0.07	0.09	0.02	0.02	0.15	0.07
Header Bag	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.09	0.00

ASC / IR Pre-op & PACU Initial Audit Data Summary

Date	19-Sep-12
Department	ASC/IR Pre-Op & PACU
# of Beds	40
Average # Patients / Day	45
Total # of Audits	3
# patients represented	40

Audit Results Summary

Waste Type	Weight (lbs)	Per Case Weight (lbs)	% by Weight
Non-Recyclable	27.41	0.69	94%
Recyclable	1.83	0.05	6%

Recyclables by Category

Category	Weight (lbs)	Per Case Weight (lbs)	% by Weight
Film Plastic	1.10	0.028	60%
Paper	0.51	0.013	28%
Rigid Plastic	0.20	0.005	11%
Tyvek®	0.02	0.001	1%
Blue Wrap	0.00	0.000	0%
Foil	0.00	0.000	0%
Total Plastics	1.32	0.033	72%

Department Overview:

ASC/IR Pre-Op and PACU provides patient care before and after procedures in the Ambulatory Surgery Center and Interventional Radiology.

Audit Notes:

The ASC/IR Pre-Op & PACU initial waste audit evaluated departmental waste for recyclable potential, over the course of one full work-day. The ASC Pre-op and PACU shares a workspace footprint with the Interventional Radiology Pre-op & PACU department. For the purposes of the pilot study, we evaluated both departments' waste profile together.

Note: ASC/IR Pre-op & PACU launched clinical recycling in October 2012.

Stanford Hospital / HPRC Plastics Recycling Pilot

ASC/IR Pre-op/PACU Waste Audit Data

Waste Audit	Ambulatory Surgery Center Pre-Op and PACU						
Room	Pre-Op	PACU	Pre-Op	PACU	Pre-Op	PACU	PACU: 3 lg bins
Date	9/19/12	9/19/12	9/19/12	9/19/12	9/19/12	9/19/12	9/19/12
Collection Time	10am	10am	12pm	12pm	230pm	230pm	end of shift pull
Total Waste Volume (lbs)	4.80	6.80	2.77	1.96	3.48	3.65	5.79
Non-Recyclable Waste (lbs)	3.87	6.56	2.62	1.91	3.17	3.50	5.79
Recyclable Waste (lbs)	0.92	0.24	0.15	0.04	0.31	0.15	0.00
% Recycled by Weight	19%	4%	6%	2%	9%	4%	0%

Material Category	Material Weight (lbs)						
Paper	0.26	0.07	0.04	<.01	0.11	0.02	0.00
Film Plastic	0.59	0.13	0.07	0.04	0.15	0.11	0.00
Rigid Plastic	0.07	0.02	0.04	<.01	0.04	0.02	0.00
Foil	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Blue Wrap	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tyvek®	2 pieces	0.01	4 small pieces	0.00	5 small pieces	6 pieces	0.00

Rigid Plastics	Material Weight (lbs)						
Corrugated	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Blue Tint	1 piece	0.00	1 piece	0.00	1 piece	0.00	0.00
Opaque	0.07	0.02	0.04	<.01	0.04	0.02	0.00
Bottles	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Film Plastics	Material Weight (lbs)						
Chevron Peel Pack	0.02	0.04	<.01	0.01	<.01	<.01	0.00
Vent Bag	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Linear Tear Bag	0.51	0.04	0.02	0.02	0.13	0.09	0.00
Formed Cavity	0.07	0.04	0.04	0.01	0.02	<.01	0.00
Header Bag	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other	0.00	0.00	0.00	0.00	0.00	0.02	0.00

Main Operating Room (MOR) Audit Data Summary

Date	27-Nov-12
Department	Main Operating Room (MOR)
# of Procedure Rooms	21
Total # of Audits	11

Audit Results Summary

Waste Type	Weight (lbs)	Per Case Weight (lbs)	% by Weight
Non-Recyclable	242.29	22.03	77%
Recyclable	71.70	6.52	23%

Recyclables by Category

Category	Weight (lbs)	Per Case Weight (lbs)	% by Weight
Blue Wrap	33.66	3.06	47%
Paper	16.48	1.50	23%
Rigid Plastic	11.09	1.01	15%
Film Plastic	8.95	0.81	12%
Tyvek®	1.30	0.12	2%
Foil	0.22	0.02	0%
Total Plastics	55.00	5.00	77%

Department Overview:

Main OR (MOR) specializes in adult surgical procedures including Cardiac, Thoracic, Vascular, Neurosurgery, Orthopedics, Otolaryngology, Head and Neck, Plastics, General, Gynecology, Urology, Transplants, and Robotics.

Audit Notes:

The MOR quality waste audit evaluated post-case waste for diversion rate and separation quality. The assessment was conducted as part of a recycling quality improvement initiative. The initial diversion rate of 23% reflects baseline waste diversion (before quality improvement efforts). A corrected diversion rate (31%) was obtained after quality improvement efforts, during a series of follow-up quick waste audits detailed on the 'MOR Progress Report' page.

