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Case Studies

Medical Device Reprocessing
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Regulated Medical Waste Reduction and Minimization
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Medical Plastics Recycling in the OR
Spectrum Health, Grand Rapids, MI

Rigid Sterilization Containers for Surgical Instrumentation
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Fluid Management in the OR
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Energy Efficiency in the OR—HVAC Setback Program
Providence St. Peter Hospital, Olympia WA

Greening the OR Sponsors



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The Business Case for Greening the OR®

WHY FOCUS ON THE OPERATING ROOM?

The operating room is critical to a hospital's success, and to its business model—bringing in between 40-60% of the organization's revenue^{1,2} and up to 60% of its operating margin in some instances.³ The OR is also a significant cost center. It is the leader in medical supply usage for the entire hospital,⁴ estimated to account for approximately 33 percent of all hospital supply costs,⁵ and has large cost requirements relative to energy use and waste management.

But hospitals across the country are demonstrating that there are ways to cut costs in the OR while reducing the environmental footprint of the department.

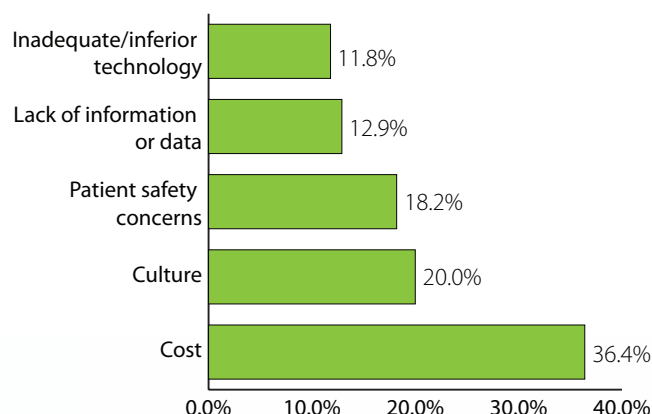
- MetroWest Medical Center saved an estimated \$29,843 and was able to reduce its waste stream by 5,606 lbs of disposable blue wrap in 2010 as a result of transitioning 66% of its surgical instrumentation to reusable rigid sterilization containers in the OR.
- Bon Secours Good Samaritan Hospital, a 377-bed facility in Suffern, NY, installed a system for fluid management in the operating room avoiding the creation of 261,999 lbs. of waste and saving \$86,460 in 2010.
- Hospital Corporation of America (HCA) and its 163 member hospitals realized \$17.6 million in savings in 2010 by reprocessing medical devices and avoided placing 298 tons of waste into landfills.

Greening the OR® is a new initiative—led by Practice Greenhealth—to coalesce and build the body of knowledge around environmental best practices in the OR that can also improve patient safety, worker health and the bottom line. A number of hospitals have made significant advancements in identifying green best practices in the OR, but until now, no one has stepped in to make those best practices accessible in one place, nor facilitate the kinds of dialogue needed to drive green innovation in the OR forward.



Practice Greenhealth asked hospitals the following question:

Overall, what are the biggest challenges to implementing 'green' interventions in your organization's ORs?



The resulting data demonstrates the need to frame this issue for the sector and increase the published literature substantiating green best practices in the OR. While some green practices do require capital investments, many do not and can generate significant cost-savings. Tackling OR culture, while difficult, is possible when you have strong data to base decisions upon, peer hospitals who can model best practices, and leadership from within the OR. Patient safety must and will remain paramount in any discussion of alternate practices or products. This business case will lay out the rationale for the integration of green, sustainable best practices in the OR, and will demonstrate how OR departments at leading hospitals are beginning a new dialogue with sustainability leaders, the supply chain and service providers about how to create collaborative solutions to today's sustainability challenges that can not only save critical healthcare dollars that can be rediverted into patient care, but can also improve patient and worker safety while being a better community steward.

Practice Greenhealth is using a dynamic, collaborative approach that brings together a variety of stakeholders to define a set of data-driven, science-based, best practices in the OR that reduce environmental impact, reduce cost, increase efficiency, and improve worker and patient safety—or some combination of these. The Initiative is focused on engaging key stakeholder groups relevant to the OR to ensure that best practices are being discussed and vetted through the appropriate channels and driven by all available data.

The Initiative has the potential to significantly impact the supply chain—hospitals, health systems and group purchasing organizations are working with Practice Greenhealth to leverage the purchasing power of the healthcare sector to drive product and process innovation. The healthcare supply chain is also a critical partner in the exploration of new and innovative ways to address old and unsustainable practices, products and services. Companies today are increasingly recognizing that green products make good business sense—for the long term, and are engaged and interested in strategic thinking and dialogue with healthcare customers about creating better solutions. Indeed, many of these companies have demonstrated their willingness to try innovative approaches to identifying synergies and even collaborations across company lines to meet the needs to hospital customers.

Those responsible for designing and constructing the hospitals of the future are also a key element in this conversation—as the green operating room of the future goes beyond product selection to think about integrated design teams, engineering, safer materials selection and technology integration.

Perceptions persist that green programs and products cost more despite comprehensive evidence to the contrary. Learn more about how environmental best practices in the OR are a mechanism to reduce cost while also engaging staff in a new dialogue about how to increase efficiencies at the organization.

Deliver quality patient care utilizing practices and products that are safe for patients, workers and the environment while minimizing costs.

Greening the OR™ is a sector-wide initiative that will provide administrators and OR managers with the tools necessary to reduce environmental impact while driving down costs.



BEST PRACTICE #1: RMW Segregation in the OR

Leading hospitals have demonstrated that an early focus on waste segregation in the OR can demonstrate significant reduction of the infectious waste stream while also generating big dollar savings relative to the hospital's waste budget. Specific implementation strategies vary but emphasis is placed on diverting clean, sterile packaging and non-infectious waste (per state definition) into either solid waste or recycling containers.

- "Inova Fairfax Hospital, an 833-bed hospital in Northern Virginia, decreased the regulated medical waste being generated by its ORs by 18.6% over just a 6-month period, saving the hospital more than \$15,000 and promising far greater savings long-term."

Seema Wadhwa LEED AP, Sustainability Engineer, Inova Health System/Sustainability Director, Urban Ltd, Fairfax, VA

- "In 2010, our Waste Management Team achieved a 47% reduction in regulated medical waste, reducing 28,795 pounds of waste by initiating a targeted focus on RMW reduction in our ORs and Labor & Delivery. Cost savings due to red bag waste reduction were in excess of \$89,000."

Judith Focareta, Coordinator, Environmental Health Initiatives, Magee-Womens Hospital of UPMC, Pittsburgh, PA

BEST PRACTICE #2: Divert and Purchase Reprocessed Medical Devices

Hospitals are finding that partnering with a third party reprocessor to reprocess medical devices are an important element in responsible stewardship of the organization's financial resources. Programs to collect certain FDA-eligible medical devices in the OR for reprocessing and then purchase back the reprocessed devices are generating huge cost-savings and significant waste reductions for a variety of organizations. More than 70% of hospitals nationwide now reprocess some or all of their FDA-eligible medical devices.⁶

- "The University of Washington Hospitals in Seattle, WA diverted 5.8 tons of waste and saved the organization \$496,123 in 2008 by reprocessing more than 100 different single-use medical devices."

Sheila Jobe-Lockwood, Compliance Outreach Coordinator, Environmental Health & Safety, University of Washington Medicine, Seattle, WA

- "Through reprocessing of medical devices, Advocate Christ Medical Center was able to save \$400,000 and avoided sending almost 5 tons of waste to the incinerator or landfills in 2010."

Mary Larsen MS, Environmental Stewardship Manager, Advocate Health Care, Chicago, IL

BEST PRACTICE #3:

Fluid Management Systems in the OR

Hospitals are eliminating staff exposure to bloodborne pathogens and minimizing regulated medical waste (RMW) disposal costs by moving to fluid management systems in the OR. Fluid management systems automate the process of flushing blood and body fluids to the sanitary sewer, reducing the need for staff to manually empty suction canisters or use expensive solidifiers to dispose of suction canisters to RMW. Many also utilize a reusable or integrated canister that is cleaned and reused, lowering ongoing supply costs.

- "Bronson Methodist Hospital implemented a fluid management system in 2003. In 2010, this technology allowed Bronson to save approximately 8 tons of regulated medical waste and plastic suction canisters at a savings of \$7,200."

Lisa Hardesty, EOC and Sustainability Manager, Bronson Methodist Hospital, Kalamazoo, MI

- "In 2007, St. Mary's Hospital Medical Center (an affiliate of Hospital Sisters Health System) instituted a fluid management system that reduces its regulated medical waste by 5,400 lbs each year at an annual cost savings of over \$10,000 dollars."

Ronald VanSchyndel, EVS 1st Line Supervisor, St. Mary's Hospital Medical Center, Green Bay, WI



Perioperative staff at MetroWest highlight the rigid sterilization containers used in the OR and Sterile Processing.

BEST PRACTICE #4:

Medical Plastics Recycling in the OR

The OR might be the last place you'd expect to find a recycling container, but hospitals are increasingly partnering with their waste haulers to identify appropriate medical plastics for diversion to recycling markets. While a large portion of OR supplies are disposable and packaging is ubiquitous, facilities are surprised to find the vast majority of medical plastics generated in the OR are recyclable with the right hauling partner. As several of the country's largest waste haulers develop integrated waste solutions focused on servicing all of a hospital's waste streams, access to medical plastics recycling in the OR is growing rapidly. Partnered with a focus on better segregation of infectious waste, this program can derive real financial savings.

- "Fletcher Allen Medical Center achieved a 38% recycling rate in 2010. The nursing staff in the OR have been initiators of Fletcher's OR recycling program which collects approximately 50 tons of recycling annually at a savings of approximately \$6000."

Louis Dinneen, Director, Facilities Management, Fletcher Allen Medical Center, Burlington, VT

- "Spectrum Health in Grand Rapids, MI initiated a medical plastics recycling program in its 45 ORs in 2007. In 2010, the OR recycled 42,500 lbs of Blue Wrap, saving \$1,300 in avoided waste costs. The blue wrap program is part of Spectrum Health's larger hospital recycling initiative that since 2007 has saved nearly \$200,000 and reduced waste bound for the landfill by 2,943 tons."

Josh Miller, Sustainability Coordinator, Spectrum Health, Grand Rapids, MI

BEST PRACTICE #5:

Reusable Gowns, Textiles and Basins in the OR

The culture of waste in the OR is driven in large part by the increasing volume of disposable medical supplies on the market today. Many hospitals—after jumping on the disposables bandwagon—are beginning to rethink the use of reusable textiles and supplies in the OR. Reusable surgical textiles are demonstrating increased clinician satisfaction while also providing comparable barrier protection. And reusable table and mayo stand covers, surgical towels and basins are common sense switches that drive down costs by reducing the volume of waste generated.

- The University of Maryland Medical Center moved to reusable textiles in the OR more than 15 years ago, and utilizes a vendor to provide clean, sterilized surgical textiles. In 2010, UMMC avoided the creation of 138,748 pounds of waste as a result of using reusable textiles in the OR, demonstrating an estimated cost-savings of \$38,849⁷ in avoided waste disposal costs, and an estimated \$39,000 in returned instruments.

Victoria Stewart, MBA, Business Director, Perioperative, Endoscopy and Rehab Services, University of Maryland Medical Center, Baltimore, MD

- "Kaiser Permanente's use of reusable surgical gown and basin sets reduced the organization's regulated medical waste by 30 tons, at a savings of 3.8% in 2010."

Andrew Knight, Senior Sourcing Director, Kaiser Permanente, San Diego, CA

BEST PRACTICE #6:

Reusable Hard Cases for Surgical Instrumentation

Hospitals purchase large volumes of blue sterile wrap for sterilization of kits in preparation for the OR. Blue wrap is not reusable and immediately becomes waste in the OR during procedure set up. While recycling of blue wrap is available in some areas, the supply costs relative to replacing used material continue. Innovative hospitals have begun a transition from disposable blue wrap to the use of reusable rigid sterilization containers for surgical instrumentation. The cases can be reused continually, driving down the purchase of blue wrap and the associated waste disposal costs while still protecting sterility and function of the instrumentation.

- Mills-Peninsula Medical Center, a 413-bed hospital in Burlingame, CA purchased rigid sterilization containers for the organization in 2006 at a cost of \$34,987. They were able to avoid blue wrap purchases of \$25,173 and save \$26,000 in rewrapping costs for torn blue wrap sets, making the payback 8.2 months with an additional cost-savings of \$16,186 in one year without even tallying waste avoidance costs into the equation.

Gail Lee, past Director, Environmental Health & Safety, Mills-Peninsula Medical Center, Burlingame, CA

- Boulder Community Hospital purchased \$150,000 of rigid sterilization containers for the OR in 2003 and over two years, reduced blue wrap purchase from \$250,000 to \$60,000 annually—less than a two year payback. BCH has saved over \$1 million in avoided supply costs since 2003 as a result of the program.

Kai Abelkis, Sustainability Coordinator, Boulder Community Hospital, Boulder, CO

BEST PRACTICE #7:

OR Kit Reformulation

ORs routinely dispose of items included in OR kits that are never used during the procedure. OR staff in leading hospitals are working with physicians to review preference cards—and in some cases, audit surgeries—to determine where unneeded or excess items may be making their way into the kits and routinely are disposed of as waste rather than utilized during the procedure. Streamlining custom kits, reviewing preference cards, and standardizing both the number and type of items included (as much as possible) can result in decreased inventory, reduced supply costs and avoided waste disposal fees. While this best practice tackles entrenched behavior and OR culture head on, it is very feasible to implement with cooperation from surgical staff.

- “The University of Minnesota Medical Center-Fairview, saved an estimated five tons of waste and \$116,000 dollars in 2010 through its surgical pack reformulation efforts.”

Crystal Saric, Coordinator of Waste Services and Waste Reduction, Fairview Health Services, Minneapolis, MN

- “In collaboration with its vendor, Mayo Clinic Surgery in Rochester, MN reviewed and reformulated its custom packs in the OR in an effort to reduce both waste and cost, saving nearly \$125,000 in avoided supply costs with the new kits since April of 2009.”

Kevin T. Hovde, C.P.M., Supply Chain Mgmt Performance Consulting Lead Senior Analyst – Surgery, Mayo Clinic, Rochester, MN

Thomas J. Louks, Hospital Surgical Services Finance Specialist, Mayo Clinic, Rochester, MN

BEST PRACTICE #8:

OR Setback Programs for HVAC for Unoccupied ORs

ORs have the highest requirements for air changes per hour, require strict temperature parameters and use energy-intensive (and often heat-generating) surgical lighting systems. Often these systems run all night—even when the OR is unoccupied. Forward-thinking hospitals are evaluating OR setback mechanisms to decrease air changes and/or turn out the lights during these unoccupied hours as a means of reducing both energy and cost. Other hospitals have replaced heat-generating halogen lighting with LEDs or have adjusted temperature fluctuation to a setpoint to increase efficiency.

- “By moving to HVAC occupancy sensors in two of its new digitally controlled ORs, Providence St. Peter Hospital in Olympia, WA reduced its energy use by 25,000 kWh and 2,460 Therms and is saving \$4,000 dollars per year.”

Keith Edgerton, Sustainability Coordinator, St. Peter Hospital and Providence Southwest Washington Service Area

- “By increasing the temperature in Advocate Illinois Masonic Hospital’s operating rooms from an average of 64 degrees, to an average of 70 degrees, we saved \$72,000 per year in patient warming devices. Eliminating the need to pre-cool the operating rooms yielded a significant energy savings as well.”

York Chan, Administrator, Facilities Services Advocate Health Care, Chicago, IL

BEST PRACTICE #9:

Reusable Sharps Container Systems

Instead of buying disposable sharps containers that go into the infectious waste stream and drive up waste costs while also requiring ongoing replacement, hospitals are moving to reusable sharps container systems. The full containers are typically collected by a service provider who mechanically empties them (reducing exposure for workers at the same time), cleans and disinfects them and returns them to the hospital for reuse. Containers are often used hundreds of times, driving down both waste and replacement supply costs—a win-win.

- “Borgess Medical Center, a 450-bed hospital in Kalamazoo, MI made the switch to reusable sharps containers in 2007. The transition has enabled Borgess to reduce its regulated medical waste by 10.5 tons at savings of \$11,000 dollars annually.”

Eric Buzzell, Executive Director, General Services & Property Management, Borgess Medical Center, Kalamazoo, MI

- “The reusable sharps container program at Illinois Masonic Hospital (an affiliate of Advocate Health) reduced its regulated medical waste by 10 tons and saved the organization \$13,000 dollars in 2010.”

Steve Verzi, Safety Coordinator, Advocate Illinois Masonic Hospital, Chicago, IL





How Can the Greening the OR™ Initiative Assist Your Facility?

The Greening the Operating Room™ Initiative is designed to let healthcare organizations play at the level they feel comfortable. Participation is free and there are a myriad of resources—evolving every day—that can assist your facility in learning more about different best practices. The initiative is a dynamic learning community where you can hear about other hospitals' successes, strategize around barriers to implementation and engage the supplier community to create new solutions to today's issues. Learn a bit more about some of the educational opportunities offered by the initiative.

Checklist

Want to get a sense of how far along your facility is in greening its operating rooms? Use this checklist to do a self-audit. You may be surprised by how many best practices you already have in place or may encounter all kinds of new best practices to explore.

