



Creative Cooperation: An In-Depth Look at the Innovative Dartmouth- Hitchcock Recycling Program

[Dartmouth-Hitchcock Medical Center](#) is a nonprofit academic health system that performs nearly 20,000 surgeries, discharges more than 25,000 patients, and cares for 31,000 emergency visits in their Lebanon emergency department every year. One way that they live out their mission of “advanc[ing] health through research, education, clinical practice and community partnerships, providing each person the best care, in the right place, at the right time, every time,” is through a strong commitment to recycling.

Their approach to recycling healthcare plastics, a unique collaboration between hospitals, industry, and waste haulers, offers a model for hospitals looking to identify their own unique opportunities for plastics recycling. Focused specifically on blue wrap and stretch wrap, the Dartmouth-Hitchcock process offers a proof point that relationships truly are the key to recycling success. Dartmouth-Hitchcock needed an outlet for its blue wrap, but wasn't generating sufficient quantity to be appealing on its own; [Casella](#) (resource management service provider) was looking to move blue wrap at scale, and saw a valuable commodity; [Hypertherm](#) (a local manufacturer of cutting tools) had lofty goals for net zero waste to landfills, but no outlet for some of their materials and insufficient logistical framework to get there on their own.

Together, all are able to make progress, meeting mutual goals, reducing costs, and increasing recycling across the board. By collecting and aggregating their recyclables together in one place, the Area Reclamation Collaborative – ARC™ - operated by Casella at Hypertherm helps organizations such as Dartmouth-Hitchcock pool materials for recyclable materials plus provides the space and logistical support they need to make this system work environmentally and economically. This collaboration between a service provider (Casella), hospital, and industry is critical and represents innovative advances in the quest to effectively increase recycling for all participating parties.

Through a series of site visits and stakeholder interviews, HPRC has put together a comprehensive case study of the Dartmouth-Hitchcock recycling program in hopes of inspiring and educating other hospitals who might want to follow in their footsteps. First, we'll examine the recycling process and systems Dartmouth uses, and then we'll take a deeper dive with the participants to learn about the realities of how it all came together.

I. The Process

1. Pre-Procedure

Prior to use in the OR, kits are put together and staged on case carts outside the OR in two different ways: either they are wrapped in blue wrap or staged in reusable sterilized autoclavable trays. Custom kits are staged with blue wrap, while common kits are staged in reusable trays. These kits are specific to different procedures being performed. For example, if a knee replacement is being performed, then a “Total Knee Replacement Kit” would be needed. Once a case cart is ready for use, it is staged inside the OR where, prior to conducting the procedure, the OR team sets-up the sterile field and unwraps the kit tray and sterile items. This is the first point in the process where the recycling determinations are made.



FIGURE 1: Custom kit staged in blue wrap



FIGURE 2: OR recycling receptacles

2. Sorting and Receptacles

The configuration of receptacles for disposal differs from OR to OR, depending on the department. Commonly there are four receptacles, prompting staff to sort materials by recycling, autoclavable medical waste, used linens, and trash.

3. Post-OR Collection and Consolidation

Post-procedure, all waste (including blue wrap) is taken to a soiled utility room for further collection and consolidation into containers for transport to the in-house waste and

recycling management center. This is the last stop before materials leave the hospital, and is where all recycling segregation and landfill diversion takes place, including mixed plastics, paper, compost, and so on. Dartmouth-Hitchcock staff separate all the recyclables, and segregate the blue wrap from rest of the general recycling, and transport it to Casella about once a week.

Products and materials not used during the procedure are sent back to the inventory room. Some of these can be reused for other procedures, but others are disposed or donated for other purposes.

4. Off-Site Collation and Collaboration

The blue wrap then makes its way to the Casella/Hypertherm Recycling ARC where Casella weighs, inventories, and bales DHMC blue wrap with blue wrap from other sources (like nearby UVM Medical Center and Alice Peck Day) until there is enough to fill a trailer to ship to end markets. From there, it can be melted into pellets at a plastics reprocessing facility, turned into resin, and made back into hospital products with a partner

like Sustainable Solutions, or used as raw material to refabricate into a fabric tote bag with a partner like Circular Blu. (See [Supplemental Materials](#) for more on these organizations.)