Note: MOR has been recycling since September, 2011.

Stanford Hospital / HPRC Plastics Recycling Pilot

MOR Waste Audit Data

Waste Audit	Main OR										
Audit Number	1	2	3	4	5	6	7	8	9	10	11
Date	11/27/12	11/27/12	11/27/12	11/27/12	11/27/12	11/27/12	11/27/12	11/27/12	11/27/12	11/27/12	11/27/12
Case Type	Knee Replacement (Uni-compartmental)	Knee Replacement	Lumbar Micro-Diskectomy	Rib Resection	Laproscopic Gastrectomy	Hip Replacement	Wound-Vac Change	Laproscopic Gastric Bypass	Femoral Nail Insertion	Knee Replacement	Knee Total Joint
Total Waste Volume (lbs)	33.31	37.95	22.73	27.63	28.07	31.90	17.86	30.05	27.21	38.85	18.41
Non-Recyclable Waste (lbs)	27.08	27.35	21.47	21.16	20.90	24.20	16.72	20.90	20.90	28.80	12.80
Recyclable Waste (lbs)	6.23	10.60	1.25	6.47	7.17	7.70	1.14	9.15	6.31	10.05	5.61
% Recycled by Weight	19%	28%	6%	23%	26%	24%	6%	30%	23%	26%	30%

Material Category	Material Weight (lbs)										
Paper	1.01	2.77	0.24	0.90	1.74	1.78	0.33	1.89	1.83	2.57	1.41
Film Plastic	1.36	0.88	0.33	1.01	0.62	0.51	0.79	1.14	0.31	1.19	0.81
Rigid Plastic	0.84	1.19	0.04	1.28	1.78	0.62	0.02	2.31	1.10	1.47	0.44
Foil	0.04	0.02	0.02	0.02	0.00	<.01	0.00	0.02	0.04	0.02	0.02
Blue Wrap	2.71	5.61	0.57	3.08	2.86	4.73	0.00	3.52	3.04	4.77	2.77
Tyvek®	0.26	0.13	0.04	0.18	0.18	0.07	0.00	0.26	0.00	0.02	0.15

Rigid Plastics	Material Weight (lbs)										
Corrugated	0.00	0.07	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00
Blue Tint	0.26	0.97	0.02	0.62	1.19	0.26	0.02	1.47	0.44	0.33	0.44
Opaque	0.20	0.15	0.00	0.53	0.59	0.02	0.00	0.57	0.40	0.22	0.00
Bottles	0.13	0.00	0.00	0.13	0.00	0.26	0.00	0.26	0.26	0.40	0.00
Other	0.24	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.53	0.00

Film Plastics	Material Weight (lbs)										
Chevron Peel Pack	0.44	0.37	0.13	0.11	0.13	0.29	0.22	0.31	0.18	0.53	0.33
Vent Bag	0.37	0.22	0.00	0.04	0.04	0.13	0.40	0.22	0.13	0.31	0.15
Linear Tear Bag	0.07	0.09	0.15	0.07	0.07	0.02	0.07	0.15	0.00	0.11	0.15
Formed Cavity	0.29	0.13	0.02	0.57	0.31	0.02	0.11	0.33	0.00	0.24	0.13
Header Bag	0.09	0.04	0.00	0.22	0.04	0.00	0.00	0.00	0.00	0.00	0.02
Other	0.11	0.02	0.02	0.00	0.02	0.04	0.00	0.13	0.00	0.00	0.02

Stanford Hospital / HPRC Plastics Recycling Pilot

Main Operating Room (MOR) Progress Report

Initial Waste Audit Summary: 27 Nov. 2012	
Average Pre-Case Total Waste (lbs)	22.03
Average Recyclable / Case (lbs)	6.52

'Quick Weights' - Post Case Waste Volumes: 28 Mar 2013										
Room *(1st case in each room)*	Room 3	Room 5	Room 6	Room 8	Room 10	Room 11	Room 13	Room 16	Room 18	Room 20
Post-Case Waste (lbs)	28.76	22.35	15.32	14.23	24.15	21.65	25.85	22.45	15.43	25.67
Total Recycled (lbs)	7.25	9.30	8.21	9.29	9.72	10.33	11.46	8.99	11.45	10.65

'Quick Weights' - Data Summary: 28 Mar 2013		
Average Post-Case Waste (lbs)	21.59	**% of Total Case Weight Recycled**
Average Post Case Recyclables (lbs)	9.67	**31%**

The Main Operating Room (MOR) waste audit was conducted as part of a quality improvement initiative within the existing recycling program. Waste diversion rate, therefore, was skewed lower due to reduced collection volumes within the MOR. At the completion of our quality improvement work, a series of quick weights were obtained on recyclable and non-recyclable waste generated during procdures, providing a more accurate diversion rate.