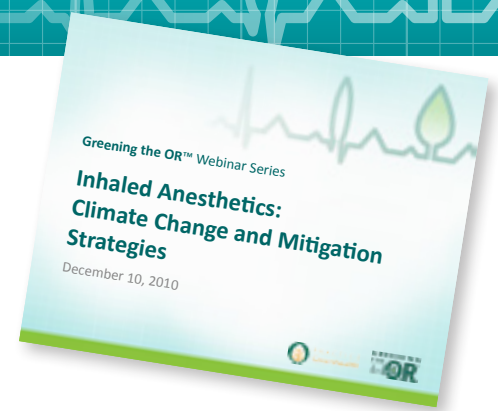
Sharing Calls

Want to learn more about a new program but don't see it on the webinar calendar or have a more immediate need for additional information? Hospitals formally participating in the initiative (and all Practice Greenhealth members) can request a sharing call. Staff will put out a call request inviting other hospitals to come and share their experience with that particular program. Calls are facilitated by Practice Greenhealth but are largely informal opportunities for sharing advice, resources and strategies.

Webinars

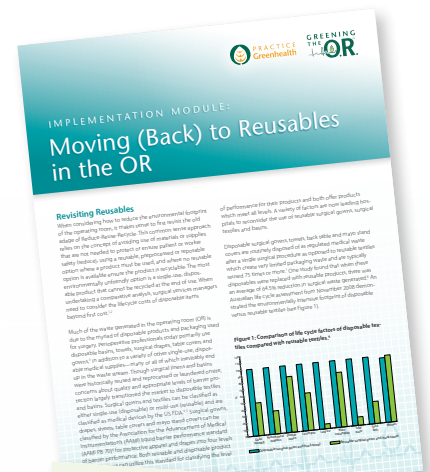
Practice Greenhealth began a Greening the OR® webinar series in 2011.

Webinars are free to all facilities formally participating in the initiative and to all Practice Greenhealth members. Each month, the series focuses on a different best practice and shares real-time case studies from participating hospitals. Webinar calendar available at: www.GreeningTheOR.org.



Implementation Modules

Practice Greenhealth is rolling out a series of implementation modules as part of the Greening the OR® Initiative. These multi-step resource guides walk interested hospitals through the steps necessary to explore, build and implement different sustainable best practices in the OR. For a complete list of current modules, go to: www.GreeningTheOR.org



Case Studies

Practice Greenhealth is writing a series of case studies featuring organizations participating in the Greening the OR® Initiative. Practice Greenhealth realizes the value of data-driven case studies that share the experiences and successes of other healthcare organizations in implementing sustainable best practices. Learn how other hospitals have organized their implementation efforts or overcome key barriers. Practice Greenhealth also makes case studies from other sources available on its website to give participants the widest range of resources possible. For a recent list of case studies on different sustainable best practices in the OR, go to: www.GreeningTheOR.org



Greening the OR® Calculators

Making the business case for a specific sustainable practice can be challenging if you don't know how to frame the data and make the cost-benefit analysis. Practice Greenhealth is working with hospitals and the healthcare supply chain to provide a series of calculators that will allow healthcare organizations to accurately estimate the kinds of financial savings and environmental benefits they can expect to realize. Learn more at www.GreeningTheOR.org.

Council for Environmentally Responsible Surgery (CERS)

Practice Greenhealth recognizes the critical role that physicians in the operating room can play in determining the success (or failure) of new best practices. The Council is a new initiative aimed at engaging surgeons, other physicians who perform surgery and anesthesiologists to explore the needs of this community relative to substantiating and driving best practices.



How to Participate

The Greening the OR® Initiative is bringing together a cross-section of the healthcare sector to explore and demonstrate that ORs are identifying strategies to reduce their environmental impact while searching for ways to do it safely and cost-effectively.

Learn how you can join the community.

Endorse the Initiative.

Healthcare facilities and ambulatory surgery centers can participate in the initiative by filling out a simple commitment form. **There is no fee to participate.** The commitment form provides a menu of options—offering facilities different ways to participate in the initiative. From sharing calls with other hospitals to the Greening the OR® Webinar Series to opportunities to highlight your organization's successes at conferences and to the media—Practice Greenhealth is committed to building a vibrant learning community. Learn more at: www.GreeningTheOR.org

Sponsor the Initiative.

This initiative is about reaching across company lines and innovating sustainable strategies to address today's OR challenges. Is your company ready to be part of the solution? Learn how you can get involved in Greening the OR® activities by contacting:

Robert Jarboe

Executive Vice President, Business Development

bjarboe@practicegreenhealth.org • 502.727.8658

Endnotes

- 1 McKesson Information Systems Inc. and the Healthcare Financial Management Association. *Achieving Operating Room Efficiency Through Process Integration*. Accessed on May 20, 2010 at: http://www.mckesson.com/static_files/McKesson.com/MPT/Documents/HFMAProcessIntegration.pdf
- 2 Randa, K., Heiser, R. and Gill, R. *Strategic Investments in the Operating Room (OR): Information Technology (IT) to Generate Rapid ROI and Long-Term Competitive Advantage*. HIMSS Website. Accessed on February 24, 2011. Available at: http://www.himss.org/content/files/SIS_Strategic_Investments_in_the_OR%20White%20Paper.pdf
- 3 Ibid.
- 4 Farmer, A. and Merbler, K. *Cost Accounting in the Operating Room*. TriNet Healthcare Consultants Inc. Accessed on April 15, 2010 at: <http://www.trinethealth.com/Articles/Cost%20Accounting%20in%20the%20Operating%20Room.pdf>
- 5 Perioperative Services. Picis Website. Accessed on February 20, 2011. Available at: <http://www.picis.com/solutions/perioperative-services.aspx>
- 6 Williamson, JE. *Waste reduction: ways to get leaner and greener in the SPD*. Healthcare Purchasing News. April, 2008. Accessed on March 17, 2011. Available at: http://findarticles.com/p/articles/mi_m0BPC/is_4_32/ai_n25151368/?tag=content;col1
- 7 Waste cost estimated using national average of \$0.28 per lb per: Conrardy, J., Hillanbrand, M., & Nussbaum, G.F. (June 2010). *Reducing Medical Waste*. Association of Perioperative Registered Nurses Journal (AORN), 6, 711-721.



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The Greening the OR® Initiative is defining best practices in the OR to reduce environmental impact, reduce cost, increase efficiency, and improve worker and patient safety. Practice Greenhealth is grateful for the support of a number of sponsors of the Greening the OR® Initiative. For a complete list, please visit: www.GreeningTheOR.org

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Greening the Operating Room® Checklist

Hospitals rank among the largest users of energy, highest producers of waste and are a major consumer of chemicals, paper, water and other resources, resulting in an industry with a huge environmental footprint. In an effort to reduce the impact on the environment, healthcare organizations are asking for information on best practices, guidance in establishing green practices and methods to measure success. They are also asking for guidance on where to focus their efforts. As a primary source of hospital revenue, one of the largest users of supplies and generators of hospital waste, the operating room (OR) is a strategic priority for any hospital hoping to reduce its impact on the environment. This tool is designed to assist health care providers in assessing the status of environmental best practices in the OR.

For organizations just beginning to identify sustainability programs in the operating room, this tool will illustrate where opportunities exist. For those further along, it can highlight products, processes and elements that may have been overlooked. Whether your organization is just beginning its sustainability journey or is looking for ways to assess and measure progress, this tool was designed for you.



Facility Name

Contact Name

Title

Phone

Email

Date

Instructions: Place an uppercase 'X' in the appropriate box next to each activity. Please only use one 'X' per line.

Greening the OR® Checklist	Fully Established (>1 Year)	Implementation In Progress	Not Implemented	Unaware of the Program/ Process	Not applicable (N/A)	Additional Notes
Organizational Development						
Endorse and participate in Practice Greenhealth's Greening the OR® Initiative	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Build a Green Team specific to Surgical Services/OR	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Educate OR staff on benefits of greening and opportunities for cost and waste reduction and safety benefits	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Waste Reduction and Prevention in the OR

Conduct a waste audit in Surgical Services/OR

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Implement a process to divert pre-incision, non-pharmaceutical waste from regulated medical waste stream into a clear bag for non-infectious waste disposal

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Implement a process to segregate non-infectious solid waste from the regulated medical waste stream during and after the procedure.

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Recycle medical plastics from the OR, including:

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- Clean, rigid plastics of any shape (e.g., trays, containers and packaging)

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- Clean, empty bottles (e.g., saline and alcohol)

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- Clean blue wrap (polypropylene sterile wrap)

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- Clean, soft plastics (e.g., overwraps)

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- Clean Tyvek

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- Other:

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Utilize a fluid management system for capturing liquid waste from surgery in reusable containers that empty liquid directly to sanitary sewer

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Recycle batteries generated in the OR

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Utilize a reusable sharps container system

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Collect FDA-approved medical devices for reprocessing with an FDA-approved third party reprocessor

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Segregate pharmaceutical waste into specially labeled containers for appropriate disposal

☐☐☐☐☐**Environmentally Preferable Purchasing in the OR**

Reformulate OR kits to reduce excess supplies and overage

☐☐☐☐☐

Purchase reprocessed medical devices from an FDA-approved third party reprocessor

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Replace disposable items with reusable items in OR kits where demonstrated safe and economically viable

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Utilize reusable hard cases for surgical instrumentation

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Environmentally Preferable Purchasing in the OR (continued)

Use PVC and DEHP-free IV bags and tubing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Purchase PVC-free (non-vinyl) surgical gloves	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Purchase reusable gowns for surgical staff	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Purchase reusable covers for mayo stands	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Purchase reusable covers for back table	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Purchase reusable surgical (huck) towels	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Purchase energy-efficient or EnergyStar-rated monitors for equipment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Purchase EPEAT-registered* computers and monitors for use in the OR	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Utilize mercury-free blood pressure devices	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Use reusable pulse oximeter sensors/probes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Purchase other reusable devices or products, please describe:					
Utilize reusable grounding pads	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Utilize rubber corners for surgical trays wrapped in blue wrap to prevent breakage requiring resterilization	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Utilize environmentally preferable cleaners or disinfectants for hard surfaces in the OR	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Utilize reusable totes for delivering surgical supplies to the OR	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Built Environment					
Utilize occupancy sensors for lighting to reduce energy use in unoccupied ORs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Program HVAC system to reduce air changes when ORs are unoccupied in order to reduce energy use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Utilize LED surgical lighting to reduce energy use and increase thermal comfort	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Use an anesthetic gas capture system to capture waste anesthetic gases (WAGs) and prevent venting to outside air	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

* EPEAT is an environmental certification system for electronics. Learn more at www.epeat.net

Built Environment (continued)

Install a power boom with a laser smoke capture system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Utilize modular casework that does not contain urea formaldehyde	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Utilize PVC-free edge details in casework						
Utilize durable countertops such as solid surfacing in the OR	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Utilize PVC-free wall and door protection	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Utilize PVC-free flooring (such as rubber flooring) in the OR	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Utilize epoxy-free and bisphenol A (BPA)-free coatings for walls	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Implement ASHRAE 170 guidance for air changes as a mechanism to reduce energy use in the OR	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Implement ASHRAE 170 guidance for humidity control as a mechanism to reduce energy use in the OR	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Follow ASHRAE 170 guidance for air distribution as a means to reduce energy use, enhance infection prevention and reduce air changes in the OR	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Use paperless documentation systems to prevent errors, speed information exchange, conserve resources and reduce space.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	



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IMPLEMENTATION MODULE:

Medical Device Reprocessing

Reusable to “Single-Use” to Reprocessed

Hospitals have accepted that third-party reprocessing of medical devices labeled “single use” is a safe and effective process that can help redirect valuable financial resources back into patient care while significantly reducing the volume of regulated medical waste generated by the organization. The US Food and Drug Administration (FDA) requires third party reprocessors to meet the same standards as originally manufactured single-use devices (SUDs).¹ The reprocessing industry has safely reprocessed over 50 million devices and prevented over 10,000 tons of medical waste from entering landfills between 1997 and 2007.² Reprocessing is now common practice, with all of US News and World Report’s “Honor Roll” hospitals choosing to reprocess single use devices,³ and 77% of Practice Greenhealth Award winners in 2010 choosing to reprocess medical devices with a combined savings of over \$10.8 million dollars.⁴ Original equipment manufacturers, however, continue to drive efforts to stop the adoption of this program touting patient safety concerns while quietly acknowledging that reprocessing can severely impact their bottom lines. Practice Greenhealth supports reprocessing as an environmentally beneficial, clinically proven, patient-safe method of reducing waste while also reducing cost to the healthcare organization.

Hospitals historically reprocessed a myriad of medical devices onsite in the Sterile Processing Department. Over time, as equipment changed from durable materials like stainless steel to plastic versions, different hospitals utilized different standards for onsite reprocessing and FDA became concerned about the lack of standardization among reprocessing procedures. As a result, FDA—the oversight authority for medical devices and equipment, created new stringent standards for reprocessing of medical devices. Concurrently, concerns around infection prevention and healthcare-associated infections (HAIs) grew, and many of

the original equipment manufacturers (OEMs) began to market a set of products labeled “single-use”—a label not required by the FDA. Many of these products appeared to be similar or identical with little to no change in product formulation to products once reprocessed onsite at hospitals, only with a new label that indicated they should be disposed of after a single-use. Many hospitals, struggling to meet the new stringent standards for onsite reprocessing and confused about whether devices labeled single-use were acceptable to reprocess, began using greater volumes of the disposable devices and discontinued the vast majority of onsite reprocessing.

A new service industry arose in 1997, called third party reprocesors—these companies collected a set of devices (many now labeled “single-use”) specifically approved by the FDA and reprocessed them, making them available for resale to hospitals. Each and every device was cleaned, function-tested, packaged and sterilized then returned to the hospital for purchase at a significantly discounted price. Third party reprocessors were tightly regulated and reviewed by the FDA as of 2000,⁵ and any liability for a faulty reprocessed device was transferred to the third party reprocessor. The FDA set up a reporting system to capture any adverse events related to reprocessed medical devices as a mechanism to build accountability.

OEMs provided considerable push-back, selectively educating surgeons and clinical staff on the risks of reprocessing single-use devices, touting liability and patient safety as drivers for avoiding third party reprocessing. But many in healthcare—cost-conscious and environmentally engaged, and having long understood the

In the US in 2007, nearly 45% of hospitals had agreements with third-party reprocessing companies, a number that increased to 70% in 2008 after the economic recession.⁶

value of reprocessing their own devices in-house—forged ahead with a commitment to third party reprocessing after studying the process in detail, visiting reprocessing plants and putting repro- cessors through their own quality assurance programs. Third- party reprocessors inspect, functionally test, clean, package, and sterilize medical devices labeled for single-use in such a manner that the quality, physical characteristics, and performance func- tions of the device are not significantly affected and that the device remains safe and effective for its appropriate clinical use. Reprocessors encourage hospital clients to tour their reprocess- ing plants—demonstrating through a multi-step process that each device is carefully scrutinized and tested before being sent back to hospitals for resale. It is useful to note that OEMs often only test a sampling of the millions of devices they produce, while reprocessors test and inspect each and every device.

Multiple stakeholders across the healthcare sector have posi- tion statements supporting medical device reprocessing and remanufacturing. These include arguably the most important—the Association of Professionals in Infection Control (APIC) and the Association of Perioperative Registered Nurses (AORN) as well as the American Hospital Association, its personal membership group the American Society for Healthcare Central Service Professionals. Other groups with position statements supporting third party repro- cessing of medical devices include the American Medical Association, the American College of Cardiology (ACC) and the American Association of Orthopedic Surgeons (AAOS). For a complete list of position statements supporting medical device reprocessing and the specific language, visit www.GreeningTheOR.org. In 2008, the Government Accountability Office released a study demonstrating that the FDA’s analysis of reported device-related adverse events indicates that reprocessed SUDs present no increase risk as com- pared with originally manufactured SUDs. The report also notes that



Surgical staff divert reprocessable single-use medical devices into a special collection container in the OR.

Figure 1. Commonly reprocessed medical devices⁷

Device type	New device price	Reprocessed price
Cardiac catheters	\$280	\$60
Orthopedic surgical blades	\$30	\$14
Deep vein thrombosis compression sleeves	\$125	\$11
Laparoscopic instruments	\$1,240	\$250
Torniquet cuff	\$25	\$12
Saw blade	\$40	\$18
Ultrasound catheters	\$2,900	\$1,400
Laparoscopic shears	\$120	\$55
Cardiac stabilisers	\$900	\$380
Pulse oximetry sensor	\$10-\$20	\$6-\$10

third party reprocessors are more stringently regulated by FDA than the original equipment manufacturers.^{8,9}

From an environmental perspective, most single-use dispos- able devices that are not collected for reprocessing make their way into the regulated medical waste (RMW) stream. Healthcare organizations pay a premium to dispose of RMW—6 to 10 times the amount it costs to dispose of solid waste. Reprocessing provides a way to divert these devices from RMW or solid waste and put them back into meaningful use. A single hospital can divert over a ton of devices from the waste stream each year.¹⁰ Additionally, these devices typically cost between 40-60% less than the original device,¹¹ which can mean huge cost-savings for the organization, as the OR arguably utilizes the most expensive medical devices across the healthcare sphere. There is typically no up-front capital investment other than appropriately educat- ing and engaging clinical staff. Reprocessors collect devices in color-coded reusable totes designed specifically for medical instrumentation and deliver packaged sterile devices back to the hospital in reusable totes—eliminating excess packaging brought in by new devices. Most of the major third party repro- cessors also track waste diversion data for their customers, as well as estimated device purchase savings.

With some surgeons and OR staff still skeptical of a transition to the collection and use of reprocessed single-use medical devices, how then does one make the case to move ahead and operationalize the change? There are several finite steps that an organization can follow to ease the transition to reprocessed single-use devices.

