Reusable Totes, Blue Wrap Recycling and Composting

Environmental Best Practices for Health Care Facilities | November 2002

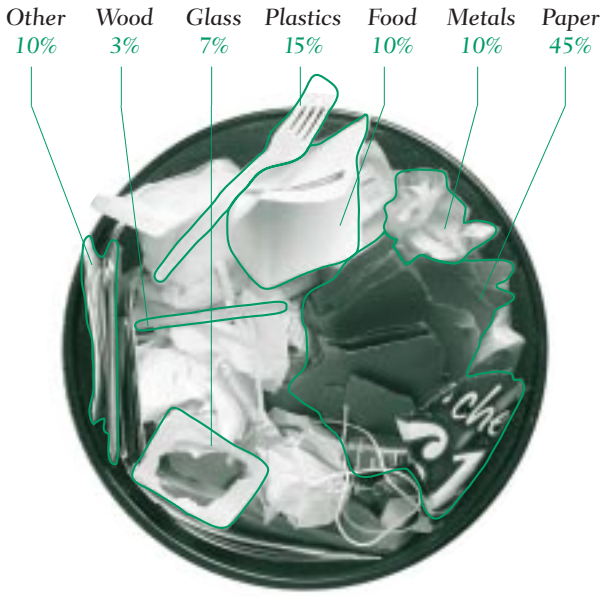
JCAHO Environment of Care Standards 1.3, 2.3, 4.0

How Much Waste is Wasteful?

Although medical and infectious wastes are often highlighted in evaluations of a hospital's waste stream, these hazardous wastes constitute only 15% of a hospital's total waste generation. The remaining 85% of a hospital's waste, which is considered to be nonhazardous solid waste, is similar to a combination of wastes from hotels, restaurants, and other institutions providing lodging, food services, data processing and administration, and facility operations. In fact, disposal costs for hospital solid waste in 2000 ranged from $44 to $68 per ton, depending on local conditions, disposal method (landfilling versus incineration), and proximity to the disposal facility. Often, solid waste is mistakenly placed in "red bag" or medical waste containers, thus increasing the cost of disposal and unnecessarily raising the level of treatment needed for the waste. By implementing effective solid waste reduction and recycling programs, hospitals can significantly reduce their solid waste streams.

This fact sheet highlights case studies for three of the largest components of an average hospital's solid waste stream: paper material (including cardboard), plastics, and food waste. The case studies provide detailed information on costs, savings, and implementation issues to help your facility evaluate these waste reduction and recycling techniques.

Hospital Solid Waste Composition



From Bisson, McRae, and Shaner, 1993

Reusable Totes: Cardboard Pollution Solution

Cardboard and other paper materials represent almost half of a typical hospital's solid waste stream. The following case study describes how one large healthcare system decreased cardboard and packing material use by implementing reusable totes for internal distribution of supplies. The cost-effectiveness of using reusable totes varies among hospitals and greatly depends on the structure of the health care organization. The reusable totes are most cost-effective when they replace a constant cardboard need, such as when a health care system has a central distribution center and uses new cardboard boxes to distribute materials to satellite locations. However, the scale of a reusable tote program can be tailored to meet the needs of the organization – even on a small scale, reusable totes may be a cost-effective alternative for replacing a constant cardboard need.

case study | Cutting Cardboard with Kaiser Permanente

Kaiser Permanente (Kaiser) operates three distribution facilities that serve as central supply warehouses for all its hospitals and clinics throughout the United States. Kaiser sorts and repackages the medical supplies delivered to the central supply facilities (most often on pallets) based on the needs of each hospital and clinic. In 1990, Kaiser implemented a pilot program that has since changed the way it manages inventory: Kaiser began using reusable totes in place of disposable cardboard boxes for distribution.

The program began in Kaiser's Livermore, California, supply warehouse, which serves 12 northern California hospitals. Initially, Kaiser purchased a total of 11,000 totes in four sizes: large, medium, small, and tiny. This enabled warehouse employees to select totes based on the volume of material to be distributed, nearly eliminating the packing material needed to fill partially full containers. Since implementing the program in 1990, Kaiser has saved approximately $40,000 a year by dramatically reducing the cardboard boxes, tape, and filler purchased. Because Kaiser had previously recycled the cardboard at no cost, most of it was

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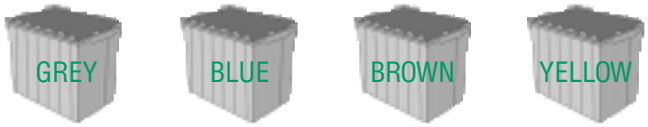
already being diverted from the landfill and does not represent a significant savings in avoided disposal costs. Unlike cardboard boxes, the totes do not require assembly for use and resulted in a significant increase in productivity, saving approximately 500 labor hours or $12,100 in wages annually.[1]

Kaiser also reduced the amount of labor required for delivery of supplies to end-users by color-coding the totes according to their content. Kaiser employees can identify the contents – and general destination – simply by noting the color of the tote.