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Main OR SAU & PACU Initial Waste Audit Data Summary

Date	12-Dec-12
Department	Main OR SAU & PACU
# of Beds	34
Average # Patients / Day	50
Total # of Audits	4
Representing # Cases	45

Audit Results Summary

Waste Type	Weight (lbs)	Per Case Wt (lbs)	% by Weight
Non-Recyclable	34.19	0.76	88%
Recyclable	4.82	0.11	12%

Recyclables by Category

Category	Weight (lbs)	Per Case Wt (lbs)	% by Weight
Rigid Plastic	2.42	0.05	50%
Paper	1.41	0.03	29%
Film Plastic	0.90	0.02	19%
Tyvek®	0.09	0.00	2%
Foil	0.00	0.00	0%
Blue Wrap	0.00	0.00	0%
Total Plastics	3.41	0.08	71%

Department Overview:

The Main OR Pre-Op or Surgery Admission Unit (SAU) and Post-Anesthesia Care Unit (PACU) provides patient care before and after surgical procedures in the Main OR.

Audit Notes:

The MOR SAU & PACU initial waste audit evaluated departmental waste for recyclable potential, over the course of one full work-day. The MOR SAU waste assessment includes waste generated during spinal block procedures performed by anesthesia. Waste generated by the Main OR Pre-Anesthesia Clinic is also included in departmental waste assessment data. Waste audit for the MOR Pre-Anesthesia Clinic was analyzed separately, due to the highly different clinical functions of both areas. Pre-Anesthesia waste audit summary page follows.

Note: MOR SAU & PACU, including MOR Pre-Anesthesia Clinic, launched clinical recycling in January, 2013.

Main OR Pre-Anesthesia Clinc Initial Waste Audit Data Summary

Date	12-Dec-12
Department	MOR Pre-Anesthesia Clinic
# of Beds	5
Average # Patients / Day	50
Total # of Audits	1
Representing # Cases	1

Audit Results Summary

Waste Type	Weight (lbs)	Per Case Wt (lbs)	% by Weight
Non-Recyclable	2.20	0.04	40%
Recyclable	3.30	0.07	60%

Recyclables by Category

Category	Weight (lbs)	Per Case Wt (lbs)	% by Weight
Paper	2.20	2.20	67%
Rigid Plastic	0.55	0.01	17%
Film Plastic	0.55	0.55	17%
Tyvek®	0.00	0.00	0%
Foil	0.00	0.00	0%
Blue Wrap	0.00	0.00	0%
Total Plastics	1.10	0.02	33%

Department Overview:

Main OR Pre-Anesthesia clinic evaluates and educates outpatients who have upcoming scheduled surgeries in MOR.

Audit Notes:

The MOR Pre-Anesthesia Clinic (PAC) initial waste audit evaluated departmental waste for recyclable potential, as part of the MOR SAU/PACU departmental waste assessment. Waste volume for the MOR Pre-Anesthsia Clinic was measured for one patient, and extrapolated per daily patient volume, due to consistent waste profile of each patient visit. Waste audit for the MOR Pre-Anesthesia Clinic was analyzed separately, due to the highly different clinical functions of both areas. MOR SAU/PACU waste summary preceeds this page.

Note: MOR SAU & PACU, including MOR Pre-Anesthesia clinic, launched clinical recycling in January, 2013.

Stanford Hospital / HPRC Plastics Recycling Pilot

MOR SAU/PACU/PAC Waste Audit Data

Waste Audit	Main O.R. Pre-Op and PACU								
Room	Pre-Op	PACU	Pre-Op	PACU	Pre-Op	PACU	Pre-Op	PACU	Pre-Anesthesia Clinic
Date	12/12/12	12/12/12	12/12/12	12/12/12	12/12/12	12/12/12	12/12/12	12/12/12	12/12/12
Collection Time	8am	8am	11am	11am	2pm	2pm	4pm	4pm	estimated *(see below)*
Total Waste Volume (lbs)	4.05	4.88	4.53	4.53	5.70	7.77	1.89	5.65	5.50
Non-Recyclable Waste (lbs)	2.51	4.75	3.45	4.53	4.38	7.28	1.80	5.48	2.20
Total Recyclable Waste (lbs)	1.54	0.13	1.08	0.00	1.32	0.48	0.09	0.18	3.30
% Recycled by Weight	38%	3%	24%	0%	23%	6%	5%	3%	60%

Material Category	Material Weight (kg)								
Paper	0.55	0.07	0.42	0.00	0.31	0.04	0.02	0.00	0.04
Film Plastic	0.20	0.04	0.15	0.00	0.15	0.15	0.07	0.13	0.01
Rigid Plastic	0.79	0.00	0.48	0.00	0.81	0.29	0.00	0.04	0.01
Foil	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Blue Wrap	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tyvek®	<.01	0.02	0.02	0.00	0.04	0.00	0.00	0.00	0.00

Rigid Plastics	Material Weight (kg)								
Corrugated	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Blue Tint	0.55	0.00	0.29	0.00	0.64	0.29	0.00	0.00	0.01
Opaque	0.15	0.00	0.18	0.00	0.15	0.00	0.00	0.04	0.00
Bottles	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other	0.09	0.00	0.02	0.00	0.02	0.00	0.00	0.00	0.00