Figure 2. FDA-Recommended Questions to Ask Potential Third Party Reprocessors¹²

- *Has the reprocessing facility been inspected by the FDA?*
- *Can you provide documentation showing that the FDA has approved the firm to reprocess single-use devices?*
- *Which aspects of the process — cleaning, packaging, sterilization — have been validated?*
- *Do you have limits on how many times items can be reprocessed?*
- *How are those limits determined?*
- *How do you make sure items are not reprocessed too many times?*

Step 1. Create the Project Team

Before starting down the road of convincing OR staff and surgeons that a reprocessing program makes sense, begin by reaching out to Purchasing, Infection Prevention, the Sterile Processing Department (SPD), Risk Management and others who might be helpful. Lay out the hospital's sustainability goals (if applicable) and point to staff's desire to reduce the organization's environmental impact. Help them understand the dramatic cost-savings that can occur as a result of collecting and purchasing reprocessed devices. It will also be important to lay out the quality assurance process and stringent regulatory oversight for reprocessed medical devices. Point out that reprocessors actually become the "manufacturers" of the reprocessed devices. It is the reprocessor, rather than the OEM, who becomes liable for any defects or quality issues.¹³

Step 2. Identify a Potential Reprocessing Partner

Work with the project team to determine the best potential reprocessing partner. Ask your GPO who they recommend or other hospitals within your system or nearby. When you have narrowed down your choices, ask each candidate company to address the questions suggested by the FDA, and other questions about their service model. Do they provide containers for collection of devices? How often do they pick up collection containers? Can they help you understand how containers will be stored onsite before collection? What kinds of devices do they reprocess and are they able to track cost-savings and waste diversion benefits for you? What happens to devices that are collected but cannot be reprocessed? One hospital mentioned their reprocessor provides them with device collection containers that allow them to avoid buying 18-gallon sharps containers at \$19 each.¹⁴ Ask about additional opportunities to save money, reduce waste or supply costs or ease handling concerns for staff. You're the customer—a good reprocessor will be happy to lay out the benefits of partnership.¹⁵

Step 3. Educate-Educate-Educate Surgeons and Staff

A proactive education effort is a key ingredient in building understanding, acceptance and support for reprocessing among OR staff and surgeons. Take a stakeholder approach and tailor education for different audiences. Nurses and surgical technicians may have concerns about infection prevention and the process for separating appropriate devices in the OR—what standards are used for cleaning and sterilization? Will segregation be time-consuming? Surgeons are going to be concerned about functionality of devices—are the blades sharp, are there quality concerns? They may also need an in-depth briefing on how the FDA considers the third party reprocessor the manufacturer of these supplies and that they must meet the standard of original device functionality in order to be placed back into service. A thorough update on product liability is helpful here as is a referral to the GAO report that demonstrated that reprocessed devices are equally safe if not safer than the original devices, which are batch tested, and highlight the industry's outstanding safety record. Many hospitals have found that having OR staff take an onsite tour of the reprocessing plant can build comfort levels with the new process and address any questions or fears different stakeholders might have.

Step 4. Pilot the Program and Start Small

Once the program has gained a basic level of acceptance amongst OR staff and the program is ready for roll-out, hospitals may find it easier to start small or begin with a trial period. Some begin by collecting all devices for reprocessing, but only buying back non-invasive devices as a way to gain a comfort level with the process. Others move directly into buying back all kinds of devices but work slowly with surgeons to gain acceptance—never forcing a surgeon to use a reprocessed device without his/her knowledge. Some surgeons—supportive of the program have suggested a blind test where they use both kinds of equipment to see if they can sense any difference in quality. But that strategy requires surgeon leadership, and each hospital needs to figure out a formula that works with its own culture, staff and surgeons. Hospitals find that engaged OR staff can build on their existing relationships with surgeons to gently reiterate the dual benefits of cost reduction and decreased surgical care impact on the environment.¹⁶ Recruit engaged nurses and techs to be the eyes and ears of the new initiative and to flag areas of concern to be addressed.

Figure 3. Commonly reprocessed medical devices¹⁷

Estimated Savings for a 500 Staffed Bed Acute Hospital	Annual Est. Savings Potential Based on Best Demonstrated Practices	Annual Est. Waste Diversion (lbs) Potential Based on Best Demonstrated Practices
Laparoscopic	\$93,700	4,288
Trocars	\$124,345	1,985
Ultrasonic Scalpels	\$202,193	1,072
Compression Devices	\$209,217	13,540
Diagnostic Ultrasound Catheters	\$289,430	282
EP Catheters & Cables	\$433,585	994
Pulse Oximeter Probes	\$191,576	2,883
Total Annual Savings Potential	\$1,544,144	25,045

Step 5. Evidence Based Decision-Making

Increasingly, clinical leaders are interested in their role in environmental stewardship.¹⁸ It is important to help OR staff and surgeons understand this is not a decision being pushed on them, but rather one they have chosen to support and adopt. The ongoing discussion between reprocessors and OEMs can be fierce at times and many hospitals find that they have some issues with OEMs trying to selectively “re-educate” surgeons or staff. Hospitals have found various ways to deal with this issue—ranging from outreach to OEMs asking them not to interfere in the hospital’s decision to reprocess single-use medical devices, to instituting policies that force OEMs to come into the hospital only through pre-approved appointments with materials management. How your organization deals with this issue will again be site-specific, but these counter efforts can leave surgical staff confused and conflicted about the program if not quickly addressed by OR management. If necessary—use this as an opportunity to pull staff together to address any remaining concerns or new information that has been brought to their attention by OEMs.

Step 6. Setting Up for Success

Smooth implementation requires support from a diverse team of players—as demonstrated by the Environment of Care committee—and it is no different with operating room strategies. As the hospital initiates program roll-out, it is important that everyone is clear about the new procedures for handling these devices. Bring in the reprocessor to provide In-Services to staff about:

- Placement of the collection containers;
- Which devices can and should be placed in the container during and after surgeries;
- Which devices the hospital has chosen to reprocess initially (if a shortened list);
- Which devices should be cleaned in SPD before being sent for reprocessing;
- How this fits with medical waste disposal regulations; and
- General information on how the process works.

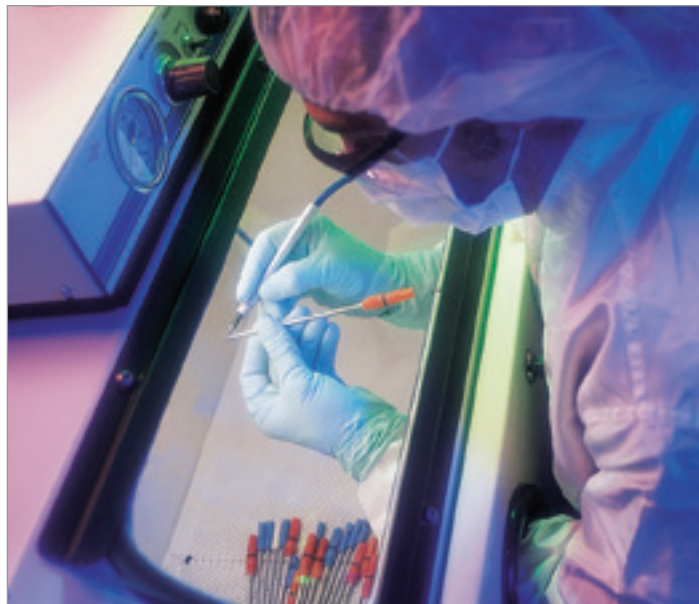
Work with Environmental Services (EVS) to develop a process for collection of containers from the OR to onsite storage to pick-up by the vendor. Even determining the staging area for onsite storage can sometimes be challenging when dealing with limited dock space. And strategizing with EVS around how to structure collection so that it doesn’t require additional labor or pick-ups on their part can be key to gaining this department’s support for the new initiative. When reprocessed devices are brought back into the facility—newly cleaned, packaged and sterilized, talk to Central Sterile Supply about where these items get stocked. Reprocessors often try and use the same size packaging utilized by the original equipment manufacturer as a means to allow unified storage of new and reprocessed devices. Some hospitals have encountered early resistance to utilizing the reprocessed devices as the program gains traction and separate storage areas can aid that resistance. Having integrated supply areas for both kinds of devices can assist in program uptake. While the program will immediately begin to provide environmental benefits in the form of waste reduction back to the organization, many of the deeper savings come from replacing the purchase of new devices with the purchase of reprocessed devices. Troubleshooting the case cart process or reaching out to resistant staff and offering an opportunity to express and address concerns can be a good way to continue to build momentum for this program across the organization.

Step 7. Troubleshoot and Expand the Reprocessing Program

Once the program is up and running, and clinicians and staffers are comfortable with the transition, the organization may consider more aggressive reprocessing goals. This can mean moving to the reuse of invasive devices if you began with non-invasive devices. It can mean upping the collection rate in the ORs by re-educating staff. Or it can mean troubleshooting the selection of reprocessed devices for new surgeries. Use this as an opportunity to reach out to OR staff and ask how the program is working and whether there are things that can be done to aid implementation or collection. Check in with EVS to make sure the collection process and pick-ups are proceeding smoothly. Hospitals also find that reprocessing is applicable to other areas of the hospital beyond Surgical Services. Consider adding additional departments to the service contract. Electrophysiology labs, for example, can save up to \$150,000 by reprocessing electrophysiology and imaging catheters.¹⁹ The use of reprocessed SCD sleeves and pulse oximetry sensors is another area where huge savings are possible. Some of these items may also be available for reprocessing from a variety of different companies beyond those who can provide large-scale reprocessing of the most complicated devices. Compare and contrast your existing reprocessor's service model and savings with other companies who may specialize in reprocessing these more non-invasive devices. Extending this program into labs and critical care units can offer the organization significant additional savings.

Step 8. Track Improvements and Recognize Success

Like with any other quality improvement initiative, tracking performance and reporting positive outcomes can support the value of program maintenance. Ensure that waste tracking continues in order to capture volume and cost reductions associated with this program. Work with Environmental Services in advance to set up a system to track improvements in RMW reduction coming from the OR. This can be as exact as data from a waste tracking or bar-coding system that specifically identifies OR RMW volumes and fluctuations or an estimate, based on a bi-monthly audit where OR waste is pulled aside and weighed separately. EVS can be very helpful in determining how best to track or estimate waste reductions.



When sent for reprocessing, each device is individually cleaned and function-tested before packaging and sterilization.

Work with Purchasing to track cost savings from purchasing reprocessed versus new devices. Typically, the reprocessor will be able to track many of these savings for you and provide these figures on your monthly statement. Though double-checking doesn't hurt, it may be a redundant effort. Report cost reductions, waste diversion volumes and other environmental or other benefits back to leadership and OR management and keep a running tally of savings to demonstrate payback. Congratulate OR staff and surgeons on their success in decreasing environmental impact while continuing to protect patient health and safety. Make sure the organization's sustainability leader or green team (if applicable) knows about the success the OR is having, and includes it in any award applications or recognition opportunities.

For More Information: Go to www.GreeningTheOR.org for a list of key resources that can assist you in this program area. Because this list is updated often, we keep it online, so as not to date this implementation module. Also available are case studies on reprocessing programs at different facilities. Learn from your peers!

Endnotes

- 1 Food and Drug Administration. Executive Summary: survey on the reuse and reprocessing of single-use devices (SUDs) in US hospitals. <http://www.fda.gov/MedicalDevices/DeviceRegulationandGuidanceReprocessingofSingle-UseDevices/ucm121678.htm>. Accessed March 13, 2011.
- 2 Association of Medical Device Reprocessors. 1997-2007-Ten Years of Excellence in Reprocessing. 2007. Available at: [http://www.ascenth.com/docs/AMDR_10_Years_\(00051493\).pdf](http://www.ascenth.com/docs/AMDR_10_Years_(00051493).pdf). Accessed on March 12, 2011.
- 3 Razor, T. *Recycling boosts Iowa Health's bottom line*. Des Moines Business Record. December 4, 2010. Accessed on March 28, 2011. Available at: <http://www.ihs.org/body.cfm?id=67&action=detail&ref=187>
- 4 Practice Greenhealth. Sustainability Benchmarking Report. 2010. Accessed on March 21, 2011.
- 5 Jobe-Lockwood, S and Nguyen, T. *Are you Reprocessing Single Use Devices?* Outpatient Surgery. 2009. Available at: <http://www.outpatientsurgery.net/guides/going-green/2009/are-you-reprocessing-single-use-devices&pg=2>. Accessed on March 12, 2011.
- 6 Moduga, A. *Reduce, Reuse, Recycle: Reprocessing Medical Devices*. HospitaManagment.net March 31, 2010. Available at: <http://www.hospitalmanagement.net/features/feature80981/> Accessed on March 13, 2011.
- 7 Ibid.
- 8 US Government Accountability Office. Report to the Committee on Oversight and Government Reform, House of Representatives: Reprocessed single-use medical devices. January 2008. <http://www.gao.gov/new.items/d08147.pdf>. Accessed March 13, 2011.
- 9 Boone, PK. Transition to Reprocessing-One OR's Success. Nursing Administration Quarterly. 2010. Vol. 34, No. 4, pp. 343-345.
- 10 Practice Greenhealth. Sustainability Benchmark Report. 2010. Available at www.practicegreenhealth.org.
- 11 Hurst, D. Leaner and Greener Operations- The Environmental Benefits of Reprocessing. The Source- HealthTrust Purchasing Group. Summer 2009. pp. 14-17. Available at: <http://viewer.zmags.com/publication/b1fe9b7d#/b1fe9b7d/16>. Accessed on March 12, 2011.
- 12 Jobe-Lockwood, S and Nguyen, T. *Are you Reprocessing Single Use Devices?* Outpatient Surgery. 2009. Available at: <http://www.outpatientsurgery.net/guides/going-green/2009/are-you-reprocessing-single-use-devices&pg=2>. Accessed on March 12, 2011.
- 13 Jobe-Lockwood, S and Nguyen, T. *Are you Reprocessing Single Use Devices?* Outpatient Surgery. 2009. Available at: <http://www.outpatientsurgery.net/guides/going-green/2009/are-you-reprocessing-single-use-devices&pg=2>. Accessed on March 12, 2011.
- 14 Jobe-Lockwood, S and Nguyen, T. *Are you Reprocessing Single Use Devices?* Outpatient Surgery. 2009. Available at: <http://www.outpatientsurgery.net/guides/going-green/2009/are-you-reprocessing-single-use-devices&pg=2>. Accessed on March 12, 2011.
- 15 Jobe-Lockwood, S and Nguyen, T. *Are you Reprocessing Single Use Devices?* Outpatient Surgery. 2009. Available at: <http://www.outpatientsurgery.net/guides/going-green/2009/are-you-reprocessing-single-use-devices&pg=2>. Accessed on March 12, 2011.
- 16 Boone, PK. *Transition to Reprocessing-One OR's Success*. Nursing Administration Quarterly. 2010. Vol. 34, No. 4, pp. 344.
- 17 Brannen, L., Guity, A. and DeLoach Lynn, C. *Improving Sustainability Performance in a High-Paced, "Big" Cost-Center, and Resource-Constrained O.R. Setting*. ASHE International Summit and Exhibition on Planning, Design and Construction. March 15, 2011.
- 18 Kwakye, G., Pronovost, P., and Makary, M. *Commentary: A Call to Go Green in Health Care by Reprocessing Medical Equipment*. Academic Medicine. Vol. 85, No. 3. March 2010. Accessed on March 4, 2011.
- 19 Moduga, A. *Reduce, Reuse, Recycle: Reprocessing Medical Devices*. HospitaManagment.net March 31, 2010. Available at: <http://www.hospitalmanagement.net/features/feature80981/> Accessed on March 13, 2011.



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IMPLEMENTATION MODULE:

OR Kit Reformulation

Background

The OR is responsible for approximately 33 percent of all hospital supply costs.¹ Other estimates of the OR's contribution to total supply costs are much higher—coming in at greater than 50%.² And yet another figure estimates that 30.1% of all health care outlays are related to surgical expenditures.³ Within the OR, supply costs can comprise more than 50% of the departmental budget.⁴ Supply costs in the OR are driven in large part by surgeon preference, but are also due to occasional hoarding of supplies and increased inventory when supplies are split between the Sterile Processing Department (SPD) and the OR and often duplicated. While certain supplies are common to certain procedures, often surgeons have strong preferences about composition of the OR packs, devices, equipment and other items, typically captured on their preference cards and resulting “pick lists”. There can be considerable variation in supply costs per procedure across a set of surgeons, resulting in part from different preferences for different kinds and volumes of supplies.

Beyond strong physician preference, a key driver of supply costs are those supplies that are placed in surgical and anesthesia kits and then not used during the procedure.⁵ Under FDA guidelines, any item prepared for use on a particular patient but then not used is not able to be used on a different patient, as the material is then deemed “unsterile.”⁶ This concept, defined as “overage” by a 1997 study,⁷ can drive significant wastage of devices and materials. These excess supplies are driven in part by how often the custom kit or the preference card has been updated and whether care has been taken to remove excess supplies from the kit. Every item picked in SPD and the OR and then not used represents additional labor and transportation costs that ultimately diminish margins. And restocking unopened, unused items can double the labor.⁸ It is recommended that preference cards should only include items that are used more than 90% of the time.⁹ When

preference cards are not regularly updated, excess supplies in the kits continue to be opened and become unusable. Hospitals often end up throwing these materials away, most typically in the regulated medical waste stream. In some instances clean, unopened or expired supplies are donated to missions or third party organizations that facilitate getting supplies to developing countries. Despite the goodwill of donation efforts, the excess supplies still represent significant supply costs to the organization.