Because the large, medium, and small totes each have the same footprint, they are easily stackable ("nestable") and do not require much storage space – the medium and large totes have an average footprint of 15 by 21 inches, varying in height between 6 and 9 inches. The smaller totes are 6 inches high and have a footprint of 10 by 10 inches.

In addition, the totes have proven to be very durable. Since the initial purchase, Kaiser has bought an additional 500 to 700 totes per year (5 to 7% of total inventory) to replace totes that were damaged, "lost" in the system (used for storage), or stolen.

Kaiser's color coded totes helped reduce labor cost and simplify routing



GREY	BLUE	BROWN	YELLOW
For non-perishable consumable goods such as intravenous bags, tubing, and bandages	*For pharmacy refills that are less time-critical*	*For initial prescriptions that are urgently needed*	*For refrigerated medication that must be kept cold*

Lastly, the totes have not posed a significant maintenance issue. Because the contents of the totes are new, sealed products, the interiors of the totes stay clean. About every other year, Kaiser sends 25 percent of the inventory to be steam-cleaned, which costs $0.50 per tote or $687.50 annually.

The program has since been expanded from the Livermore facility to the other two central supply warehouses.

Kaiser Permanente Reusable Tote Program

Before	After
Cardboard Boxes (360,000), Tape, and Packing Material $40,000	Purchase of 11,000 Totes at $14.50 each[3] $159,500
500 Hours for Box Assembly[2] $12,100	Steam-Cleaning 25% of Tote Inventory[4].....$688
Disposal of Cardboard Boxes .....Not quantified[5]	Replacing 500 to 700 Totes.....$8,700

Payback Period: Less Than 4 Years

[1] While not quantified for this case study, additional labor may have been saved since Kaiser did not have to breakdown the cardboard boxes for recycling.
[2] Exact numbers were not available at the time of fact sheet publication. Kaiser estimates that a cardboard box could be assembled in 5 seconds, or 720 cardboard boxes per hour.
[3] The average retail cost for a 12-gallon tote sold by vendors listed on the back page of this fact sheet; considerable discounts are typically offered to organizations purchasing in bulk.
[4] Totes are steam-cleaned every other year, costing Kaiser $687.50 annually
[5] Since the cardboard was recycled at the facility where the supplies were delivered, cumulative disposal costs were not available.

Blue Sterile Wrap and Plastic Film Recycling

Recently, blue sterile wrap recycling has attracted interest as a way to significantly reduce the amount of plastic disposed as solid waste. For example, the Nightingale Institute estimated that approximately 19% of the waste stream generated by surgical services is blue sterile wrap. Made of polypropylene (plastic #5), a polymer with good resistance to chemicals and wear, blue sterile wrap is used in all hospitals to protect patient gowns and toiletries, medical devices, and surgical instruments from contamination. Blue sterile wrap waste is most often generated in just a few areas of a hospital, simplifying the collection process. Blue sterile wrap is not reusable, as the material does not withstand the sterilization process between uses. Less bulky material has been considered; however, the alternatives have not matched polypropylene's ability to 1) resist tearing when holding sharp surgical instruments and 2) provide a protective moisture barrier to prevent contamination after sterilization. Recently, several manufacturers have begun using polypropylene as feedstock for other retail products, making it easier to recycle blue sterile wrap and other plastic films (including plastics #2, #4 and #5). Nonetheless, a few key requirements must be met to make a recycling program practical:

- Identify a local market for polypropylene or #5 plastics. Without a regional recycler, it is unlikely that a program will be economically feasible. It is inefficient to ship the material significant distances for recycling because of the relatively low market value of #5 plastics and the high volume and low weight of the material.

- Establish a low-cost collection and transport system. Because the market value of polypropylene is relatively low, collection and transportation costs must be minimized. Essentially, the cost of collection and transport cannot exceed the recycling income (approximately $0.04 per pound) and avoided disposal fees (approximately $0.03 per pound, or $56 per ton).
- Generate a significant quantity to warrant vendor cooperation. Although arrangements can be made with local recyclers to supply blue sterile wrap and plastic film collection containers at little or no cost to a hospital, the facility must generate enough used polypropylene to make the program worthwhile. However, the quantity required varies directly with regard to the points above. For example, the further the distance from a regional recycler, the greater the quantity required to support a program.