Film Plastics	Material Weight (kg)								
Chevron Peel Pack	0.07	0.02	0.07	0.00	0.09	0.00	0.00	0.00	0.00
Vent Bag	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Linear Tear Bag	0.04	0.00	0.04	0.00	0.02	0.15	0.04	0.13	0.00
Formed Cavity	0.09	0.02	0.04	0.00	0.02	0.00	0.02	0.00	0.01
Header Bag	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00

Main O.R. Pre-Anesthesia Clinc						
Waste Analysis					Average # Patients /Day	50
Waste Generated per Patient Visit		Weights (lbs)				
Items:		Recyclable	Municipal	Total Waste	Summary	Weight (lbs)
Paper Table Liner, Tear Pack Tops		0.04	0.00		Daily Recycle Potential	3.30
Gloves		0.00	0.04		Daily Municipal Waste	2.20
Rigid Blue Tint Package		0.01	0.00		Daily Total Waste	5.50
3D-Formed Cavity Package		0.01	0.00			
	Total	0.07	0.04	0.11		
	Percentage	60%	40%			

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Pharmacy Initial Audit Data Summary

Date	12-Feb-13
Department	Pharmacy
# of Pharmacies	11 total
Average # Orders /Day	14,553
Total # of Audits	20
Representing # Cases	14,553

Audit Results Summary

Waste Type	Weight (lbs)	Per Case Wt (lbs)	% by Weight
Non-Recyclable	48.29	0.003	30%
Recyclable	110.04	0.008	70%

Recyclables by Category

Category	Weight (lbs)	Per Case Wt (lbs)	% by Weight
Paper	86.55	0.006	79%
Film Plastic	17.51	0.001	16%
Rigid Plastic	5.81	0.000	5%
Tyvek®	0.18	0.000	0%
Foil	0.00	0.000	0%
Blue Wrap	0.00	0.000	0%
Total Plastics	23.50	0.002	21%

Department Overview:

The Pharmacy Department provides pharmaceutical services for the hospital, including medication delivery,therapeutic recommendations, and promotion of optimal drug therapy.

Audit Notes:

The pharmacy initial waste audit evaluated departmental waste for recyclable potential, over the course of one full work-day. Waste was collected and audited from each pharmacy location: Main Pharmacy, and each satellite pharmacy location. While there were some variations in waste type and volume per each location, the majority of recyclables measured were paper via medication boxes and large paper package inserts.

Note: Pharmacy will launch clinical recycling in 2013.

Stanford Hospital / HPRC Plastics Recycling Pilot

Pharmacy Waste Audit Data

Waste Audit	Pharmacy																			
Room	MAIN	MAIN	MAIN	MAIN	MAIN	MOR	MOR	B2	B2	ITA	ITA	D1	D1	D2	D2	FGR	FGR	B3	B3	E3
Date	2/11/13	2/11/13	2/11/13	2/12/13	2/12/13	2/11/13	2/12/13	2/22/13	2/22/13	2/22/13	2/22/13	2/22/13	2/22/13	2/22/13	2/22/13	2/22/13	2/22/13	2/22/13	2/22/13	2/22/13
Collection Time	10am	2pm	7pm	10am	2pm	2pm	2pm	12pm	4pm	12pm	4pm	12pm	4pm	12pm	4pm	12pm	4pm	12pm	4pm	12pm
Total Waste Volume (lbs)	23.69	18.33	13.42	26.75	25.50	4.97	10.19	3.04	1.52	9.86	0.64	5.28	0.24	4.16	0.70	2.97	1.52	1.94	2.05	1.58
Non-Recyclable Waste (lbs)	5.81	4.00	1.14	8.62	6.38	1.17	2.90	1.50	0.86	2.55	0.64	4.95	0.07	2.07	0.35	2.16	0.68	0.95	0.88	0.62
Recyclable Waste (lbs)	17.89	14.32	12.28	18.13	19.12	3.81	7.28	1.54	0.66	7.30	0.00	0.33	0.18	2.09	0.35	0.81	0.84	0.99	1.17	0.97
% Recycled by Weight	75%	78%	91%	68%	75%	77%	71%	51%	43%	74%	0%	6%	73%	50%	50%	27%	55%	51%	57%	61%

Material Category	Material Weight (lbs)																			
Paper	9.02	12.76	10.98	16.76	17.40	2.55	5.04	0.88	0.26	6.97	0.00	0.15	0.00	0.97	0.11	0.35	0.53	0.64	0.73	0.44
Film Plastic	6.36	0.15	1.25	1.14	1.45	1.17	2.16	0.42	0.26	0.22	0.00	0.09	0.18	0.88	0.22	0.37	0.26	0.15	0.35	0.42
Rigid Plastic	2.35	1.41	0.04	0.20	0.26	0.09	0.09	0.24	0.13	0.11	0.00	0.09	0.00	0.24	0.02	0.09	0.04	0.20	0.09	0.11
Foil	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Blue Wrap	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tyvek®	0.15	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Rigid Plastics	Material Weight (lbs)																			
Corrugated	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Blue Tint	0.02	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
Opaque	0.55	0.00	0.00	0.04	0.07	0.07	0.00	0.07	0.13	0.11	0.00	0.00	0.00	0.13	0.02	0.00	0.04	0.20	0.09	0.11
Bottles	1.45	0.09	0.04	0.09	0.09	0.00	0.00	0.15	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other	0.33	1.32	0.00	0.04	0.11	0.02	0.09	0.02	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.09	0.00	0.00	0.00	0.00