The dilemma of having surgeons select their own supplies without review is that the hospital is typically responsible for paying the surgeon a set fee per procedure regardless of supply cost. And multiple surgeons with multiple supply preferences for the same procedure drive up supply budgets and inventory costs. Surgeons are coming under more scrutiny for supply costs as automated materials management systems are starting to allow for a side-by-side comparison of supply costs for the same procedure for different surgeons.

Figure 1. How to increase efficiency in the operating room¹⁰



As hospital administrators struggle to control costs by attempting to limit surgeons to a pre-selected or standardized group of devices, implants or supplies, the pushback can be fast and furious with surgeons touting the “quality” card in comparison to administrators’ “cost” card. There are early indications that some surgeons and hospitals are exploring a reduction in variation in clinical practice between surgeons performing similar operations^{11,12} which could be a mechanism to drive toward more standardization and substitution of clinically effective, but less expensive alternative supplies. Reimbursement models will keep cost-cutting front and center in the next decade, while public reporting of quality measures will force administrators to determine the best way to initiate compromise and ensure that product selection in the OR is not based just on lowest cost, but that products and equipment are also demonstrated to be functionally and clinically equivalent or drive better patient outcomes.

Do surgeons differ in use of disposables for same surgical procedure?

The sum total of disposable instruments for a single operative case in which laparoscopic cholecystectomy was performed ranged from \$92 to \$637 (mean \$333) depending on the preference of the surgeon. [The] study points out the differences in expenses between surgeons. Maintaining this type of expense tracking can apply to other procedures and is a good place to start a surgeon-led and hospital-based cost-saving initiative.¹⁵

There are a number of mechanisms that can be used to address overage and reduce the resulting waste creation. Strategies include reviewing existing OR packs and updating preference cards, streamlining supply locations so inventory isn’t redundant, standardizing supply kits, or utilizing an “on hand but unopened” area on the case cart where items are available for the procedure but not opened unless needed.¹³ This last strategy still requires restocking incurring the labor cost, but doesn’t waste the device. Another idea is to standardize supply kits. Examine copies of high volume doctors’ highest volume preference cards. Identify items used 50% of the time and mark as “hold” rather than “open.”¹⁴

While each of the strategies can drive cost reduction and decrease waste, this module is focused on how an organization can go about developing a systematic program for OR kit reformulation, with a focus on eliminating certain unused supplies from the preference card and pick list. There are several finite steps an organization can follow to implement an OR kit reformulation process in the OR.

Step 1. Create the Project Team

Like most new programs, OR kit reformulation can benefit from a team effort. The team should include nursing staff who are concerned about the volume of supplies being used, a representative from Purchasing or Materials Management, as well as OR leadership and Sterile Processing. Environmental Services may also play a useful role on this team if the organization is interested in tracking its waste reduction benefits. Explore whether there might be a surgeon interested in this initiative—being careful to explain that any changes to custom kits are voluntary rather than mandated. The team will also want to bring in different nursing staff or surgeons as advisors, depending on which kind of kit you are reviewing—where one staff member might have more expertise or experience than another.

Step 2. Start Small: Identify Target Packs

Like most projects, it makes sense to focus the project on the areas of largest impact or opportunity—the 80-20 phenomena. The Pareto principle states that 20% of the factors typically can cause 80% of the impact. With that in mind, identify which packs get used the most frequently—of which the organization purchases the greatest volume. Target one pack as a starting point and bring together the project team to discuss how the review process will work.

Step 3. Review Initial Pack

Working with the project team and any other OR staff or surgeons brought in for specific expertise, carefully review the chosen pack and group items into “always need,” “sometimes need” and “never need” categories. Gather input from the surgeons who perform the majority of this kind of surgical procedure and from circulating nurses who can pull the charges for this procedure to see what typically gets used. Surgical custom packs often contain items such as extra light handles, emesis basins or suture.¹⁶ During the case, the circulating nurses are responsible for marking off on the preference card what supplies are utilized. They are also responsible for indicating what additional supplies are routinely used that may not be included in the custom pack. If possible, try and use just two categories—“always” and “never,” but it is important in this process to ensure that the team is not

proposing to remove items that will later cause a delay or anger a surgeon during surgery while a nurse runs to grab the missing item. If there are items about which the team is uncertain—take the opportunity to gather additional input from other surgeons who perform the procedure. At this early stage in the process, it is better to leave some supplies in question in the pack than risk removing them and the problems that may cause.

Step 4. Collect Data on Pack Transition

Using a gram scale, weigh each item in the original custom pack. List weights for each item individually—then tally the original pack weight and the weight of the pack without the excess items. Using knowledge of how the OR segregates waste at the facility, assess whether the excess items would typically be disposed of as regulated medical waste (RMW), solid waste, or recycling. Gather the disposal costs per pound for each of the three waste streams (if applicable) from the Environmental Services Director. Using the knowledge of how the items would typically be disposed of, multiply the weights by the appropriate cost per pound to establish what the organization would save in disposal costs per each revised pack. Then multiply this total cost by the number of packs the OR uses over a set period to determine total potential cost-savings from waste avoidance.

The next step involves working with purchasing to establish itemized costs for each item in the pack. Again, list the prices for each item in the pack separately and then tally the cost of the original pack against the cost of the revised pack. Subtract the revised pack supply cost from the original pack supply costs to

determine the approximate supply costs savings per pack and then multiply by the number of packs used over a set period (same number used in waste estimate above) to establish the total potential cost-savings from avoided purchase of supplies. Total the waste avoidance and the avoided purchase costs to get a total potential savings for reformulating this one custom kit. See Figure 2.

Step 5. Sit Down with Vendors

Once the OR and Purchasing leadership have reviewed the potential financial and environmental benefits and agreed that it makes sense to move forward, the next step is to reach out to the vendor who supplies the kit that was reviewed and formally request reformulation. Depending on the vendor, these conversations can be incredibly easy or slightly challenging. Many vendors want to meet the needs of their hospital clients and will gladly revise the pack contents. Others may try and sell the organization on new additions to the pack to replace the eliminated items, as a means of keeping their revenue steady. Make sure Purchasing is helping to lead the discussion and be clear that the organization is not interested in purchasing items it cannot or will not use. It also makes sense at this point, to let the vendor(s) know that the organization will be proceeding with additional pack reformulation moving forward. Don't be discouraged if there is a lag time before the hospital begins to receive reformulated packs. Many suppliers make up the packs in bulk volumes and there may be a period of using up the old packs before the new packs can be brought in. Reformulating packs may also be beneficial for SPD staff as items that weren't included originally but should have been and have been integrated into the reformulated packs will reduce labor for SPD each time they pick a case.

Figure 2. Track Savings from OR Kit Reformulation

- Add weight of each item remaining in the pack
- Multiply by appropriate waste cost per pound
- Multiply avoided waste cost by the number of packs used monthly
- = **Total potential cost-savings from waste aversion**

- Determine cost of each item remaining in the kit
- Subtract from cost for original custom kit
- Multiply avoided supply cost by the number of packs used monthly
- = **Total potential cost-savings from avoided purchase costs**

**Total avoided waste costs + Total avoided purchase costs
= Total cost savings from OR kit reformulation**



Items removed from thoracotomy pack as part of kit reformulation process.

Step 6. Tackle Additional Packs

Now that the project team has had an initial success and developed a process for analyzing packs, use the same format to select additional packs for review—high volume, high utilization packs. Continue to tie in applicable staff with the right expertise and be sure to vet pack reformulations with surgeons who utilize those packs. Continue to track the cost-savings and waste reduction data from each pack reformulation to share with leadership in the OR, SPD and Purchasing, as well as the organization's Green Team or sustainability leader (if applicable). These are real-time cost-savings for the organization at a time when healthcare dollars are scarce—make sure organizational leadership is aware of how the OR is addressing its own environmental and cost footprint.

Step 7. Review Preference Cards

Beyond reformulation of custom packs, the project team can also move on to reviewing surgeon's preference cards with an eye toward eliminating unnecessary supplies. Take note of any surgeons who might be interested in or supportive of the project. Having a surgeon on board as a champion can really be a way to engage other surgeons, and perhaps increase their willingness to review and revise preference cards. A surgeon can approach his or her colleagues to begin a dialogue about reviewing preference cards—perhaps even proactively thinking about how to review those procedures cross-surgeon as a means of pre-empting what may be an inevitable move by administrators to try to push surgeons toward increased standardization of preference cards for the same procedure.

Step 8. Other Strategies for Reducing Wastage of Unused Supplies

Beyond reformulating kits and updating preference cards, there are several other strategies that can help ORs reduce excess supplies and prevent them from going into the waste stream. Often a surgeon may feel the need to have a device on hand, just in case the procedure requires it. Staff can work to create an area on the case cart where items that may be needed are stored but not necessarily opened during set up. If a surgeon were to need the item, the item is on hand and can easily be opened and passed into the sterile field without having to scramble for the core or the SPD. If the item remains unused, however, it remains intact in its packaging and can be restocked by SPD when the case cart goes back. While there is still additional labor involved, the device won't be wasted (financially) nor create waste (environmentally). The project team may also be able to reach out to Anesthesia and identify a champion who may have an interest in reducing waste generated by anesthesia kits. This is a separate domain from the custom packs and preference cards and needs to be done in collaboration with anesthesia technologists and anesthesiologists.



Updating preference cards regularly can reduce work for SPD staff by only including necessary items for surgery.



Streamlining custom packs and reviewing preference cards can also reduce excess inventory.

Step 9. Creating a Mechanism for Staff Feedback

It is very important that as the organization begins a kit reformulation program that there is a mechanism set up to allow staff, surgeons and anesthesiologists to provide feedback. If certain items are removed from the pack but then are found to be needed, staff need a way to express those concerns. Likewise, the project team needs to be prepared to come up with stopgap solutions to ensure patient safety and surgeon satisfaction. Make the pack review part of all-staff or committee meetings. Vet the changes as thoroughly as possible before moving ahead with the reformulation. The project team needs to stay flexible to meet perioperative staff demands while still continuing to find new ways to reduce excess materials and supplies.

Step 10. Celebrate Success

Continue to track the cost-savings and environmental benefits of the pack reformulation and preference card revision process. Share the data and results with staff. Help them understand how their willingness to rethink the way the OR does business is helping reduce the organization's impact on the environment and public health while also helping protect the organization's critical financial resources. Translate environmental benefits in to concepts that feel tangible for staff. Share the department's successes with organizational leadership and ensure that the organization's Green Team or sustainability leader is aware of the department's success and includes it in any awards applications.

For More Information: Go to www.GreeningTheOR.org for a list of key resources that can assist you in this program area. Because this list is updated often, we keep it online, so as not to date this implementation module. Also available are case studies on OR kit reformulation at different facilities. Learn from your peers!

Endnotes

- 1 Perioperative Services. Picis Website. Accessed on February 20, 2011. Available at: <http://www.picis.com/solutions/perioperative-services.aspx>
- 2 Park, KW and Dickerson, C. *Can efficient supply management in the operating room save millions?* Current Opinion in Anaesthesiology. 2009. Vol. 22. Pp:242–248. Accessed on March 21, 2011.
- 3 Kanich, DG, and Byrd, JR. *How to Increase Efficiency in the Operating Room.* Surgical Clinics of North America. February 1996. Vol.76, Issue 1. Available at: [http://www.surgical.theclinics.com/article/S0039-6109\(05\)70429-1/abstract#bib13](http://www.surgical.theclinics.com/article/S0039-6109(05)70429-1/abstract#bib13)
- 4 Park, KW and Dickerson, C. *Can efficient supply management in the operating room save millions?* Current Opinion in Anaesthesiology. 2009. Vol. 22. Pp:242–248. Accessed on March 21, 2011.
- 5 Laustsen, G. Reduce—Reuse—Recycle: guidelines for promoting perioperative waste management. Aorn J. 2007; 85(4):717–728. Available at: http://findarticles.com/p/articles/mi_m0FSL/is_4_85/ai_n19021028/pg_7/?tag=content;col1. Accessed on March 12, 2011.
- 6 Esaki, RK, and Macario, AE. *Wastage of Supplies and Drugs in the Operating Room.* Medscape Anesthesiology. Web MD LLC. Accessed on March 4, 2011. Available at: <http://www.medscape.com/viewarticle/710513>
- 7 Rosenblatt WH, Chavez A, Tenney D, Silverman DG. Assessment of the economic impact of an overage reduction program in the operating room. J Clin Anesth. 1997;9:478–481. Abstract.
- 8 Grossman, L. *There's GOLD in "Them Thar" Preference Cards!* Unibased Systems Architecture. Podcast. Accessed on March 12, 2011. Available at: <http://www.unibased.com/TheresGOLDinThemTharPreferenceCards.pdf>
- 9 Thill M: Hidden costs of discarded supplies under scrutiny. Hospital Purchasing News. 16:523–524.
- 10 Kanich, DG, and Byrd, JR. *How to Increase Efficiency in the Operating Room.* Surgical Clinics of North America. February 1996. Vol.76, Issue 1. Available at: [http://www.surgical.theclinics.com/article/S0039-6109\(05\)70429-1/abstract#bib13](http://www.surgical.theclinics.com/article/S0039-6109(05)70429-1/abstract#bib13)
- 11 Park, KW and Dickerson, C. *Can efficient supply management in the operating room save millions?* Current Opinion in Anaesthesiology. 2009. Vol. 22. Pp:242–248. Accessed on March 21, 2011.
- 12 Rueth, NM. *Endobronchial ultrasound versus mediastinoscopy: A single institution cost analysis and waste comparison.* Journal of the American College of Surgeons. September 2010. Volume 211, Issue 3, Supplement. Page S104.
- 13 Park, KW and Dickerson, C. *Can efficient supply management in the operating room save millions?* Current Opinion in Anaesthesiology. 2009. Vol. 22. Pp:242–248. Accessed on March 21, 2011.
- 14 Allen, JW, and Polk, HC Jr. *A study of added costs of laparoscopic cholecystectomy based on surgery preference cards.* The American Surgeon. May 2002. Vol.68(5):474–6.
- 15 Surgery Management Improvement Group. Cost Reduction: Preference Card, Custom Pack & OR Back-table Utilization. Materials Management in the Operating Room: BEST PRACTICE in SURGERY MATERIALS MANAGEMENT. Web. Accessed on March 3, 2011. Available at: <http://www.surgerymanagement.com/presentations/materials-management-or.php#crprefcard>
- 16 Zimmer, C. *Making the Case for Leaner, Greener Surgical Supplies.* Outpatient Surgery. 2010. Accessed on March 2, 2011. Available at: <http://www.outpatientsurgery.net/guides/going-green/2010/making-the-case-for-leaner-greener-surgical-supplies&pg=2>



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IMPLEMENTATION MODULE:

Moving (Back) to Reusables in the OR

Revisiting Reusables

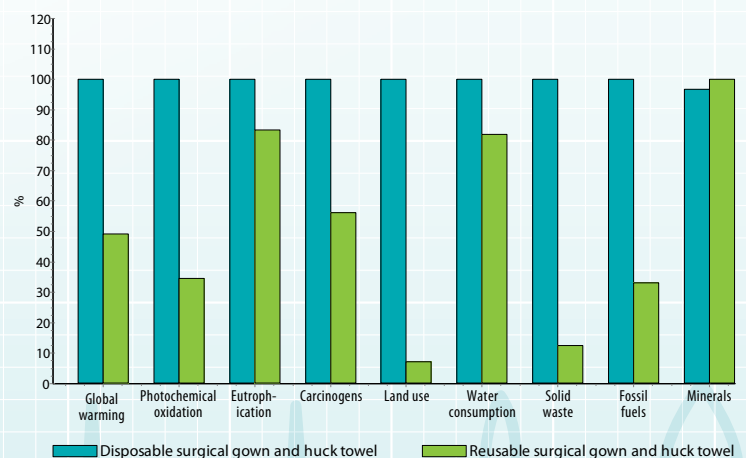
When considering how to reduce the environmental footprint of the operating room, it makes sense to first revisit the old adage of Reduce-Reuse-Recycle. This common sense approach relies on the concept of avoiding use of materials or supplies that are not needed to protect or ensure patient or worker safety (reduce), using a reusable, preprocessed or reusable option where a product must be used, and where no reusable option is available ensure the product is recyclable. The most environmentally unfriendly option is a single-use, disposable product that cannot be recycled at the end of use. When undertaking a comparative analysis, surgical services managers need to consider the lifecycle costs of disposable items beyond first cost.^{1,2}

Much of the waste generated in the operating room (OR) is due to the myriad of disposable products and packaging used for surgery. Perioperative professionals today primarily use disposable basins, towels, surgical drapes, table covers and gowns,³ in addition to a variety of other single-use, disposable medical supplies—many or all of which inevitably end up in the waste stream. Though surgical linens and basins were historically reused and reprocessed or laundered onsite, concerns about quality and appropriate levels of barrier protection largely transitioned the market to disposable textiles and basins. Surgical gowns and textiles can be classified as either single-use (disposable) or multi-use (reusable) and are classified as medical devices by the US FDA.^{4,5} Surgical gowns, drapes, sheets, table covers and mayo stand covers can be classified by the Association for the Advancement of Medical Instrumentation's (AAMI) liquid barrier performance standard (AAMI PB 70)⁶ for protective apparel and drapes into four levels of barrier performance. Both reusable and disposable product manufacturers can utilize this standard for classifying the level

of performance for their products and both offer products which meet all levels. A variety of factors are now leading hospitals to reconsider the use of reusable surgical gowns, surgical textiles and basins.

Disposable surgical gowns, towels, back table and mayo stand covers are routinely disposed of as regulated medical waste after a single surgical procedure as opposed to reusable textiles which create very limited packaging waste and are typically reused 75 times or more.⁷ One study found that when these disposables were replaced with reusable products, there was an average of 64.5% reduction in surgical waste generated.⁸ An Australian life cycle assessment from November 2008 demonstrated the environmentally intensive footprint of disposable versus reusable textiles (see Figure 1).