II. The Participants

1. The Resource Management Service Provider

First up, HPRC met with Liza Casella, Director of Solutions Development from [Casella Resource Solutions](#), a Northeast-based company that provides integrated resource management services consisting of collection, transfer, disposal, organics, recycling and professional services across the United States, helping communities and customers sustain—economically and environmentally—the planet’s limited resources.

Casella is the service provider for Dartmouth-Hitchcock and partner with [Hypertherm](#) in an operation which recovers high-value, non-traditional materials from local businesses, institutions, and industry. Casella has worked with Hypertherm for over two decades, and in 2015 the organizations entered a strategic partnership in a quest to help Hypertherm reach its zero-waste goals. To meet these goals, the partnership needed to aggregate materials from other local generators to get the quantity needed to effectively move recyclables into the marketplace. Materials are brought to a facility operated by Casella and owned by Hypertherm where they are sorted, processed, weighed, inventoried, baled and ultimately shipped to market by Casella. This co-operative model works because it obtains sufficient volume to send to market and allows for engagement with local businesses that generate high-end plastics.

As a regional resource management company, Casella identified material streams from other area customers that do not conform to traditional blue bin recycling programs often referred to as “single stream” (bottles, cans, glass, paper, and cardboard). These high-value, non-traditional materials either cannot be accepted in a blue bin recycling program (single stream) or have higher value when segregated—examples include materials like film plastics, HDPE reels, poly-propylene and poly-carbonate manufacturing scrap plastics, off-spec packaged products, ferrous/non-ferrous metals, and more.

Currently, most blue wrap is converted into new products domestically. Casella ships the material into the market in two ways—direct to mill for remanufacturing or through a secondary processor who further processes the material to prepare it for remanufacturing. Dartmouth-Hitchcock blue wrap is sent to [Constantly Green](#) for direct remanufacturing and stretch wrap is processed in New Jersey (via secondary processing) and prepared for mill buyers who create other consumer products made from plastics.



FIGURE 3: Waste sorting

2. The Industry Partner

Up next, HPRC spoke to Frank Austin, the Buildings & Grounds Leader from [Hypertherm](#) manufacturing, which has an ambitious 2020 goal of zero landfill waste and is looking beyond profit towards reducing its environmental impact. In 2012, Hypertherm sorted and recycled or reused around 40 tons of waste out of a total amount of about 100 tons. By 2016, expansion from plastics recycling allowed for 330,000 pounds of cardboard to be recycled. Hypertherm has simultaneously reduced its disposal costs to landfill and created a revenue stream by disposing of its landfill waste in other ways, including through its partnership with Casella.

As a result of this relationship, Hypertherm no longer needs to be concerned with not producing large enough waste streams, and the logistical issues in processing waste streams for recycling have also been resolved, including sufficient sorting space, parking for trailers, and processing the waste in a timely fashion for delivery.

In the early years, Hypertherm and Casella partnered together to weigh and sort waste streams for plastics recycling on their own. Then in 2014, a movement began locally to consolidate other community businesses to participate in recycling efforts and generate larger amounts of plastics for recycling and more opportunities for quicker processing and shipping of materials. Currently there is not huge local demand for blue wrap, though it may be possible to drive demand up with the right local relationships and other organizations (such as hospitals) could become key partners to help sustain and expand the program.

3. The Hospital

Lastly, HPRC interviewed Zachary Conaway, Manager of Waste, Recycling, and Training at Dartmouth-Hitchcock, to get the hospital's perspective. Dartmouth-Hitchcock is committed to being a good community citizen and reducing their environmental impact, including diverting as much as possible from landfill. This inspired looking for creative ways to recycle, which led to this innovative program. Initial setup required a fair bit of work, but Casella and Hypertherm shouldered a lot of the burden and made it fairly seamless, illustrating the importance of good partners and strong relationships to making success stories like this one possible.