Film Plastics	Material Weight (lbs)																			
Chevron Peel Pack	0.48	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00
Vent Bag	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Linear Tear Bag	4.18	0.00	0.02	0.00	0.97	0.62	1.32	0.15	0.13	0.00	0.00	0.00	0.13	0.57	0.11	0.07	0.13	0.09	0.18	0.02
Formed Cavity	1.19	0.00	0.04	0.00	0.22	0.37	0.51	0.13	0.02	0.00	0.00	0.00	0.02	0.31	0.02	0.24	0.13	0.07	0.09	0.15
Header Bag	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other	0.51	0.15	1.19	1.14	0.26	0.18	0.33	0.11	0.11	0.22	0.00	0.09	0.02	0.00	0.09	0.07	0.00	0.00	0.07	0.24

Radiology Initial Audit Data Summary

Date	12-Feb-13
Department	Radiology
# of clinical divisions	7
Average # Exams / Day	453
Total # of Audits	8
Representing # Cases	488

Audit Results Summary

Waste Type	Weight (lbs)	Per Exam Wt (lbs)	% by Weight
Non-Recyclable	71.81	0.15	76%
Recyclable	22.64	0.05	24%

Recyclables by Category

Category	Weight (lbs)	Per Exam Wt (lbs)	% by Weight
Glass	7.37	0.02	33%
Rigid Plastic	7.00	0.01	31%
Paper	4.73	0.01	21%
Film Plastic	2.99	0.01	13%
Tyvek®	0.55	0.00	2%
Foil	0.00	0.00	0%
Blue Wrap	0.00	0.00	0%
Total Plastics	10.54	0.02	47%

Department Overview:

The Radiology Department provides state of the art imaging services for inpatient and outpatient clients.

Audit Notes:

The Radiology initial waste audit evaluated departmental waste for recyclable potential, over the course of one full work-day. Waste was collected and audited from each radiology location representing the department's eight functional clinical areas. Waste profile varied widely according to clinical function. 'Per-exam' unit weights are based on an average of total departmental waste, the same method used in all other summaries. Diversion projections, including actual diversion rate, are based on calculations per functional clinical area, due to differences in productivity among all areas.

Note: Radiology will launch clinical recycling in 2014.

Stanford Hospital / HPRC Plastics Recycling Pilot

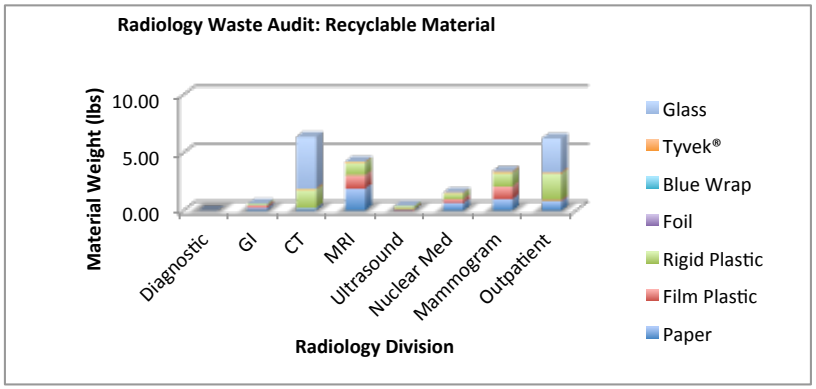
Radiology Waste Audit Data

Waste Audit	Radiology							
Room	Diagnostic	GI	CT	MRI	Ultrasound	Nuclear Med	Mammogram	Outpatient
Date	2/27/13	2/27/13	2/27/13	2/27/13	2/27/13	2/27/13	2/27/13	2/27/13
Collection Time	End of day	End of day	End of day	End of day	End of day	End of day	End of day	End of day
Total Waste Volume (lbs)	4.31	9.33	26.16	15.27	5.39	7.96	12.14	13.88
Non-Recyclable Waste (lbs)	4.31	8.78	19.80	11.04	5.02	6.42	8.76	7.68
Recyclable Waste (lbs)	0.00	0.55	6.36	4.22	0.37	1.54	3.39	6.20
% Recycled by Weight	0.00	0.06	0.24	0.28	0.07	0.19	0.28	0.45

Material Category	Material Weight (lbs)							
Paper	0.00	0.20	0.20	1.89	0.04	0.64	0.97	0.79
Film Plastic	0.00	0.22	0.02	1.14	0.07	0.35	1.10	0.09
Rigid Plastic	0.00	0.13	1.56	1.10	0.26	0.48	1.17	2.29
Foil	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Blue Wrap	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tyvek®	0.00	0.00	0.11	0.09	0.00	0.07	0.15	0.13
Glass	0.00	0.00	4.47	0.00	0.00	0.00	0.00	2.90