Figure 1: Comparison of life cycle factors of disposable textiles compared with reusable textiles.⁹



Beyond their environmental impact, disposable gowns and drapes often get negative feedback from surgeons and surgical technologists for thermal comfort issues, tearing—as in the case of the back table cover where surgical techs often use an extra drape to prevent tearing on the back table,¹⁰ and size—disposables are often smaller than reusable products which can lead to additional draping to weigh down the edges.¹¹ When surgeons were asked in a 2010 study to rate gown comfort, ease of use and protective properties of reusables versus disposables, they found surgeons clearly preferred the reusables:

Figure 2: Surgeons’ Preference for Disposable and Reusable OR Supplies¹³

	Superior	Good	Fair	Poor
Gown Comfort				
Disposable	6%	38%	23%	33%
Reusable	86%	10%	4%	0%
Ease of Towel/Gown Use				
Disposable	33%	47%	19%	1%
Reusable	87%	11%	2%	0%
Protective Properties of Gowns				
Disposable	30%	45%	20%	5%
Reusable	96%	6%	2%	0%

The same study found that the process to order and deliver sterile disposable products actually had six additional handling steps as opposed to using a service provider to deliver reusable products.¹⁴ While reusable textiles typically have a higher first cost than disposables, perioperative services should be evaluating all of the steps in the supply chain as well as waste disposal costs in order to look at a one-to-one comparison. When you consider all the data, the cost-benefit for reusables becomes clearer.

For perioperative professionals that have been in the business for awhile, talking about reusable surgical gowns may conjure up images of the once-tried and true cotton and poly-cotton gowns laundered onsite. But today’s reusable textiles are not those of twenty years ago—they are technologically advanced textiles that have been tested to meet barrier performance standards and refined to provide optimal clinician comfort and ease of use. How then does a facility make the case to transition back to reusables utilizing a service provider, and operationalize the change? There are several finite steps an organization can follow to make a move to reusable surgical gowns, towels, sheets, back table and mayo stand covers and basins.

Reusables: In-House or Vendor?

There are some significant differences between choosing to utilize a vendor to provide reusable textiles, and choosing to go back to laundering and sterilizing reusable textiles in-house. The environmental impact of laundry operations can be significant. If a hospital is not able to upgrade aging infrastructure for its laundry operations to take advantage of water and energy efficiencies, as well as transitioning to more environmentally friendly laundry chemicals, the environmental impacts of the laundry operation can sometimes challenge the environmental preferability of reusable surgical textiles. Pair this with the fact that hospitals then become responsible for ensuring that surgical textiles are all classified correctly, sterilized appropriately, and repaired or replaced in a timely manner and the business case can be complicated. When paired with an environmentally progressive laundry operation and top-notch SPD staff, reusable surgical textiles processed in-house can make sense but one definitely needs to take additional factors into consideration. This implementation module focuses specifically on making the business case for the use of reusable surgical textiles and basins via a vendor rather than processing reusables in-house—with additional research to come on identifying the right mix of factors to champion onsite processing of reusable surgical textiles.

Step 1. Identify your Allies: Infection Prevention

Changing practices sometimes means changing minds. Before you work on rolling out reusable surgical gowns, towels, sheets, back table and mayo stand covers and basins, think about what the arguments against a transition to reusables might be. Reach out to your Infection Preventionist (IP). Share the literature available demonstrating that reusable surgical linens meet the AAMI liquid barrier performance standards for protective apparel and drapes. Understand any concerns your organization’s IP may have and address them one at a time, gathering data from Practice Greenhealth, reusable textile vendors, the American Reusable Textile Association or others. IPs can be your greatest ally in this transition as patient safety concerns trump just about any other issue. Reach out to OR leadership and let them know you are trying to learn more about the benefits of reusable textiles and ask if they will support you in gathering additional information for consideration.

Step 2. Develop a Baseline for Use of Disposables

Before being able to make the case for a transition to reusables, it is important to be able to quantify how disposables are impacting the OR and the environment. You're going to want to understand:

- **What is the volume of custom packs that the OR uses each month?** Materials Management or OR management should be able to provide you with data on the number and kinds of custom OR packs being utilized by the department.
- **What disposable textile products are part of each kind of custom pack used by the OR?** You may have to audit different packs in order to correctly identify disposable textile components in each pack. You'll want to quantify disposable surgical gowns (by performance level), towels, back table and mayo stand covers, sheets and basins in each kind of pack.
- **How much do the disposable textiles and basins found in each pack weigh?** Once you have itemized the contents of each kind of pack, gather a sample set of disposable textile supplies and basins and gather using the different combinations just gathered for the different custom packs, weigh the number of disposable textile and basin items in each pack. Multiply these weights times the number of that kind of pack utilized each month by the OR. This data should provide you with a fairly accurate assessment of the volume of disposable textiles (in pounds) leaving the hospital each month.
- **How are disposable textiles currently being disposed of?** Also relevant to this baseline is determining whether all disposable textiles and basins are currently being disposed of as regulated medical waste—as is often common practice. If your organization has a strong RMW segregation program and is segregating disposable textiles and basins as solid rather than medical waste, it will impact your baseline cost assessment. Reach out to Environmental Services and determine what the hospital is spending per pound to dispose of RMW and/or solid waste. Multiply your total weight of disposable textiles and basins each month by the cost per pound to dispose of it to get a total waste management cost of disposable textiles for the OR. This is the money the organization will avoid spending on waste disposal if it moved to reusable surgical textiles and basins.
- **What are the line item costs for disposable textiles in custom packs—if available?** In order to do a comparison, you need to have a sense of how much the disposable textiles and basins are costing your organization. Because there are other disposable products in the custom packs that won't be eliminated by a transition to reusable textiles and basins, it is important to try and identify pricing for just the disposable textiles and basin items rather than estimate the total cost of

the custom pack. Be sure to capture any handling, packaging or sterilization costs that may be added following the line item pricing. Multiply the cost for disposable textiles in each pack by the number of packs of that type utilized by the OR each month to get a total supply cost for disposable textiles in the OR. Also be sure to understand if there are common practices that would add to that supply cost, e.g. staff double drape the back table for each procedure or are lining the back table with towels to prevent holes, and have ordered extra back table covers or towels separately for this purpose. These additional supply costs should be figured in to the total.

- **Are there any other factors to consider about current use of disposable textiles?** Inquire with staff whether they have any ongoing concerns about the use of disposable textiles in custom packs. Do the gowns make them too hot—requiring additional cooling for the OR? Too cold—requiring reheat for the OR? Are they uncomfortable? Reach out to Central Supply or Sterile Processing to determine how many steps your organization currently has in place to order, receive, handle and deliver sterile disposable supplies to the OR.
- **Determine total costs for use of disposable textiles in the OR each month.** Add the total waste management costs for disposable textiles to the total supply costs for disposable textiles to get the total current baseline cost for the use of disposable textiles in the OR. Make a note of other intangible drawbacks or benefits to the use of disposable textiles in custom packs and keep supply handling steps for disposable textiles for comparative purposes.

Step 2. Reach out to Reusable Surgical Supply Vendors/Reprocessors

The next step is to understand what alternatives are available to replace the use of disposable textiles and basins in custom packs. Get a sense of what different vendors are offering. Understand if they provide their reusable textiles as a stand-alone offering or if they partner with a disposable kit manufacturer to also provide custom packs. Some reusables vendors/reprocessors have unique partnerships with disposable custom kit manufacturers where reusable textiles are provided as part of a disposable custom kits.¹⁵ Are they able to deliver the sterile reusable surgical textiles to your OR each day? Determine the steps that would need to be taken by the Sterile Processing Department or Central Supply to order, receive, handle and deliver sterile reusable supplies to the OR. If providing just-in-time inventory, what is the back-up plan were a truck to be delayed or diverted? Get pricing estimates for similar volumes of reusable textiles to replace the disposable textiles currently being used. Ensure any additional hauling or fuel surcharges are captured in the total price point.

Step 3. Compare Disposable vs. Reusable Textile Costs and Process

Line up the baseline supply costs for disposables against the projected costs for the replacement reusables. Factor in waste disposal costs for disposables. While the costs for disposing of disposable textiles does not usually show up in the budget of the OR (as waste management costs are typically charged centrally to Environmental Services), it is a cost to the bottom line of the organization. See sample cost comparison below.

Disposable Surgical Textiles and Supplies	Reusable Surgical Textiles and Supplies
Total Supply Cost for Disposable Surgical Textiles and Supplies in existing OR custom packs monthly	Potential Supply Costs for Reusable Surgical Textiles and Supplies to replace Disposables
Any additional supply costs for a la carte disposable textiles, basins, pitchers for OR monthly	Any additional supply costs for a la carte reusable textiles and supplies for the OR monthly
Total pounds of waste generated by disposable surgical textiles and supplies from OR monthly	Savings from recovered instruments—estimated for a typical hospital at upwards of \$20,000 per year.
Total costs for managing disposables as RMW or solid waste each month	\$0
Total Costs of Using Disposable Surgical Textiles and Supplies	Potential Costs of Using Reusable Surgical Textiles and Supplies

You should now be able to lay out the case for why a transition to reusable surgical gowns and textiles makes sense financially and environmentally. The next step involves getting feedback from staff on the comfort, ease of use and protective qualities of disposable versus reusable textiles in the OR. Note: the cost-benefit analysis might be so compelling at this point that OR leadership might be willing to consider a transition. If you have a sense that there may be clinician resistance to a transition, include Step 4.

Step 4. Pilot Reusable Surgical Textiles

To allay any concerns about transition to a new product in the OR, it makes sense to pilot new products before moving forward with a full-scale roll-out. Pull together a small team to work on running the pilot project and get approval from surgical services leadership before proceeding. Based on initial cost-comparison numbers, they will likely agree to support a pilot. Determine a reasonable pilot period—one to three days midweek would likely hit many of the surgeons on staff as well as other clinical staff.



Perioperative staff utilizing reusable surgical gowns to perform surgery.

Work with a reusables vendor to provide product for pilot period. Determine questions you will be asking OR staff after the using the reusable products and document in a simple questionnaire. Work with a small team to set up exact pilot procedure. A 2010 study highlighted in the AORN Journal¹⁶ provides a good working model to start from. Pilot steps include:

1. Announce the pilot project and let surgical staff know they are being asked to participate and provide feedback.
2. From baseline development in Step 2, you should already have weights for disposables in each custom kit. This will be the amount of waste avoided when reusables are used.
3. Replace all disposable textiles and previously agreed upon disposable supplies (e.g. basins) with reusable versions.
4. After surgery, ensure reusable textiles and supplies are captured for reuse.
5. Provide each surgical team with review questions. (Referenced study asked surgeons to rate gown comfort, gown and towel ease of use and gown protective properties. Simultaneously, they were asked to rate the disposable products they typically work with).
6. Allow space for other kinds of feedback and commentary about pros or cons of reusables versus disposables.
7. Tally results and write up for management review.

If your results are similar to other studies, you should see increased clinician satisfaction and positive feedback. This, in addition to the cost-benefit analysis, should be the linchpin in moving the organization to reusable surgical textiles and supplies. Be sure to utilize other factors in your case for reusables including improved surgical supply inventory process and lost instrument return—the latter a huge cost-savings for the organization.

Step 5. Coordinate Chain of Custody for Reusables

Once the transition to reusables has been approved by OR leadership and a vendor has been selected, it is critical to work with the vendor/reprocessor, materials management, central supply and/or the sterile processing department to determine the appropriate chain of custody for the reusable textiles and supplies. Sterile reusables packs configured per the hospital's requirements should arrive in SPD each day. SPD personnel pull packs for case carts which then make their way down to the ORs. Unlike disposables, these products do not leave the OR in waste receptacles. Instead, the vendor should supply liquid-proof, color-coded bags or totes in which used reusable items should be placed after surgery. The bags or totes of used reusable surgical products are then moved to a predetermined designated pick-up point for vendor to transport to reprocessing plant. Because these steps have not previously been utilized with the disposable products, it is important to ensure that all of the details are addressed and a plan is in place for handling the soiled products before training the OR and SPD staff.

Step 6. Train OR Staff on Use and Collection of Reusables

Once the supply handling and collection procedure has been finalized, it is time to educate perioperative staff on appropriate practices for using reusables. Education should be provided on the differences between the levels of protection for the different reusable products, and which products should be used for which procedures. Surgical set-up should remain consistent, but breakdown after the surgery will require some practice changes. Hold In-Services to educate staff about the new reusable products being rolled-out. Ensure they understand the collection procedure for these reusable items and the need to sort reusable items from the disposable items. Help staff understand that throwing out reusable products will not be considered acceptable as this runs counter to the idea of reducing waste and adds to the overall cost. Hold a more in-depth training and troubleshooting session with a volunteer from each shift to ensure each knows collection procedure inside and out and can guide other members of the surgical team on the correct procedure if need be. Partner with the vendor to provide the most comprehensive and useful training. Vendor training capacity and support should be written into the sales contract where possible.

Step 7. Collect Post-Implementation Evaluation and Address Concerns

It may be meaningful to consider doing an evaluation about a month or two after implementation of the reusable textiles and supplies. This could be as informal as asking around or as formal as a short written feedback request asking again about comfort, ease of use, protective properties and any other benefits and/or concerns. Be sure to check in with SPD as well as OR staff. Carefully review concerns. Expect that there will be some negative feedback—as is typical in any major product transition. Do your best to determine whether these are isolated complaints or a consistent theme that needs to be addressed. Troubleshooting is part of any product replacement.

Step 8. Track Savings and Environmental Benefits and Celebrate Success

Tracking cost-savings and waste avoidance provides a way to demonstrate the benefits of the transition back to the organization. Some vendors will actually track avoided costs of disposables and waste generation for you. They can compare the volume of products you are currently using to the weight and costs of the disposable alternatives and provide you with accurate benefit figures. In other cases, you may need to collect some of this data yourself. Reach out to EVS and see if they have a way to track RMW reductions in the OR. Use purchasing records to determine supply costs. Be sure to share positive data with staff. You can also use this as an opportunity to share positive feedback from the post-implementation survey. Make sure the organization's sustainability leader or green team (if applicable) knows about the success the OR is having, and includes it in any award applications or recognition opportunities. It is important to let staff know that they are making a difference—not only in the financial viability of the organization, but also by better protecting the environment—which is intrinsically connected to human health. Success in one arena can often build momentum to tackle the next—seemingly more difficult—challenge.

For More Information: Go to www.GreeningTheOR.org for a list of key resources that can assist you in this program area. Because this list is updated often, we keep it online, so as not to date this implementation module. Also available are case studies on replacing disposables with reusables in the OR. Learn from your peers!

Endnotes

- 1 Laustsen, G. Reduce—Reuse—Recycle: guidelines for promoting perioperative waste management. AORN J. 2007; 85(4):717-728.
- 2 Fisch, S. *Safety and hygiene of surgical gowns and surgical drapes*. Clinicum Expertise. Published by Medizin Medien Austria. December 2010. Accessed on February 28, 2011. Available at: http://www.medizin-akademie.at/mm/mm020/Expertise_hygiene_engl_cc1210_low.pdf
- 3 Conrardy, J et al. *Reducing Medical Waste*. AORN Journal. Volume 91, No.6. June 2010. Pp: 711-721.
- 4 Ibid.
- 5 Medical devices: General and Special Controls. US Food and Drug Administration. Accessed March 12, 2011. http://www.fda.gov/MedicalDevices/DeviceRegulationandGuidance/Overview/GeneralandSpecialControls/default.htm#class_2.
- 6 American National Standards Institute (ANSI)/Association for the Advancement of Medical Instrumentation (AAMI). PB70:2003-Liquid barrier performance and classification of protective apparel and drapes intended for use in health care facilities. 2003. Accessed on March 20, 2011.
- 7 Personal Communication, SRI. 2011.
- 8 Conrardy, J et al. *Reducing Medical Waste*. AORN Journal. Volume 91, No.6. June 2010. Pp: 711-721.
- 9 Fisch, S. *Safety and hygiene of surgical gowns and surgical drapes*. Clinicum Expertise. Published by Medizin Medien Austria. December 2010. Accessed on February 28, 2011. Available at: http://www.medizin-akademie.at/mm/mm020/Expertise_hygiene_engl_cc1210_low.pdf
- 10 Conrardy, J et al. *Reducing Medical Waste*. AORN Journal. Volume 91, No.6. June 2010. P714.
- 11 Fisch, S. *Safety and hygiene of surgical gowns and surgical drapes*. Clinicum Expertise. Published by Medizin Medien Austria. December 2010. Accessed on February 28, 2011. Available at: http://www.medizin-akademie.at/mm/mm020/Expertise_hygiene_engl_cc1210_low.pdf
- 12 Ibid.
- 13 Conrardy, J et al. *Reducing Medical Waste*. AORN Journal. Volume 91, No. 6. June 2010. Pp: 718.
- 14 Ibid.
- 15 Cardinal Health, *SRI Surgical Sign Five-Year Agreement For Surgical Kits*. Cardinal Health. Web. Accessed on March 7, 2011. Available at: <http://ir.cardinalhealth.com/phoenix.zhtml?c=105735&p=irol-newsArticle&ID=1230979&highlight=>
- 16 Conrardy, J et al. *Reducing Medical Waste*. AORN Journal. Volume 91, No. 6. June 2010. Pp: 716.

Updated January 2013: More information on Synergy Health (formerly SRI Surgical) can be found at www.synergyhealthplc.com.