The biggest challenge the hospital faced in implementing the program was educating and getting buy-in from OR staff, who are already dealing with a fast-paced, high-stress environment on a daily basis. It required regular communication with OR departmental leadership, whose support was invaluable in driving recycling initiatives forward. Having a clinical champion in the department to help support regular education initiatives and answer questions also proved extremely effective. By working with people the staff could relate to as colleagues who were on board with the program, Zachary and his team were able to make their messaging and training effective and efficient for nurses and OR staff.

Dartmouth-Hitchcock nurse champion Pat Stockwell summed it up well: "Operating Rooms generate more waste than any other department in a facility. As a nurse and a Green Team Champion, I am asked to teach others about recycling and waste diversion. My first question is whether an individual recycles at home, and if so, why. The responses often include, to save money on my trash disposal, because my city requires it, or just



FIGURE 4: Unloading area for blue wrap, stretch wrap, and drums at Casella's facility

to take care of the earth. My response is, that's exactly why you can recycle in the OR! It all starts with a designated bag for recyclables, a willing waste management department and a final destination that will process it."

Lessons Learned

It's apparent from the success of the Dartmouth-Hitchcock program thus far that this new model of localized creative cooperation has great potential and applicability for other hospital programs. By thinking outside of the hospital (or healthcare system) and working cooperatively with local businesses, new possibilities open up to move towards a true circular economy. Consistency and standardization is key (especially at large hospitals) and are a necessary prerequisite for this kind of next-level cooperation.

Facilities need to have dedicated space and staff to operate a program like this to its maximum capabilities, and need to really understand the materials they are dealing with and the possibilities for end reuse. Yet even in the Dartmouth-Hitchcock program there is room to push the boundaries of relationship-based waste diversion—what other possibilities are there for reuse and repurposing within their material stream? What relationships could still be built with groups like [Project CURE](#) (a non-profit dedicated to donating medical supplies to developing countries)?

A commitment to bringing people together—staff, patients, external partners—results not only in efficiencies, cost savings, and increased program success, but also empowers everyone to tell their story together.

Better Together

The lesson from the Dartmouth-Hitchcock program is really to bet big on relationships, to think outside the box when looking for partners, and that many options are available to all hospitals. Please consider opportunities to partner with industries in your community to help support your plastics recycling program, and visit www.HPRC.org for more great information and case studies to help support your program, whatever stage it is in.

Supplemental Materials

To complement the perspectives offered by the case study team, HPRC also sought two additional perspectives on the sterilization wrap recycling market and a counterpoint from another local hospital looking to achieve the same result in a slightly different way.

Sustainable Solutions

As part of our supplemental stakeholder conversations, HPRC spoke to Dan Constant, Consultant for Halyard Health from [Sustainable Solutions](#), which recycles blue wrap for reuse through 'Halyard's Blue Renew' wrap recycling program. Sustainable Solutions takes blue wrap and turns it into BlueCON Resin products derived from Halyard's Blue Renew program, then repurposes it into hospital supplies for buy-back, including bed pans, trash cans, and wash basins utilizing a company called [Careline Industries](#) for the molds.

Sustainable Solutions currently is working with around 600 hospitals and is recycling about 4,000,000 pounds of blue wrap per year. In 2016, the 'Halyard's Blue Renew' wrap recycling program really began to gain momentum as hospitals became more invested in reducing blue wrap waste and buying it back as new products. This resulted in less disposal to landfills, cost savings for the hospitals buying back recycled product, and increased employee engagement from staff who felt good about more sustainable practices. Another major benefit for sites is the ability to track waste streams and then fully tell their sustainability story.

However, for an organization like Sustainable Solutions to be profitable, hospital procurement organizations must be willing to tie the quantity of blue wrap purchased with amount recycled—that is, to commit a given volume of blue wrap to Sustainable Solutions which in turn will result in a fixed amount of recycled product in return. This will create higher demand, which will result in the need for more recycled blue wrap, which will further fuel the cycle.

At some point in time if the recycling market, specifically # 5 Polypropylene, does not rebound, the only way to keep wrap recycling programs alive will be through a circular economy approach to recycling and, as a result, OR recycling will be crucial..