Rigid Plastics	Material Weight (lbs)							
Corrugated	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Blue Tint	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
Opaque	0.00	0.00	1.34	0.73	0.26	0.20	1.06	1.80
Bottles	0.00	0.13	0.22	0.00	0.00	0.29	0.00	0.46
Other	0.00	0.00	0.00	0.37	0.00	0.00	0.11	0.00

Film Plastics	Material Weight (lbs)							
Chevron Peel Pack	0.00	0.09	0.02	0.22	0.00	0.00	0.26	<.01
Vent Bag	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Linear Tear Bag	0.00	0.00	0.00	0.24	0.00	0.02	0.00	0.00
Formed Cavity	0.00	0.11	0.00	0.31	0.07	0.13	0.66	0.04
Header Bag	0.00	0.00	0.00	0.22	0.00	0.00	0.00	0.00
Other	0.00	0.02	0.00	0.15	0.00	0.20	0.18	0.04



Appendix 2b: Beyond the HPRC Pilot Study

The Stanford Hospital & Clinics / HPRC plastics recycling pilot officially concluded in March 2013. Stanford Hospital & Clinics continues to grow the Clinical Recycling Program beyond the scope of the study. During the pilot study, the initial waste audit process provided baseline weights of the municipal and recyclable waste profiles, as well as information on recyclable waste sources and generation patterns throughout the entire observation period. This provides information for diversion estimates, and strategic implementation of the recycling program. Therefore continue to collect waste audit data as we expand the hospital recycling program.

Methodology, including adjustments remain unchanged from those of the pilot study. The three additional clinical settings do differ from those in the study and are highlighted below.

Clinical Settings

Endoscopy includes a mixture of clean (versus sterile) procedure rooms, exam rooms, pre-and post-procedure patient care bays, and a central nurses' station. This essentially blends the procedural area recyclables profile with a patient care area recyclables profile.

G2P/G2S houses two separate inpatient nursing care units combined geographical location (G2), separated by doors. G2P delivers care to low acuity, ambulatory patients who require minimal clinical intervention. G2S is a small, eight bed unit, specializing in post surgical patient care. The waste analysis reflects the low levels of clinical packaging generated, as we analyzed waste from med rooms, central nursing station, nourishment rooms, charting rooms, staff lounges, and departmental offices.

ITA (Infusion Treatment Area) provides outpatient cancer care and infusion services to patients in an ambulatory setting. There are 68 total treatment areas, a satellite pharmacy, offices, charting areas, and staff lounges. This waste profile reflects a combination of the patient care area and ancillary care setting as designated in the pilot study.

Waste diversion projections

Each department's unit measure (ie: weight of recyclables per case) was extrapolated by FY 2012 department productivity numbers to project annual waste diversion. Projected diversion, by the ton, is featured on the HPRC Pilot Summary page.

Waste diversion projections based on pilot study data

The Stanford Hospital and Clinics' Outpatient Surgery Center (OSC), located in Redwood City, is the next target clinical area for recycling program expansion. Rather that audit another procedural and patient care area for diversion potential, we utilized existing data to estimate material generation and source, extrapolating diversion projections. We feel that the audit data collected provides a useful base measure for guiding future program expansion within the hospital setting.

Note: Redwood City is in a different county than Palo Alto, the location of Stanford Hospital. The OSC clinical recycling project therefore represents the new challenge of establishing collection of materials in a new city, with new waste haulers and processors, under a new waste franchise agreement. Our waste diversion projections account for total recyclable waste, as well as total recyclable waste within the specific terms of the waste franchise agreement.

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Stanford Hospital / HPRC Plastics Recycling Pilot

Endoscopy Initial Audit Data Summary

Date	16-Apr-13
Department	Endoscopy
# of Rooms	8
Average # Orders /Day	40
Total # of Audits	8
Representing # Cases	40

Audit Results Summary

Waste Type	Weight (lbs)	Per Case Wt (lbs)	% by Weight
Non-Recyclable	45.12	1.13	88%
Recyclable	5.94	0.15	12%

Recyclables by Category

Category	Weight (lbs)	Per Case Wt (lbs)	% by Weight
Paper	1.21	0.03	79%
Film Plastic	3.37	0.08	16%
Rigid Plastic	0.75	0.02	5%
Tyvek®	0.51	0.01	0%
Foil	0.00	0.00	0%
Blue Wrap	0.11	0.00	0%
Total Plastics	4.73	0.12	21%

Department Overview:

The endoscopy department performs advanced gastrointestinal procedures, including ERCP, EUS, endomicroscopy, EMR, endoscopic suturing, ablations, enteroscopy, routine and avanced colonoscopy and CT colonography, in addition to other invasive and non-invasive procedures as part of the Digestive Health Center. Pre- and Post-procedure care is performed in a 14-individual bay,patient care area adjacent to procedure rooms.