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IMPLEMENTATION MODULE:

Regulated Medical Waste Segregation and Minimization in the OR

Regulated Medical Waste in the OR

The operating room (OR) is often the largest generator of waste within a hospital setting, and has been estimated to produce between 20-33% of the total waste generated in the hospital¹ despite its diminutive spatial footprint. Of the waste generated by the OR, the largest percentage is often regulated medical waste (RMW), which can cost between 5 and 10 times more than solid waste to dispose of. A 2001 study by Malcolm Grow Medical Center estimated that approximately 60% of the hospital's RMW was generated by its ORs.² National benchmarks tell us that RMW should be no more than 15% of the total waste stream,³ with the best performers driving down to well below 10%. ORs are one of the most egregious departments in terms of lack of segregation of RMW, despite the fact that every piece of waste generated pre-incident (save pharmaceutical products and certain anesthesia drugs) are either clean or sterile, and certainly not biohazardous by any state definition. Instead, some ORs have large regulated medical waste containers and virtually no other trash receptacle, meaning that all waste generated in the OR—packaging, paper, plastics, surgical instruments as well as blood-soaked waste may end up in the regulated medical waste stream.

Why is disposing of waste as RMW an issue? This waste stream costs on average, eight times more per ton to dispose of than solid waste and is linked to a myriad of environmental impacts through treatment and disposal. A single ton of solid waste might cost the facility \$121 to dispose of while a ton of RMW might cost \$963—an \$842 differential per ton.⁴ Many ORs mistakenly dispose of more than 50% of their waste as RMW. If a typical OR department were to generate 4.0 tons of RMW per month at a cost of \$963/ton and 50% of it (conservatively) could be handled as solid waste (at \$121/ton) had appropriate segregation been utilized, the differential is approximately \$1684 monthly or \$20,208 annually. Most administrators would agree that they

could find good uses for \$20,000 to be re-diverted back into patient care, especially when segregation is not about technology fix that requires capital, but rather about a behavior change. Appropriate segregation of regulated medical waste is considered low-hanging fruit in terms of green programs in the OR.

How then does a facility begin to operationalize an RMW segregation program in the OR? There are several finite steps an organization can follow to set up and implement a regulatory-compliant RMW segregation program.

Step 1: Use a Team Approach

As with any other initiative, leadership support is critical. Make sure OR leadership are supportive of tackling this issue and provide adequate background and examples from other hospitals, so they understand the benefits. Reach out to OR staff to see who might be interested in exploring implementation strategies or championing this effort with other staff. It is not uncommon to hear OR nurses complaining about the amount of waste generated. Help them understand that making sure waste goes in the correct disposal container is a first step toward being able to actually reduce that waste. And that by diverting clean or non-infectious waste to either solid waste or recycling, they are reducing the environmental impact generated when RMW is treated and disinfected—often the most toxic aspect of its disposal. Reach out to Infection Prevention and Environmental Services. Getting these two departments on board early can really strengthen an RMW segregation and minimization program. Both can provide critical guidance in setting up a program that will work with the hospital's existing waste and infection prevention policies and guidance.

Step 2: Assess Current Practice

Before determining how and when to roll out a new initiative, it is important to assess how the practice is currently being handled. Determining a baseline is important in order to understand later if appropriate progress is being made in reaching program implementation goals. In the case of RMW generation in the OR, there are several options for determining a baseline. First, one can do a visual audit of how OR staff are handling waste during set up, during the surgery and during breakdown after the surgery. Ask a few questions:

- How many RMW containers are present in the room?
- What size are the containers?
- Are there any OTHER waste containers in the room (solid waste, recycling, etc.)?
- Are all containers accessible to OR staff?
- How is packaging and set up waste disposed of pre-incision?
- How is waste handled during the procedure?
- How is waste handled after the patient has left the room?
- Is there any segregation guidance (stickers, labels, posters) on RMW containers?

Understand the volume of waste going out the door as RMW. Work with Environmental Services (EVS) staff to try and pinpoint as accurate a volume as possible. If the hospital uses a waste tracking system, EVS may be able to offer very exact data on the pounds of RMW generated each day in the OR. Many hospitals, however, track RMW volumes hospital-wide and not by specific department. If this is the case, work with EVS staff to see if the organization can estimate:

- The number of daily pickups
- Approximate volume of material per pick up (some docks have a floor scale that could be used to weigh a sampling of waste carts coming from the OR over a set period of time)
- Multiply the average or estimated-weight-per-cart by the number of pickups to get a rough sense of what the OR is producing in a day in terms of RMW.

Brainstorm with EVS on how best to do this audit. Ask EVS how much the organization is charged per pound or ton of RMW. Multiply waste volume generated in the OR by the cost per pound (or ton), and the organization now has a sense of both the baseline waste volume and costs of RMW generated by the OR over a set period of time. As waste disposal costs are typically tied to the EVS budget rather than departmentally, EVS may be very willing to help think about developing an accurate baseline by which to measure waste reduction and savings.

Step 3: Understand What Material is Defined as RMW in State

To complicate matters, definitions for regulated medical waste (RMW) vary state to state, and federal guidelines through OSHA are open to interpretation. The project team should review the facility's policies, procedures and definitions for RMW handling and disposal with the organization's Infection Preventionist (IP). Connect with EVS to ensure comprehension of state-specific regulations for the proper segregation, storage and ultimate disposal of RMW. To double check the state's rules for managing RMW, visit the EPA's Healthcare Environmental Resource Center at: <http://www.hercenter.org/rmw/rmwlocator.cfm>.

Step 4: Setting Up for Success

Work with the project team to determine the most appropriate strategy for reducing RMW in the OR. Once the organization has a clear definition of RMW in mind, the team can identify different areas across the OR that generate RMW and identify opportunities for new processes, increased standardization, appropriate receptacles, signage and training. Some of these minor tweaks and changes will go a long way toward setting up the department for success. Some ideas the team may want to consider:

- Identify a standardized approach to RMW collection containers—some ORs prefer small kickbuckets for use in the OR, while others prefer a wheeled hamper.
- Create signage that depicts proper segregation definitions and sorting procedures. Many people are visual learners and signage can reinforce proper segregation at the point of generation. Signage on the inside of hamper lids can be helpful, for example.
- Eliminate any pre-incision use of regulated medical waste containers and eliminate red bags from unnecessary locations like scrub sinks where bloody waste is not generated.
- Consider increasing solid waste receptacles to ensure adequate containment of the material appropriately diverted from RMW containers.

Step 5: Educate Staff

Despite any increased interest, enthusiasm or resistance for the new RMW minimization program, all staff in the OR will need to be retrained with guidance on how to change their behavior to meet the new goals of the segregation program. Consider partnering with a Nurse Educator to engage the nursing staff. Run short In-Services for staff at the beginning of each shift. Include the facility's commitment to compliance, good segregation practices, and stewardship. Help staff understand new segregation goals and the reasons for the change. Staff should understand

that improper disposal of their waste has potentially serious safety threats to waste haulers and increased liability for the hospital. Make it clear to staff that it is part of their job to manage waste safely and segregate appropriately. Answer questions—address concerns. Train new employees on their first day as part of orientation. Retrain staff annually as part of annual training requirements. Notify physician leadership that the change is taking place. Pull aside those staff members who are unable to attend In-Services to ensure they understand the new program and address any language barriers to ensure comprehension.

Step 6: Selecting a Segregation Strategy

Different hospitals select different ways to approach the segregation issue. The hospital should select the strategy that makes the most sense given its management tone, risk management perception and the level of staff comfort. There are several dominant strategies that can be used solo or in combination:

- **Diverting Non-Infectious Waste Pre-Incision** Many hospitals begin their segregation programs by implementing a focus on the diversion of non-infectious waste during set-up. During surgical set up, the case cart is unpacked, kits and supplies are opened and lots of packaging, rigid plastics, and blue sterile wrap are thrown into the trash. Ensure there is a large solid waste container (and recycling container—if applicable yet) on hand for disposal. Because the set-up is pre-incision and it is a sterile surgical environment, virtually all of the waste generated—save any pharmaceutical formulations or sharps—will be non-infectious. Some hospitals line the red RMW containers with a clear bag during set up to capture non-infectious waste and then tie off the clear bag and set it aside before the procedure starts. A focus on diverting pre-incision waste can reduce RMW in the OR considerably.
- **Segregating Non-Infectious Waste After Surgical Procedure** Some hospitals then move to ensuring that non-infectious items are properly segregated during clean-up after the procedure. Depending on the intensity of the procedure, this can include back table cover and mayo stand covers (of the disposable variety), and surgical drapes that do not meet the regulatory guidelines for infectious waste (typically soaked or saturated with blood or body fluid), as well as remaining packaging, sterile wrap and non-sharp instruments that cannot be resterilized, reprocessed or reused for another procedure. Again, these items should be placed in a clear bag (solid waste) or recycling container as appropriate. Note: any material placed in a recycling container typically should be clean and not have come into contact with the patient.



One OR lines the regulated medical waste container with a clear bag for procedure set up—to divert clean packaging waste from the medical waste stream

- **Segregating Non-Infectious Waste During Surgical Procedure** For hospitals that feel very comfortable with their education efforts with staff around proper segregation, the last phase is a focus on having staff continue to divert non-infectious waste during the actual procedure. This would involve having an RMW container readily accessible for infectious waste generated during the procedure, but also having alternate containers (for solid waste or recycling) accessible in the room for ongoing segregation. If the institution is a teaching hospital, it is critical to ensure that residents or visiting faculty understand proper segregation guidelines. A single bloody glove in the solid waste or recycling stream can cause big issues from a regulatory compliance standpoint. Many hospitals have been very successful at this approach but education and comprehension are key.

Step 7: Consider Other RMW Sources in OR

Both liquid waste as well as sharps generated in the OR are typically considered RMW. Both of these waste streams have special handling guidelines that this implementation module will not cover. From a sustainability perspective, ORs should consider fluid management systems that divert liquid waste directly to the sanitary sewer as means to reduce staff exposure risks, supply costs and waste disposal costs. For sharps management, many hospitals have moved to the use of reusable sharps container systems that reduce both the volume and cost of RMW the organization generates while also reducing supply costs for disposable containers. Separate implementation modules address both of these topics.

Step 8: Problem Identification and Resolution Plan

Every new program has its hiccups. Expect setbacks. Have a plan of action to resolve problems. Use those setbacks as an opportunity to reengage staff on the core purpose of the program. Stay connected to the EVS Director, so that he/she keeps the OR aware of any emerging issues. Finding a nurse champion for each shift has been a very successful mechanism to grow support for this operational change. Hold refresher In-Services to re-engage and retrain staff. Develop a mechanism to report concerns or problems and appropriate solutions back to all OR staff. Many hospitals have founds that documenting problems with a photograph, and cataloging them according to shift or procedure works best, if possible. Demonstrating visually what should NOT be happening can also help other OR staff be on the lookout for improper segregation practices.

Step 9: Track Progress and Recognize Success

People like to know they are achieving their goals. Work with EVS to determine a mechanism to measure reduced waste volumes. Because waste volumes and disposal costs are typically tracked in EVS rather than by department, EVS will be a key partner in helping the organization and the OR understand the value of the RMW segregation program. Celebrate success! If possible, provide

staff with real-world estimates of reduced environmental impact or waste reductions. Report reductions or cost-savings to OR manager to share with leadership. Make sure sustainability leader or green team (if applicable) knows about the success the OR is having, and includes it in any award applications or recognition opportunities. Some hospitals have even used this program as a performance improvement indicator for Joint Commission Environment of Care. Get creative and help staff feel proud of their great work. Success in one area often builds momentum to tackle harder sustainability practices.

For More Information: Go to www.GreeningTheOR.org for a list of key resources that can assist you in this program area. Because this list is updated often, we keep it online, so as not to date this implementation module. Also available are case studies on RMW segregation efforts in the OR. Learn from your peers!

Endnotes

- 1 Esaki, Roy K., and Alex Macario. "Wastage of Supplies and Drugs in the Operating Room." *Medscape Anesthesiology*. WebMD LLC, 21 Oct. 2009. Web. 12 Feb. 2011. <http://www.medscape.com/anesthesiology>
- 2 United States Air Force IERA. Medical Waste Incinerator Waste Management Plan-Malcolm Grow Medical Center,Building 1056, Andrews Air Force Base, MD. June 2001. Accessed on Feb 13, 2011. Available at: http://airforcemedicine.afms.mil/idc/groups/public/documents/afms/ctb_033957.pdf
- 3 Practice Greenhealth. Sustainability Benchmarking Report. 2010. Available at: www.practicegreenhealth.org
- 4 Ibid.



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IMPLEMENTATION MODULE:

Medical Plastics Recycling in the OR

Solid Waste in the OR

The culture of waste in the OR is driven in large part by the increasing volume of disposable or “single-use” medical products on the market today, many of which are specifically targeted to the OR. The reasons for the transition to disposable items are many, including concerns around sterility and infection prevention, ease of use and not to be discounted—manufacturers’ awareness that disposables posed a regenerative revenue stream. Growth in disposables remains steady with the market predicted to grow by 4.6% annually to \$59 billion in 2013.¹

Packaging for the myriad of disposable products in healthcare is ubiquitous, with the intention of safeguarding sterility leading to wraps and overwraps in addition to cardboard or plastic packaging of the outer container, and finally the shipping carton. While there has been some effort by distributors to use reusable totes for delivery, the significant amounts of individual packaging continue to bring large volumes of waste into the operating room, much of which heads straight for the landfill or medical waste treatment. Anesthesia waste is also a significant contributor to the waste stream with one study from Western Hospital in Australia finding that the anesthesia waste stream represented 25% of the total operating room waste. The study also noted that 60% of the anesthesia waste was recyclable.^{2,3}

ORs have not historically been a target for large scale recycling efforts—due in part to the notion of the OR being a closed system where an additional layer of complexity or sorting would be seen as something that could interrupt patient flow or surgical procedures. An additional complexity of recycling materials in the OR is that the materials are largely medical plastics—and are not similar in shape, size, volume or even sometimes plastic type

to the plastics being commonly collected through community or commercial recycling operations. In some instances, there was a stigma attached to medical plastics, as there were worries that environmental compliance officials might see these items in the recycling stream and flag it for medical waste contamination concerns. Likewise, in some instances, there were either very limited or no existing recycling hauling capacity or markets for certain kinds of plastic being generated—such as #5 polypropylene blue wrap. This has resulted in the OR being largely ignored while traditional recycling programs have rolled out across healthcare facilities.

Recent hospital data demonstrates that recycling in the OR can generate large volumes of recyclables—in excess of 1000lbs of medical plastics weekly at one large NYC institution with more than 40 ORs/surgical procedure areas.⁴ At an average cost of \$121 per ton for solid waste disposal and a price tag of \$68 per ton for recycling the same material,⁵ a hospital might pay nearly twice the price for medical plastics disposal if the facility does not choose to recycle. In a more typical scenario, however, many of these medical plastics are ending up in red bag trash, which on average costs about \$963/ton.⁶ Estimating conservatively that 25% of those plastics end up in the RMW container rather than recycling, a hospital is now looking at \$583 vs. \$136 monthly (a four-fold increase in price) for disposal of 2 tons of medical plastics. Multiplied across a year, that’s \$6996 vs. \$1632—a difference of \$5364 annually hospitals could be saving by recycling medical plastics in the OR. While there are some upfront costs for setting up a program—including recycling containers or hampers with colored liners as well as training materials—it is possible to develop robust recycling programs for medical plastics generated in the OR.

How then does a facility begin to operationalize a recycling program for medical plastics in the OR? There are several finite steps an organization can follow to set up and implement a medical plastics recycling program in the OR.

Step 1: Enlist Allies

As the OR begins a recycling program, it will be important initially to develop some key allies and to enlist different stakeholders in supporting the new program. Reach out to Environmental Services, Infection Prevention and Nursing. Seek out staff in the OR who have expressed an interest in seeing recycling take place. Anesthesiology is a key stakeholder. Take the time to get this important element of the OR on board. Think about other employees who may be affected by the new program. By understanding the initial concerns of different groups, the organization has a better chance of being able to address those concerns in the program formation and roll-out. A team approach can be incredibly powerful—allowing different individuals to focus on different elements of the program development while still staying connected. Even if it ends up being a single individual doing much of the legwork, the effort can only benefit from getting a variety of input as it gets started.

Step 2: Identify Hauling Partner

This early step may be the most difficult—identification of a party willing to recycle the clinical plastics. Ask the EVS Director for access to the hospital's current waste hauler or recycler. Some hospitals have found that their existing waste hauler or recycler is eager to sit down and discuss the opportunity to accept additional plastics from clinical areas. Other recyclers may be reticent to accept plastics from clinical areas or may be utilizing a single-stream process that cannot or will not accept medical plastics. Don't be discouraged initially. Remember, finding the RIGHT hauler may be a trial and error process. The EVS Director can be critical ally in this endeavor and may even be willing or able to take the lead in determining hauling capacity for clinical plastics—especially if there is interest in capturing these same plastics in other clinical departments such as ICU, ED, NICU and Labor and Delivery.

It's important to take haulers on a tour of the OR or other clinical areas. Help them understand these are clean and sometimes sterile plastics with no contamination issues. Sometimes gowning up the recycler and allowing them to watch a procedure set up will be the convincing factor. If conventional waste haulers and recyclers are unwilling or unable to take the medical plastics—think creatively. Reach out to your local or state environmental agency to see if they have ideas. Call national haulers who focus on recycling to ask if they provide service in the area or know of others who do. You can even work with your EVS Director to reach out to local manufacturers to see if they are aware of anyone who is interested in exploring the capture of clean, medical plastics.