These requirements are dependent on other factors as well, such as distance to a regional recycler and proximity to other healthcare facilities that are also recycling blue wrap and other plastic films. The following case studies provide details of how two organizations have implemented successful blue sterile wrap recycling programs and highlight the potential environmental and economic benefits. The first case study highlights a new program, while the second features a program that has been operating for over 10 years.

Dominican's Blue Sterile Wrap Program Performance

Program Set-up: *24 hours*
Management Support: *4 hours per month*
Custodial Labor: *7 hours per month**

Recycling Total: *8 tons in 12 months*
Per Month Average: *1,300 lbs per month*

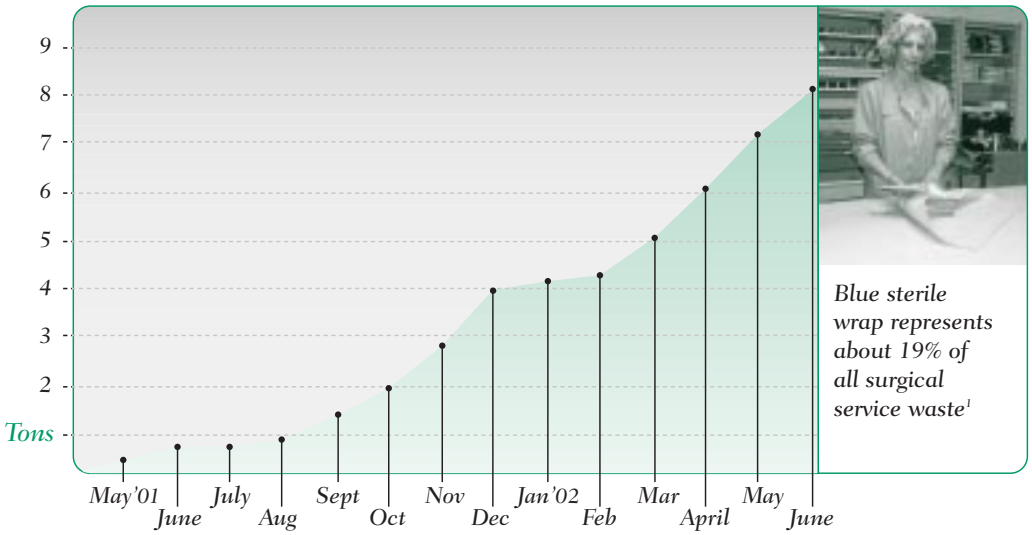
Total Diversion Savings: $544

*This effort would be required without the recycling program as the blue wrap would still be managed as a solid waste.

case study | Easy Transition to Recycle Blue Sterile Wrap and Plastic Film

Dominican Hospital (Catholic Healthcare West) in Santa Cruz, California, implemented a blue sterile wrap and plastic film recycling program in May 2001. Dominican's initial objective was to divert only the blue sterile wrap from the waste stream; however, the hospital learned that their plastic film often used to package materials and wrap pallets can also be recycled with the blue sterile wrap. Clearly labeled collection containers were placed in the six departments that generated the highest quantities of blue sterile wrap and plastic film waste: central distribution, purchasing, the pharmacy, the operating rooms, outpatient oncology, and labor and delivery. Before implementing the program, the environmental staff discussed program objectives and logistics with department staff members – including nurses, administrative personnel, and custodial employees – to address their concerns and convey the benefits of the program. In total, Dominican's environmental staff spent about 3 days setting up the program, including gaining buy-in from hospital staff, working with vendors, and setting up collection containers and schedules.

Dominican Hospital
Cumulative Blue Sterile Wrap and Plastic Film Recycling
May, 2001 through June, 2002



Collection Containers and Disinfection

One concern that emerged from the meetings with department staff was how to disinfect the containers used to collect the blue sterile wrap and plastic film. Although administrative departments such as central distribution and purchasing were satisfied with the standard cardboard containers, the operating room wanted containers that could easily be routinely disinfected. Therefore, a stainless-steel frame that could be easily wiped down was used to collect blue wrap in individual operating rooms.