Audit Notes:

The Endoscopy Department was our next Clinical Recycling activation site due to a similar clinical function as departments featured in the study, and a very engaged clinical staff eager to reduce waste. Endoscopic procedures are clean (not sterile), therefore waste is collected in lidded containers throughout the day. Waste was pulled from pre- and post procedure areas as well as active procedure rooms during a mid-day and end-of-day collection. Based on a FY2012 patient volume of 9674, annual estimated waste diversion is 1,450lbs

Note: Endoscopy Launched Clinical Recycling in May, 2013.

Stanford Hospital / HPRC Plastics Recycling Pilot

Endoscopy Waste Audit Data

Waste Audit	Endoscopy							
Room Number	2	3	4	Pre/Post	5	1	2	Pre/Post
Date	4/16/13	4/16/13	4/16/13	4/16/13	4/16/13	4/16/13	4/16/13	4/16/13
Audit Time	12:00 PM	12:00 PM	12:00 PM	12:00 PM	3:00 PM	3:00 PM	3:00 PM	3:00 PM
Total Pre-case collection (lbs)	6.95	2.90	6.29	6.18	11.48	5.41	4.69	7.15
Non-Recyclable Waste (lbs)	6.36	2.42	6.03	5.10	9.57	4.82	4.33	6.49
Recyclable Waste (lbs)	0.59	0.48	0.26	1.08	1.91	0.59	0.35	0.66
% Recyclable Waste by Weight	9%	17%	4%	17%	17%	11%	8%	9%

Material Category	Material Weight (lbs)							
Paper	0.15	0.07	0.02	0.11	0.48	0.22	0.09	0.07
Film Plastic	0.29	0.29	0.18	0.90	0.77	0.22	0.22	0.51
Rigid Plastic	0.09	0.00	0.02	0.02	0.59	0.00	0.02	0.00
Foil	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Blue Wrap	0.00	0.11	0.00	0.00	0.00	0.00	0.00	0.00
Tyvek®	0.07	0.02	0.04	0.04	0.07	0.15	0.02	0.09

Rigid Plastics	Material Weight (lbs)							
Corrugated	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Blue Tint	0.02	0.00	0.00	0.00	0.09	0.00	0.00	0.00
Opaque	0.02	0.00	0.00	0.00	0.18	0.00	0.00	0.00
Bottles	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other	0.00	0.00	0.01	0.01	0.00	0.00	0.01	0.00

Film Plastics	Material Weight (lbs)							
Chevron Peel Pack	0.04	0.00	0.00	0.04	0.33	0.02	0.02	0.00
Vent Bag	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Linear Tear Bag	0.09	0.04	0.04	0.81	0.11	0.04	0.04	0.42
Formed Cavity	0.11	0.11	0.07	0.04	0.22	0.11	0.09	0.09
Header Bag	0.00	0.09	0.04	0.00	0.04	0.00	0.04	0.00
Other	0.04	0.04	0.02	0.00	0.07	0.04	0.02	0.00

Stanford Hospital / HPRC Plastics Recycling Pilot

G2P / G2S Initial Waste Audit

Date	16-Apr-13
Department	G2P/G2S
# of Beds	24
Average # Patients /Day	17
Total # of Audits	2 timed pulls
Representing # Patients	17

Audit Results Summary

Waste Type	Weight (lbs)	Per Case Wt (lbs)	% by Weight
Non-Recyclable	58.67	3.45	85%
Recyclable	9.99	0.59	15%

Recyclables by Category

Category	Weight (lbs)	Per Case Wt (lbs)	% by Weight
Paper	7.72	0.45	77%
Rigid Plastic	2.02	0.12	20%
Film Plastic	0.22	0.01	2%
Glass	0.51	0.03	5%
Foil /Metal	0.02	0.00	0%
Tyvek®	0.00	0.00	0%
Total Plastics	2.75	0.16	28%

Department Overview:

G2P and G2S are separate inpatient nursing care units. G2P is a 14 bed unit that cares for patients under the psychiatry service, and G2S is a 10 bed post surgical care unit. Based on FY2012 productivity, G2P/G2S will divert more than 1.5 tons of waste from landfill annually.

Audit Notes:

The G2P / G2S initial waste audit is the first analysis of the inpatient nursing unit waste profile. As G2P cares for psychiatry patients, the clinical waste generated is relatively low in comparison to the average inpatient unit. G2S is a 10 bed post-surgical unit, and generates a relatively low volume of clinical recyclables as well. A large portion of recyclables generated include boxes and paper, rigid plastic patient care items such as kidney dishes (not taken into patient rooms), and plastic and glass beverage containers. Target areas audited for inpatient care units include central nurses' station, med room, charting rooms, break rooms, offices, and nourishment rooms, offering a mixed clinical and office recycling waste profile.

Note: G2P/G2S will pilot recycling in 2014.