Visit the hauler's recycling site. A site visit should be a must for any place the hospital is sending its waste. Take a look at the safety standards being utilized for workers, the flow of materials. Sloppy waste handling procedures or lack of personal protective equipment can be a red flag for troubles down the road. Ensure the hauler is bonded and insured. The hospital will also want to get a commitment from the hauler to educate its staff about the influx of medical materials that will now be coming into the recycling facility. Recycling staff should be empowered to call attention to any inappropriate materials that make their way into the recycling stream. A process should be put into place with the hauler up front that allows the two organizations to address any missteps in a collaborative manner. Skipping this step could result in inadvertent harm to staff at the recycling facility or an alarmed call to environmental officials should contamination occur.

Step 3: Have a Sense of What Can Be Recycled

A critical step in setting up a recycling program in the OR is to understand what materials the OR is trying to recycle. There are several ways to determine what recyclable materials the organization generates. Some hospitals have found it most successful to put together a team comprised of OR staff, Materials Management, Environmental Services and the potential hauler.



blue wrap



pour bottles



rigid plastics



soft plastics

Photos courtesy of Cleveland Clinic Health System, © 2010.

Go through the supply room. Discuss different high volume supplies and how they are used, when they are used, likelihood of contamination with blood or body fluids and how they are typically disposed of. Work with Materials Management to determine the volume of various supplies the organization is currently purchasing. Is blue wrap purchase increasing or decreasing? Has the organization begun a program to review custom packs to reduce excess supplies? These pieces of information will be helpful when trying to gauge the volumes of material the OR will produce.

A somewhat different strategy is to look at what is already being produced as a means of defining opportunities. This involves reaching out to the Environmental Services Director and investigating the potential for a mini- waste audit of solid waste coming out of the OR. Have EVS pull several bags of solid waste (or clear bag trash) coming out of the OR. Make sure all participants have on personal protective equipment. Then spread waste out on tarps and sort waste into categories. If possible, sort plastics based on their recycling number: many plastics are labeled 1-7 using a common labeling system. You may find however, that some plastics are not labeled. Where possible, sort them into similar materials—rigid plastics like trays, basins or molded plastic packaging, soft plastic overwraps, blister packs, Tyvek and blue sterile wrap, to name a few commonly found items. Try opening and sorting several bags, possibly from different times of day to accurately assess the kinds of clean plastics coming out of the OR.

The hauler may be willing to do additional research to develop recycling outlets for other materials the facility can generate in large volumes. Having a sense of the kind of volumes the department (or in EVS's case—the organization) generates will help the hauler understand what markets are available. For example: there are markets for #5 plastic—polypropylene—which comprises blue sterile wrap. Because recycling often goes to market based on weight, and blue wrap is a very light material, large volumes are necessary to bale and sell it on the market. Having a sense of generation rates over a set time period is helpful.

Talk to the hauler and EVS about potential strategies to get materials out of the building, which can sometimes be complicated. Does the hauler need the material baled? Can EVS making baling work with other priorities at the back dock? Addressing some of these tensions early can lead to a more successful program later on. Lastly, be patient. Over time additional market opportunities may materialize for items that may be unrecyclable to begin with. Both strategies for identifying materials can achieve your desired result, but you may get more cooperation using the first strategy due to squeamishness about opening bags of trash.

Step 4: Work with EVS to Define Containers and Collection Schedule

After identification of recyclable plastics and a willing hauler, it is critical to sit down with EVS and discuss how to structure segregation and collection of recyclables from the various locations within the OR. This initially involves determining the right container or bag color in which to segregate the recyclables. Some hospitals have found that OR space is so limited that an actual recycling container (of the sort found throughout hospitals and public spaces) is not feasible. Other options have included stainless steel linen hampers where a recycling bag can share space with linen and solid waste containers, or simply tying an extra bag onto the supply cart to collect recyclables. Whatever container is selected, ensure standardization among the suites to ease education, training & compliance. The color of trash liner used to collect recyclables will also be important. Many hospitals have chosen to use a unique colored liner to indicate to EVS staff that the materials inside are bound for recycling rather than solid waste.

Once an appropriate collection receptacle has been determined, a collection procedure will need to be identified. Again, collaboration with Environmental Services will be key. EVS must determine—in concert with OR staff—where recyclable material is placed after the procedure and how it will be distinguished from solid or regulated medical waste. Collection schedules will be paramount, as there is little room in the OR for additional waste storage capacity. EVS will need to determine how often they can collect materials from the OR and whether adding recyclables will alter their existing collection schedules. Collection schedules may also fluctuate as the program gets up and running. Consistent communication between the OR and EVS will ensure due diligence in setting up a process that works for both departments. The colored bags will facilitate commingled removal and transport, and separation into various streams at the final storage location. Remember, the volume of material being transported is not actually changing, but the change in material flows will have a significant impact on the work being done by EVS staff.

Hospitals have found that using a unique color trash liner for recycling can aid in organizational recognition of recycling receptacles across the facility while also allowing EVS to easily commingle trash and sort it at the dock.

Step 5: Develop Signage to Highlight New Segregation Practices

Some hospitals have found it exceptionally helpful to develop signage to indicate new segregation procedures for recyclables or other kinds of waste. Many people are visual learners or need a visual guide to refer to during segregation. A simple poster should include visual representations and/or lists of what kinds of materials can and cannot be placed into the recycling container. In some instances, the OR or EVS has been able to work with Media Relations or other in-house design teams to layout the signage. Signage should be posted either on the recycling receptacles or immediately adjacent to them for maximum comprehension and referral.

Step 6: Educate and Engage Staff on Appropriate Segregation Procedures

Like any new procedure or practice, education will be a critical element in determining the success of the recycling program. Reach out to staff and explain the new segregation procedure. Run short In-Services for staff at the beginning of each shift. Help staff understand the reasons for the change. Pass around different plastics so people understand which materials are acceptable to recycle and which are not. Consider a pilot period where the staff can experiment with container placement, sizing and materials segregation. The more prepared staff is for the new practice, the smoother the transition. Find a champion on each shift who is willing to assist teammates in understanding the new segregation procedures. Work with EVS to train EVS frontline staff on the new recycling initiative. This program needs to be introduced, explored, and vetted with staff in both OR and EVS in order to ensure a smooth process. Often EVS professionals can act as the first line of defense by performing a visual inspection as they pick up bags so there is some quality assurance that the wrong material does not end up in the recycling bag, especially as the program rolls out. It is also important to ensure that the hospital is training the waste crews who come to pick up the materials. Work with EVS and the hauler to ensure that everyone is clear on how the waste is to be handled during pick-ups.

Step 7: Divert Recyclable Waste Pre-Incision

Many hospital begin their recycling programs in the OR starting with diversion of recyclables during procedure set-up. During surgical set up, the case cart is unpacked, kits and supplies are opened and lots of packaging, rigid plastics, and blue sterile wrap are thrown into the trash. With proper training and/or signage, staff should have an understanding of which plastics are recyclable and which material should go into the regular trash. Having a nurse champion present, especially



One hospital separates clean plastics from the OR for recycling.

during the roll-out period, can be especially helpful. Ensure a recycling receptacle with the agreed upon trash liner color is accessible to staff during set-up. Hospitals often tie the recycling bag off before the patient enters the room to ensure no cross-contamination with infectious materials.

Step 8: Segregate Recyclable Waste After Procedure

After the surgical procedure is complete and patient has left the operating room, there is an additional opportunity to capture remaining recyclables used during the procedure. Recycling bag can be reopened or new bag used depending on organizational preference and feasibility. Due diligence should be taken to ensure that no infectious materials make their way into the recycling container if segregation is taking place post-procedure. Some hospitals are reticent to let recycling containers remain accessible during the procedure for fear of cross contamination. Recyclers are extremely cautious about receiving any kind of contaminated material, as their workers are often not appropriately protected to deal with infectious or hazardous waste, for example. Ensuring that no contamination of recycling materials occurs will be critical to developing a long-term partnership with the hauler. Depending on how well trained and engaged staff is, segregation practices can be limited or used more expansively.

Step 9: Problem Identification and Resolution Plan

Expect stumbling blocks. Whether it is in determining a hauler, replacing an unsuccessful hauling partner, working through the scheduling issues with EVS or just getting staff to understand the difference between recyclables and non-recyclables, there will be challenges to overcome. Have a plan of action to resolve problems. Use setbacks as an opportunity to reengage staff on how they are contributing to the organization's sustainability goals. Maintain good communication with the EVS department. Work through the barriers and be willing to compromise. Hold refresher in-services to re-engage and retrain staff if necessary. Many hospitals have founds that documenting problems with a photograph, and cataloging them according to shift or procedure works best, if possible. Demonstrating visually what should NOT be happening can also help other OR staff be on the lookout for improper segregation issues. Consider adding training on proper waste segregation to new employee training for the department and include re-training as part of annual education requirements for the OR.

Step 10: Track Progress and Recognize Success

Once the program is up and running and the organization has been able to troubleshoot implementation issues, consider developing a policy in the OR (or organization-wide, if applicable) that requires appropriate waste segregation—including recycling. A policy can sometimes build the program into the way organization runs and can outlast management changes. Communicate the successes of the recycling initiative back to OR staff. People like to know that the extra time they have spent on a new program or initiative was worth it. Work with EVS to capture data on pounds of waste diverted or disposal costs avoided. Share data with OR staff and recognize their efforts in an organizational newsletter, staff meetings or Earth Day events. If the organization has a Green Team or Sustainability Committee, make sure they know the OR is doing its part! Communicate successes to Media Relations. And use the momentum from a successful recycling program in the OR to tackle the next sustainability goal for the department.

For More Information: Go to www.GreeningTheOR.org for a list of key resources that can assist you in this program area. Because this list is updated often, we keep it online, so as not to date this implementation module. Also available are case studies on medical plastics recycling in the OR. Learn from your peers!

Endnotes

- 1 *Demand for Disposable Medical Supplies to Increase*. Specialty Fabrics Review. Oct. 2009. Available at: http://specialtyfabricsreview.com/articles/1009_sw14_demand.html. Accessed on Mar 19, 2011.
- 2 *Greening the Operating Room: Reduce, Reuse, Recycle and Redesign*. ASAHQ Committee on Equipment and Facilities. 2010. www.asahq.org/.../Greening%20the%20Operating%20Room_Final.ashx
- 3 McGain E, Hendel SA, Story DA. An audit of potentially recyclable waste from anesthetic practice. *Anaesth Intensive Care* 2009; 37:820-3.
- 4 Personal Communication- Stefanie Feldman. Waste Management Healthcare Solutions. March 2011.
- 5 Practice Greenhealth. Sustainability Benchmarking Report. 2010. Available at: www.practicegreenhealth.org
- 6 Ibid.



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The Greening the OR® Initiative is defining best practices in the OR to reduce environmental impact, reduce cost, increase efficiency, and improve worker and patient safety. Practice Greenhealth is grateful for the support of a number of sponsors of the Greening the OR® Initiative. For a complete list, please visit: www.GreeningTheOR.org

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IMPLEMENTATION MODULE:

Rigid Sterilization Containers in the OR

The operating room generates a large volume of disposable plastics, ranging from single-use medical devices to packaging to sterile wrap to plastic pour bottles for irrigation. The vast majority of these items go out the door as waste—either with regulated medical waste (where comprehensive segregation efforts have not yet been undertaken) or as solid waste or recycling. More efficient than disposing of waste in the least impactful way is preventing generation of waste altogether, and evaluating the potential to transition some items from disposable to reusable while still ensuring infection prevention and protection patient safety. In addition to generating less material altogether, other benefits of reusables include reduced labor and time for waste management and transport. Disposable blue sterile wrap, used for the one-time sterilization of instruments before surgery, comprises a large portion of surgical waste—estimated by one study to comprise 19% of the OR waste stream.¹ A recent onsite hospital study found that blue wrap may make up as much as 55% of the total volume of disposable plastics leaving the OR.² Blue sterile wrap is a soft plastic, made of polypropylene or #5 plastic.

While polypropylene blue wrap is ubiquitous in hospitals, staff often have problems with breakthrough, where sharp instruments or tray corners push through the blue wrap, forcing the materials inside to be re-sterilized. At Mills-Peninsula Medical Center, Central Processing estimated 5-10 torn blue wrap sets per week at a cost of \$100/set—costing the organization between \$500-\$1000 per week and up to \$50,000 annually,³ just from repackaging and resterilization efforts. Indicator systems are used to ensure sterility for items sterilized with blue wrap. Most hospitals use an indicator tape in concert with the blue wrap to validate sterility. While alternatives are available on the market, many hospitals use an indicator tape containing a lead salt. Lead is considered a hazardous waste by the US Environmental Protection Agency when found in certain concentrations, and

must be disposed of using a set of stringent management practices and can be very cost-prohibitive. In order to meet environmental compliance obligations, hospitals using lead indicator tape should be collecting it for proper disposal. This indicator tape can also be a contaminant in instances where the hospital has been able to develop a recycling program for blue wrap.

While sterilization wrap will continue to be used to some degree, hospitals are seeking ways to improve upon the current process, reduce resterilization needs, reduce the use of disposable or single-use products and reduce waste. One attractive option is the use of rigid sterilization containers for reusable medical instruments requiring sterilization. Sterilization packaging must allow for sterilant penetration during the sterilization process, prevent microbial penetration during storage and transport as a means of maintaining sterility of processed items, and facilitate aseptic presentation of the contents.⁴ Rigid containers (also called reusable hard cases) are typically made of anodized aluminum or stainless steel, can require a filter or be filterless, and meet all of these criteria. Additionally, rigid containers can protect the instruments from inadvertent drops, can facilitate the organization of the instrument sets and are not subject to any of the breakthrough or resterilization issues prevalent with blue wrap. Other noted benefits include a potential reduction in ergonomic wrapping injuries for Sterile Processing Department (SPD) staff, increased ease in keeping track of instruments, the avoided cost of blue sterile wrap and of course, the waste reduction benefits in the OR.

There are several standards that regulate and oversee the use of sterilization containers—whether hard cases or wrapped trays. Both are considered Class II medical devices by the FDA and approved as such.

The Association of Perioperative Registered Nurses’ (AORN) **Recommended Practice (RP) for Selection and Use of Packaging Systems for Sterilization** states that *“Packaging systems should be evaluated before purchase and used to ensure that items to be packaged can be sterilized by the specific sterilizers and or sterilization methods to be used and should be compatible with the specific sterilization process for which it is designed.”*^{5,6} The association for the Advancement of Medical Instrumentation (ANSI/AAMI) **Standard 79, Comprehensive Guide to Steam Sterilization and Sterility Assurance in Health Care Facilities** reiterates that health care personnel bear the ultimate responsibility to ensure that a packaging system is suitable for use in sterilization processing and sterility maintenance.⁷

A transition to rigid sterilization containers can make long-term financial sense for a healthcare organization. While these containers do have an upfront cost, many hospitals find that payback can be less than a year if the organization is tracking all of the financial benefits. A set of simple cost-benefit factors might look like this:

Blue Sterile Wrap	Rigid Sterilization Containers
Purchase Cost of Sterilization Wrap (per surgery)	Purchase Cost of Rigid Containers
Purchase Cost of Indicator Tape	Purchase Cost of Filters (per surgery if applicable)
Cost of Rewrapping Torn Sets	Continued Purchase of Sterilization Wrap (for limited number of surgeries where rigid containers are not yet appropriate and wrapping must continue)
Waste Disposal Costs of Blue Wrap (as RMW, solid waste or recycling)	--
Waste Disposal Costs of Indicator Tape (if lead indicator tape then hazardous waste)	--
Total Cost of Using Sterilization Wrap	Total Cost of Using Rigid Containers

This does not factor in labor costs—for wrapping and rewrapping sets in sterilization wrap and the waste handling related to blue wrap disposal on the one side and to clean the rigid containers and replace the filters on the other side. One could argue, however, that just outlining the tasks associated with each points to a benefit in going with the reusable hard cases.

How then does a facility make the case to transition to rigid sterilization containers for surgical instrumentation, and operationalize the change? There are several finite steps an organization can follow to make a move to reusable hard cases in the OR.

Step 1: Identify the Project Team

A transition to rigid sterilization containers requires collaboration among the SPD, the OR, Infection Prevention and Purchasing. Put together a small project team that can work together to answer all of the questions about a transition to rigid containers and support the project from concept to implementation. The team will need to think about everything from existing costs, the business case, the selection of containers to storage space to appropriate sterilization procedures to front-end cost as well as costs for existing sterilization procedures for comparison.

Step 2: Develop a Baseline to Support Cost-Benefit Analysis

Before asking the organization to invest in reusable hard cases for the OR, it will be important to be able to demonstrate what the current practice of utilizing blue sterile wrap is costing the organization. Work with the project team to develop baseline costs for each of the following items:

- **Determine the current supply costs for purchasing blue wrap and indicator tape for the OR.** Work with Purchasing to determine the exact volumes and costs of blue wrap and indicator tape ordered for the OR and utilized over a set period—such as the past year.
- **Determine the volume of blue wrap purchased for the OR.** Use purchasing records to determine how many units were purchased. Utilize the shipped weight information or actually weigh the various shipped packages to determine exact weight. Multiply by total number of units for an estimated total weight. Remember to exclude packaging weight and that different sized blue wrap will weigh different amounts.
- **Determine how the majority of blue wrap is currently being disposed of in the OR.** Is waste in the OR carefully segregated or is most of the waste going into regulated medical waste containers? Does the hospital have a program to recycle medical plastics yet? Does the program include blue wrap?
- **Determine current costs for disposing of blue wrap in the OR.** Reach out to Environmental Services (EVS) to determine what the organization is paying per pound for the disposal of whichever waste stream blue wrap is currently being disposed in. Multiply the cost per pound by the total weight of blue wrap being purchased to determine total waste costs for blue wrap disposal.