Material Management

The custodial staff spends less than 30 minutes each week emptying all the collection containers in the hospital as they are filled. Full bags, weighing about 17 pounds each, are transferred to a 3-cubic-foot dumpster on the building's loading dock. Dominican donates the sorted blue sterile wrap and plastic film to a local nonprofit recycling organization, Grey Bears, that uses the proceeds from the sale of recyclable commodities to buy and prepare hot meals for disadvantaged senior citi-

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zens in the community. Grey Bears picks up the dumpster each Friday and bales the blue sterile wrap and plastic film until a full-enough load has accumulated to warrant a pickup by Marathon Recovery of Oakland, California, which purchases the material to be used as a binding agent in making siding materials.

A similar program was established throughout the Legacy Health System (LHS) in Portland, Oregon. Since summer 1991, housekeeping employees collect sorted recyclable commodities, including blue sterile wrap and other polypropylene plastics, at four LHS hospitals in the greater Portland area. The material is collected in either clear or blue plastic bags and is delivered to the recycling depot in each building.

Legacy Health System Blue Sterile Wrap Recycling Savings

Monthly Diversion Amount: 3.5 tons

Monthly Diversion Savings: $400

Monthly Labor Costs: $250

LHS owns and operates its own recycling center just two blocks from Good Samaritan Hospital, one of LHS's facilities. LHS has established a cooperative relationship with several of its vendors, including Kimberly-Clark, Owens and Minor, and BioMed, to transport the recyclable commodities to the LHS recycling center. The commodities are hauled as "backfill" material, meaning that they are collected on return trips when the vendors' trucks are empty. In addition to the four LHS hospitals, LHS has begun accepting blue sterile wrap waste from other Portland-area hospitals that can make similar transport arrangements with their vendors.

Blue sterile wrap recycling at Dominican Hospital

Once the recyclable commodities are dropped off at the recycling center, employees of the Susan Christiance Vocational Program (SCVP), a non-profit organization that employs challenged individuals, sort the material. The blue sterile wrap is placed in a 40 cubic-yard roll-off container provided at no cost by Waste Management Incorporated. The container is hauled three to four times per month, diverting 3.5 tons of blue sterile wrap from the solid waste stream and saving $400 in disposal costs. Waste Management bales the blue sterile wrap and, once enough has accumulated, transports the material to Marathon Recovery.

Getting Green in the Kitchen

The kitchen and food service operations of a hospital leave a unique mark in the hospital's environmental footprint. Although food waste itself can represent 10% of the hospital's waste stream, for every patient tray, another 15 pounds of waste is generated (including glass, cans, and cardboard from food and washing solution packaging).[2] Although the kitchen and food service operations of a hospital generate a variety of solid wastes, source reduction and recycling programs often overlook this area of the facility – especially the opportunity to divert organic matter through composting food waste. However, there are several obstacles to consider when implementing a food waste composting program:

- Space limitations. In many cases, space constraints are the primary factor dictating which composting method a hospital can adopt. Because hospitals are often located in urban areas where space is limited, they must either make arrangements to haul the food waste to an off-site composting facility or purchase a compact, in-vessel composting unit.
- Beating the stigma. The benefits of composting are often misunderstood and overshadowed by misconceptions. For example, many people fear that composting will produce a strong odor and attract pests such as insects or rats. Consequently, a composting program should feature (1) management buy-in to ensure that employees participate in the program and (2) well-run operations to prevent odor and the presence of pests.
- Program participation. For composting to be cost-effective, a hospital must tailor the scale of the program to the quantity of food waste generated and must ensure that employees participate in the program. Both points are especially important for facilities that make a significant capital investment in purchasing on-site composting technologies.

Composting Program Costs VS. Savings

Vermitech system (worms, digester and shredder): $25,000

Building and supplies: $31,000

Labor: $62 per week

Diversion savings: $59.50 per ton

Worm castings: $1 per pound

[1] "Medcycle Offers Opportunities for Nurses as Front-Line Recyclers," Nightengale Institute, www.nihe.org/medcyc.html

[2] "Saving Disposal Dollars: Hospital Finds Winning Waste Reduction Formula" BioCycle, January 1999

The following case study provides details of how one facility has begun to divert food waste from their cafeteria and discusses some of the obstacles to implementing a successful program.