ITA Initial Waste Audit

Date	16-Apr-13
Department	ITA
# of Rooms	68
Average # Patients /Day	222
Total # of Audits	2 timed pulls
Representing # Patients	222

Audit Results Summary

Waste Type	Weight (lbs)	Per Case Wt (lbs)	% by Weight
Non-Recyclable	154.04	0.69	78%
Recyclable	43.85	0.20	22%

Recyclables by Category

Category	Weight (lbs)	Per Case Wt (lbs)	% by Weight
Paper	22.59	0.10	52%
Rigid Plastic	10.38	0.05	24%
Film Plastic	10.10	0.05	23%
Tyvek®	0.75	0.00	2%
Glass	0.57	0.00	1%
Foil /Metal	0.02	0.00	0%
Total Plastics	21.23	0.10	50%

Department Overview:

ITA performs outpatient cancer care and infusion services as part of the Stanford Hospital and Clinics Cancer Center. In addition to infusion care, the deparment performs minor procedures, such as bone marrow biopsies, and has a six-bed apheresis unit. Based on FY 2012 productivity, ITA will divert more than 2 tons of recyclable waste from landfill annually.

Audit Notes:

The ITA waste audit analyzed waste generated in the department over the course of a full workday. This waste includes materials collected from clinical areas, limited offices, staff lounges, nurses' stations, charting areas, and the adjacent pharmacy. While the ITA pharmacy has already been audited, estimated waste diversion has not been calculated and will be adjusted for this secondary audit. As an infusion center, ITA generates a high percentage of film plastics, as IV bags and supplies are unwrapped during each patient visit. Some minor procedures such as biopsies are conducted in a small number of private rooms.

Note: ITA began practicing limited, source-separated recycling in 2013, and will pilot commingled recycling in 2014.

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G2P/G2S, ITA Waste Audit Data

Waste Audit	G2P/G2S			ITA				
Room Number	G2P/G2S	G2P/G2S	Total	ITA	ITA/Pharm	ITA	ITA/Pharm	Total
Date	8/6/13	8/7/13		8/6/13	8/6/13	8/7/13	8/7/13	
Audit Time	16:00 PM	9:00 AM		16:00 PM	16:00 PM	9:00 AM	9:00 AM	
Total Waste collection (kg)	15.42	16.02	31.44	66.06	6.71	16.09	1.35	90.21
Total Waste collection (lbs)	33.92	34.74	68.66	144.83	14.76	35.33	2.97	197.89
Non-Recyclable Waste (kg)	14.32	12.35	26.67	57.49	0.00	12.53	0.00	70.02
Non-Recyclable Waste (lbs)	31.50	27.17	58.67	126.48	0.00	27.57	0.00	154.04
Recyclable Waste (kg)	1.10	3.67	4.77	8.57	6.71	3.56	1.35	20.19
Recyclable Waste (lbs)	2.42	7.57	9.99	18.35	14.76	7.77	2.97	43.85
% Recyclable Waste by Weight	7%	22%	15%	21%		28%		22%
Material Category	**Material Weight (lbs)**							
Paper	2.07	5.65	7.72	7.17	9.90	4.14	1.39	22.59
Film Plastic	0.09	0.13	0.22	2.18	3.98	2.71	1.23	10.10
Rigid Plastic	0.26	1.76	2.02	8.71	0.55	0.81	0.31	10.38
Foil	0.00	0.02	0.02	0.00	0.02	0.00	0.00	0.02
Blue Wrap	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tyvek®	0.00	0.00	0.00	0.29	0.31	0.11	0.04	0.75
Glass	0.00	0.51	0.51	0.51	0.00	0.07	0.00	0.57
Rigid Plastics	**Material Weight (lbs)**							
Corrugated								
Blue Tint								
Opaque								
Bottles								
Other								
Film Plastics	**Material Weight (lbs)**							
Chevron Peel Pack				0.31	0.62	0.09	0.00	0.00
Vent Bag				0.00	0.00	0.00	0.00	0.00
Linear Tear Bag				1.17	1.61	2.24	0.09	0.00
Formed Cavity				0.51	0.44	0.13	1.12	0.00
Header Bag				0.00	0.09	0.00	0.00	0.00
Other				0.20	1.23	0.24	0.02	0.00

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OSC Waste Diversion Projections

ASC Data	Diversion Rate	Recylables /Case(lbs)	Blue Wrap/ Case	Net Diversion Rate	Net Recyclables/Case
ASC	13%	2.40	0.94	8%	1.46
ASC Pre-op PACU	6%	0.05	0	6%	0.05
Total	13%	2.45	0.94	8%	1.50

OSC Diversion Projections

	Procedures	Recyclables (lbs)	Blue Wrap	Net Recyclables(lbs)
OSC Daily Average	28	67.3	26.4	40.8
Weekly	140	336.3	132.1	204.2
Annually	7280	17489.5	6870.9	10618.6
Total Tons/Year		8.7		5.3

Waste diversion projections are based on audits conducted at Stanford's Ambulatory Surgery Center in 2012. The proposed OSC recycling program will also include recyclables from Sterile Processing and Materials Management.