Circular Blu

HPRC also spoke to John Flanders, Chief Innovation Officer of [Circular Blu](#). Circular Blu is a start-up whose primary focus is improving the circular economy and offering products that better tell the story of sustainability for companies that buy them.

The goals for Circular Blu are to keep waste out landfills and to create new economies for waste—at present, the main products that Circular Blu offers are tote bags and laptop cases made from blue wrap (not limited to any specific blue wrap vendor). This past year, they produced and sold about 10,000 tote bags while also creating jobs through the 'Work without Limits' program for workers with disabilities.

The process is scrappy and homegrown: John personally makes connections with local hospitals, picks up blue wrap in his truck, sorts and prepares materials in his garage, and then provides it all to a third party who produces the bags. The bags are then sold back to the originating organization, where they can be provided to new hires, sold in the gift shop with donations going to charity, used to replace existing patient bags, or even used as a tool for raising awareness about specific medical conditions such as cancer. Any blue wrap trimmings

generated from the manufacturing process are captured and stock piled for reuse (often by Sustainable Solutions).

Circular Blu is quickly becoming a major circular economy consultant to the healthcare industry, working with hospitals and companies like Johnson and Johnson. They are also exploring ways to reuse Tyvek, which could benefit hospitals like Dartmouth-Hitchcock who generate Tyvek but do not have a current outlet for recycling or reuse.

UVMMC

Finally, HPRC spoke with Jennifer Bergeron, Environmental Services Supervisor, from [University Vermont Medical Center](#) (UVMMC) to offer a point of comparison with Dartmouth-Hitchcock regarding blue wrap collection and recycling. As a fellow participant in the local cooperative (providing their blue wrap to Casella alongside Dartmouth-Hitchcock) UVMMC provides a useful example of a related-but-different recycling program. From a facility size standpoint, UVMMC is 1.5 million square feet and around 5,000 employees—very similar to Dartmouth-Hitchcock. UVMMC has 21 OR suites and through May of 2017 UVMMC had collected about 2.5 tons of blue wrap for recycling.

Unlike Dartmouth-Hitchcock, UVMMC sorts the blue wrap at the source, where they have their own dedicated sorting area. However, while space constraints prevent the recycling program from reaching its full potential, UVMMC actually collects *more* blue wrap than Dartmouth-Hitchcock. This can primarily be attributed to the fact that UVMMC, unlike Dartmouth-Hitchcock, conducts blue wrap on items that aren't a good fit for the steel case kits (significant when you consider that 80% of the blue wrap generated is from wrapping kits.)

UVMMC's collection system for blue wrap in the ORs is similar to Dartmouth-Hitchcock's—UVMMC utilizes the linen hampers for blue wrap collection, and trash and recycling are still collected in standardized waste containers. This creates a customizable combined mobile waste disposal point in the ORs, something that Dartmouth-Hitchcock is not currently ready to implement. Labels are then manually removed by the waste management team, and blue wrap is consolidated into a gaylord box for shipment for recycling. (However, labels are not required to be removed as the contamination margin is minimal.) Due to space limitations UVMMC keeps one blue wrap collection gaylord on their dock and have it picked up daily by the distribution department. Full gaylords are then stored at their local warehouse and picked up by Casella weekly.

Recycling champions at the facility level have been significant drivers in the sustainability of the overall program for blue wrap and other materials, including maintaining consistent signage on collection bins and containers, monitoring collection practices, and more. Their primary recycling challenges revolve around their small footprint, their processes for separating waste streams, and staff education, which are common to most (if not all) hospital programs.

However, despite a slightly different setup, UVMMC is also seeing benefits from working together and the hospitals mutually benefit from their connection and the opportunity it provides to share challenges and successes with one another.

Dartmouth-Hitchcock Program Data

Below is a waste diversion pie graph from Dartmouth-Hitchcock, illustrating portion of their total program is represented by blue wrap; it is an important stream that must be dealt with for hospitals to successfully meet their goals and fully serve their missions. Despite the blue wrap program being a small part of Dartmouth-Hitchcock's overall waste reduction and landfill diversion programs, it is an important program.