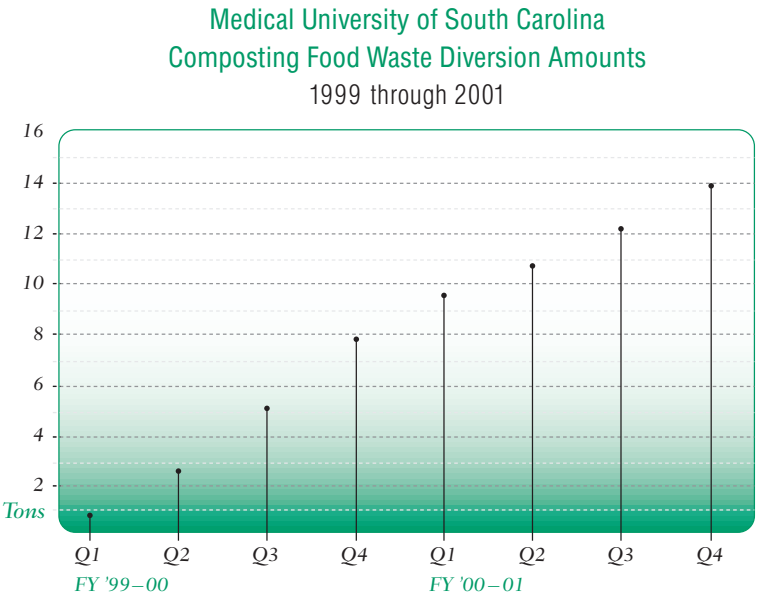
case study | Putting Worms to Work at the Medical University of South Carolina

In a continuing effort to cut material from its waste stream and noting the success of other universities' composting programs, the Medical University of South Carolina (MUSC) in Charleston, South Carolina, implemented a food waste composting program in July 1999. Three state and national organizations provided approximately 70 percent of the startup costs: the Department of Health and Environmental Control (DHEC), the DHEC Energy Office, and the Sustainable Universities Initiative. Because of its urban location and significant space contraints, MUSC chose to install the Vermitech Systems Incorporated in-vessel vermi-organic digester.

MUSC built a simple, 18 by 24-foot building to house the digester; building features include a sloped floor coated with acrylic for easy cleanup, a ventilation fan, and a 10-gallon water heater. (The digester can also be placed in an existing structure or in a secure outdoor location.) Necessary supplies include four 45-gallon, wheeled containers; a scale; a long-handled squeegee; gloves; a long-handled plastic broom; a flat headed-shovel; a hose with multi-option spray nozzle; a dustpan; and pH and moisture meters.

Contracted kitchen staff collect preconsumer food waste from the hospital's cafeteria kitchen in a 45-gallon container. Once a day the recyling staff collects the container, which varies in weight according to its contents. The contents are fed into a shredder, where the food waste is mixed with cardboard until the appropriate moisture level is obtained. The mixture is then fed into the in-vessel digester by a conveyer belt. The worms in the digester can eat 250 pounds per day, reducing the volume of the food waste and cardboard mixture by 80 percent overnight. The worms produce castings that are used as a soil amendment and have a value of about $1 per pound. The castings also slightly reduced the hospital's need for commercial fertilizers and actually improved the condition of the soil. Because the worms tend to stay near the top of the in-vessel digester (near the fresh food), the castings are mechanically harvested from the bottom of the container. The castings fall to the floor, where they are swept up using a broom and squeegee. The castings are then given to MUSC's grounds department. It typically takes no more than 1 hour each day to collect the food from the cafeteria and transport it to the composting building, process the food through the digester, and clean up after processing a batch of food waste. The recycling coordinator also spends 30 minutes per week checking the depth of the digester bedding and the health of the worms and their environment.

Thousands of worms live in the Vermitech Systems composting digester at MUSC, turning food waste into a valuable soil amendment.



MUSC composts 115 pounds of food waste each day, representing 50 percent of the digester's operating capacity. At this rate, the program can sustain itself, but is not paying back the capital costs required to set up the program. MUSC believes that the low participation rate is due to ongoing employee resistance and skepticism. Although the MUSC recycling staff makes constant efforts to convey the benefits of the program and encourages MUSC kitchen staff to participate in the program, staff participation level ranges result in using only 30 to 70 percent of the digester capacity. If the program operated at 100 percent capacity, processing 250 pounds of food waste per day and harvesting 3,000 pounds of castings per month, the payback time would be approximately 6 years (which is comparable to other in-vessel unit payback periods).

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Resources

Reusable Totes

Kaiser Permanente
(818) 321-2276

Akro-Mils
(800) 253-2467

Remcon Plastics Inc.
(800) 253-2467

Blue Sterile Wrap and Plastic Film Recycling

Dominican Hospital
(831) 462-7674

Legacy Health System
(503) 413-6066

Conigliaro Recycling
(888) 266-4425

Marathon Recovery
(510) 636-4191

Composting

Medical University of South Carolina
(843) 792-4066

Green Mountain Technologies
(802) 368-7291

Vermitech Systems Inc.
(416) 693-1027

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