Many hospitals are beginning to transfer large percentages of their surgical instrumentation into rigid sterilization containers.

- **Determine current costs for disposing of lead indicator tape (if applicable) in the OR.** Work with SPD to estimate the amount of indicator tape used by the OR. Weigh the indicator tape to determine weight per roll and multiply to get the total weight of indicator tape used by the OR. Indicator tape containing lead must be handled as hazardous waste. Check with EVS to determine pricing for hazardous waste per pound. Multiply by total indicator tape weight to determine total waste disposal costs for indicator tape in the OR. Note: If the facility is not using lead indicator tape, this step may be skipped for expedience as cost of indicator tape disposal in other waste streams will be negligible.
- **Determine how many OR packs each week need to be rewrapped due to torn blue wrap.** Collaborate with SPD to determine a conservative estimate for how many packs are sent back to SPD from the OR each week to be rewrapped and sterilized as a result of breakthrough or torn wrap. Multiply across the year to determine an estimate for the number of packs that require rewinding and resterilization.
- **Determine how much the organization is spending to rewrap torn kits or packs for the OR.** SPD in concert with Purchasing should be able to determine how much is being spent on rewinding packs in terms of additional blue wrap supply costs. If sterilization costs or labor costs are available, factor those in. Multiply across the year for total expenditure.

Add up the costs to demonstrate what the OR is currently spending yearly to utilize blue sterilization wrap. This figure will then be matched up against the front end cost of rigid sterilization containers to determine the payback period and an accurate return on investment (ROI).

Step 3: Evaluate Rigid Sterilization Containers

Work with the project team to evaluate different vendors for rigid sterilization containers. Reach out to the organization's Group Purchasing Organization (GPO) to see which suppliers may be recommended and available on contract. Ask colleagues within professional associations which manufacturer they have had success with. The team should determine the number and kinds of rigid containers needed to transition from blue wrap to hard cases for sterilization. Evaluate different options for reusable hard cases. There are a number of factors that will play a role in which container the organization chooses. Some key factors include:

- **What material is the container made of? Is it resistant to corrosion?**
- **How easy are the containers to use and clean?**
- **What is the estimated life of the container?**
- **What kind of containers does the organization need?** Different kits will require different sized containers, and packs with many small items may need particular accessories to prevent part loss or disorganization.
- **How much do the containers weigh when filled with contents?** A maximum weight limit of 25 pounds for containerized instrument sets has been recommended in the new ANSI/AAMI ST77:2006 Standard, Containment Devices for Reusable Medical Device Sterilization.⁸ The requirement was designed to ensure that the contents of the container can be reliably sterilized and dried.⁹
- **Does the container utilize a filter system or is it filterless?** There are some ongoing costs tied to containers with filter systems and filters need to be checked for integrity before each case. One study demonstrated that filterless systems have less potential for microbial penetration than the filtered systems,¹⁰ but additional research is unavailable.
- **Are the containers compatible with the organization's existing sterilization equipment?** Some containers are intended to be used only with steam sterilization. Some containers are not intended for use with low temperature sterilization techniques or appropriate for lumened devices.¹¹ Some containers can be used in both systems but be sure to check whether containers can withstand flash sterilization. It is very important to ensure compatibility early on in the evaluation process. Additionally, ensure that the containers are able to fit into different sterilization equipment.

- **Do the containers provide aseptic presentation of the contents?** Independent hospital verification that the containers meet the manufacturer's claims is critically important. It is recommended to test the container with the maximum load recommended by the manufacturer utilizing biological and chemical indicators in hard to reach corners of the tray to ensure efficacy of the container. Work with Infection Prevention and SPD to ensure appropriate testing.
- **How much do the containers cost?** Work with Purchasing to get an accurate cost assessment. Vendors should be able to provide the organization with an accurate price quote as well as determine any volume discounts or GPO rebates. Manufacturers can also work with the organization to determine the benefits of phasing in container purchase versus purchasing them in a lump sum.
- **What other hospitals are using a particular company's containers?** Ask for a list of customers and reach out to get the user's perspective and lessons learned from transitioning to reusables.

Step 4: Consider Storage and Placement

Once rigid sterilization containers have been evaluated, it is critical for the project team to determine appropriate storage for the new containers. Hard cases can take up more room than blue-wrapped packs and supply room adjustments may need to be made. Work with SPD to determine the most appropriate placement and storage locations for the new containers. Additionally, consideration should be given to the weight of different containers when full of instruments. While AAMI recommends a maximum load of 25 pounds, ensuring that heavier equipment is located lower on shelving will reduce the risk of ergonomic injuries for staff.

Step 5: Presenting the Case for Reusable Sterilization Containers

Once the organization has determined an appropriate vendor and accurate cost information and has tackled the storage issue, it is time to present the case to leadership for approval of funds. Using the baseline costs developed in Step 2, present OR management and leadership the estimated payback and ROI for the rigid sterilization containers. Be sure to include aspects of the transition that may increase efficiency or reduce wait time in the OR. Depending on the financial resources of the organization, reusable containers may be purchased in one lump sum, or may need to be phased in over time and as resources allow. If so, look at the kinds of cases that get performed most often and prioritize the selection of rigid sterilization containers for those kinds of cases/equipment. This can lead to the greatest savings over the shortest period.



Rigid containers share supply shelf space with blue wrapped kits.

Step 6: Educate Staff

When the containers arrive for use, staff in both SPD and the OR will need to be properly trained on how to utilize the new container system. Sterile Processing staff will need the most detailed training. Some considerations for SPD staff include learning the specifics on proper cleaning for the containers—some systems require a pH neutral detergent to maintain the passive layer and the durability of the container;¹² appropriate filter replacement procedures and checks on locks and gaskets. Appropriate placement in sterilization equipment is also important—sterilization containers should be placed on lower shelves when sharing space with blue wrapped packs to ensure condensate doesn't drip onto sterilized packs and SPD staff should note that some containers should not be stacked unless containers are of the same brand and specifically allowed by the manufacturer. OR staff will need to be trained to inspect the external latch, filters, valves and tamper-evident devices (locks). The lid should also be inspected for integrity of the filter or valve and the gasket.¹³ If using a disposable filter model, staff will want to keep apprised of common missteps that can occur with filter replacement and lock mechanisms.

OR Staff will also need to get used to using the rigid containers in the OR including how they make their way into and perhaps more importantly—out of—the OR. In-Services for both departments will be a valuable starting point. Seize any missteps or lack of comprehension as an opportunity for retraining. Infection prevention is absolutely paramount and ensuring items are sterile at time of use and that the container ensures the integrity of the sterilized contents until ready for use is of the utmost importance. Proper training and education can ensure safe and appropriate handling procedures. Developing a policy to support the proper cleaning, inspection and handling of containers can also build the proper procedures into the fabric of the organization. And adding appropriate training on rigid container for annual staff training and for all new hires is also a smart idea.

Step 7: Special Circumstances

Ensure that SPD staff in particular is aware of some of the special handling required for steam sterilization versus low temperature sterilization versus flash sterilization.¹⁴ For steam sterilization, wet packs are not acceptable and all items need to be dry before sterilization.¹⁵ Oxidative sterilants such as hydrogen peroxide or ozone, for example, require non-cellulose filters.¹⁶ New scrutiny is being placed on flash sterilization procedures with organizations including AORN, AAMI, the Joint Commission, the Centers for Disease Control and Prevention, and the Association for Professionals in Infection Control and Epidemiology (APIC) all taking a closer look at how flash sterilization procedures may be linked to surgical site infections. These same organizations are also exploring both the prevalence and practice of flash sterilization.¹⁷ Hospitals need to make sure they are up to speed on the latest guidance from these organizations on appropriate uses of flash sterilization. AORN, for example, clearly recommends that “Rigid sterilization containers designed and intended for flash-sterilization cycles should be used.”¹⁸

Step 8: Track Savings Data and Demonstrate Payback

Work with the project team to keep a running tally of avoided costs relative to the reduction or elimination of the use of blue sterilization wrap. Also note any increases in efficiency that come as a result of the transition—less prep time in SPD, less set-up time in the OR, etc. While not easy to generate cost-savings data from these efficiencies, sharing the improvements—even anecdotally—will be helpful for leadership. Keep the OR management apprised of all avoided costs and ensure they are aware when the containers have demonstrated payback. Validating a strong ROI with good data can also help build management’s trust—perhaps making it easier to approach them for the next greening project in the OR.

Step 9: Improve Process and Celebrate Success!

Check in with staff in both the OR and SPD to ensure things are running smoothly. Every new product transition is a work in progress, and takes some getting used to. Asking staff if they have concerns they would like to share may yield more results than expecting the same staff to step forward and complain about the new process. In addition, it can be used to demonstrate to the staff that management takes their concerns seriously and will work to address any issues that may arise. Work with Purchasing to consider if the organization can require vendors to supply their own rigid cases, especially on equipment used on consignment. Often this feature can be built into the contract language, with a little leverage. Share the updates on financial savings with the staff along with the environmental benefits of the transition. Every member of the OR and SPD staff played a role in ensuring the transition would work. Acknowledge their contributions and celebrate success.

For More Information: Go to www.GreeningTheOR.org for a list of key resources that can assist you in this program area. Because this list is updated often, we keep it online, so as not to date this implementation module. Also available are case studies on the transition to rigid sterilization containers in the OR. Learn from your peers!

Endnotes

- 1 Laustsen, G. *Greening in Healthcare*. Nursing Management. November 2010. Vol. 41, Issue 11. Pp: 26–31. Accessed on March 11, 2011.
- 2 Brannen, L., Guity, A. and DeLoach Lynn, C. *Improving Sustainability Performance in a High-Paced, “Big” Cost-Center, and Resource-Constrained O.R. Setting*. ASHE International Summit and Exhibition on Planning, Design and Construction. March 15, 2011.
- 3 McGurk, J. *Greening Healthcare Through Pollution Prevention: Overview of Waste Management*. Greening of Hospitals Workshop. Available at: <http://ca-hwi.org/resources/Santa%20Barbara%20City%20College%20GREENING%20OF%20HOSPITALS%20WORKSHOP%20ppt1.ppt>. Accessed on Mar 11, 2011.
- 4 Flynn, S. *Considerations for use of rigid sterilization containers*. Healthcare Purchasing News. October 2010. Accessed on March 18, 2011. Available at: <http://www.hpnonline.com/ce/pdfs/1010cettest.pdf>
- 5 Case Academy-Case Medical. *Sterilization Container Systems- Tutorial*. Website. Accessed on March 12, 2011. Available at: <http://www.casemed.com/caseacademy/downloads/SCSTUTRL.pdf>
- 6 Flynn, S. *Considerations for use of rigid sterilization containers*. Healthcare Purchasing News. October 2010. Accessed on March 18, 2011. Available at: <http://www.hpnonline.com/ce/pdfs/1010cettest.pdf>
- 7 Case Academy-Case Medical. *Sterilization Container Systems- Tutorial*. Website. Accessed on March 12, 2011. Available at: <http://www.casemed.com/caseacademy/downloads/SCSTUTRL.pdf>
- 8 Carlo, A. *Sterilization cues for containers*. Materials Management in Healthcare. Accessed on March 18, 2011. Available at: http://www.matmanmag.com/matmanmag_app/jsp/articledisplay.jsp?dcrpath=MATMANMAG/PubsNewsArticleGen/data/04APR2007/0704MMH_FEA_Hotline&domain=MATMANMAG

- 9 Flynn, S. *Considerations for use of rigid sterilization containers*. Healthcare Purchasing News. October 2010. Accessed on March 18, 2011. Available at: <http://www.hpnonline.com/ce/pdfs/1010cetest.pdf>
- 10 Seavey, R. *Can a Rigid Container System be Greener and Safer at the Same Time? — Unique rigid container benefits healthcare “greening” efforts*. Managing Infection Control. November 2009. Accessed on March 10, 2011. Available at: http://www.medline.com/media-room/pdf/Can_a_Rigid_Container_System_be_Greener_and_Safer_at_the_Same_Time.pdf
- 11 Case Academy-Case Medical. *Sterilization Container Systems- Tutorial*. Website. Accessed on March 12, 2011. Available at: <http://www.casemed.com/caseacademy/downloads/SCSTUTRL.pdf>
- 12 Ibid.
- 13 Seavey, R. *Can a Rigid Container System be Greener and Safer at the Same Time? — Unique rigid container benefits healthcare “greening” efforts*. Managing Infection Control. November 2009. Accessed on March 10, 2011. Available at: http://www.medline.com/media-room/pdf/Can_a_Rigid_Container_System_be_Greener_and_Safer_at_the_Same_Time.pdf
- 14 Flynn, S. *Considerations for use of rigid sterilization containers*. Healthcare Purchasing News. October 2010. Accessed on March 18, 2011. Available at: <http://www.hpnonline.com/ce/pdfs/1010cetest.pdf>
- 15 Case Academy-Case Medical. *Sterilization Container Systems- Tutorial*. Website. Accessed on March 12, 2011. Available at: <http://www.casemed.com/caseacademy/downloads/SCSTUTRL.pdf>
- 16 Flynn, S. *Considerations for use of rigid sterilization containers*. Healthcare Purchasing News. October 2010. P.54. Accessed on March 18, 2011. Available at: <http://www.hpnonline.com/ce/pdfs/1010cetest.pdf>
- 17 Stanton, C. *Talking About Flash Sterilization*. AORN News. Website. Accessed on: March 20, 2011. Available at: <http://www.aorn.org/AORNNews/Flash/>
- 18 AORN Perioperative Standards and Recommended Practices, 2010 Edition. *Recommended Practices for Sterilization in the Perioperative Practice Setting*.



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IMPLEMENTATION MODULE:

Fluid Management Systems in the OR

Liquid Waste Management in the OR

A large portion of surgical waste is liquid waste—blood and body fluids diverted during surgery. This waste stream is typically collected in disposable plastic suction canisters. A Minnesota study found that suction canisters comprise 25% of regulated medical waste at hospitals,¹ while another estimated that up to 40% of surgical waste is related to suction canister disposal.² A single canister can hold up to three liters of fluid. In a single surgery, often 3-4 three-liter containers can be filled with fluids bound for disposal—weighing approximately 6-8 pounds apiece.³

Suction canisters containing liquid waste have historically been disposed of in one of two ways. The first option involves having clinical staff manually open the canisters and pour the contents down the drain. This practice can pose a significant risk of splashing or aerosolization of bloodborne pathogens for OR—or in some cases, EVS—staff. A 2004 Healthcare Purchasing News article estimated that between 30-65% of hospitals have continued to use drain disposal, despite the exposure risks.⁴ It is hard to quantify the cost of treating employees who have had exposures related to disposal of liquid medical waste but even using a conservative numbers based on a 1990 study estimating \$500-\$3000 for initial treatment and follow-up for exposed workers, one can understand the financial and safety implications.⁵ Hospitals utilizing this practice also run the risk of OSHA citations, as even with personal protective equipment, this practice may be interpreted as violating OSHA's Bloodborne Pathogens Standard. And as a 2004 OR Business Manager article aptly stated: *"Harder to quantify are the anxiety and fear plus the obviously high costs if there is a seroconversion."*⁶ Also important to note is that suction canisters that have been emptied to the sanitary sewer are often still considered regulated medical waste due to perceived risk and are disposed of accordingly, adding the weight of each empty container to RMW disposal costs, which are typically 6-10 times higher than the cost of solid waste disposal.

A second option involves opening the container and adding chemical solidifiers (or isolyzers) to the contents. Once the solidifier has made the canister contents immovable, it is then placed in the regulated medical waste stream for treatment and disposal. Several things should be taken into consideration with this practice. Solidifiers can take up to 10 minutes to solidify completely, though many claim a two-minute solidification process.⁷ Some hospitals report that solidifiers aren't entirely solid and can still splatter if container is dropped. In terms of OR turnover time, at an estimated cost of \$17/minute,⁸ estimating just five minutes per case for suction canister solidification and disposal over eight cases a day can translate to \$680 per day in lost OR time. From a waste perspective, in a hospital that performs 7000 surgeries per year, use of solidifiers could be roughly equivalent to \$35,280 in RMW disposal costs (estimating three 6-lb suction canisters per surgery being disposed of as RMW at \$0.28 per pound each) with an additional supply cost estimated conservatively at \$105,000 for the solidifiers themselves (estimated to cost between \$5-\$30 apiece).⁹ Additionally, some solidifiers contain disinfectant chemicals such as chlorine and glutaraldehyde that may allow a solidified container to go to regular trash rather than RMW, depending on state RMW regulations. But these chemicals bring additional exposure risks to workers. Glutaraldehyde, for example, is known to cause throat and lung irritation, asthma, headaches, nausea, rash-contact and/or allergic dermatitis, nosebleed, burning eyes, nose irritation, sneezing and wheezing.¹⁰

Hospitals are finding that a third option—fluid management systems that empty liquids directly to the sanitary sewer—are safer for staff, better for the environment and offer long-term cost-savings. In 2010, 62% of Practice Greenhealth award winners reported they were utilizing fluid management systems.¹¹ Hospitals use one of several enclosed liquid management systems available on the market to dispose of blood and body



Suction canisters can comprise a large portion of OR infectious waste—up to 40%.

fluids. Fluid management systems are either stationary and hard-plumbed into the sanitary sewer or portable, on a cart that employs a docking station for automated drainage to the sanitary sewer. Some utilize a reusable canister that is disinfected and reused, while others use an integrated canister system that is completely closed, lowering ongoing supply costs for disposables as well. There is an initial capital cost for equipment ranging from approximately \$20-25,000 for each system and some smaller costs for disposable manifolds or lids for some models ranging \$15-20 per procedure as well as occasional container replacement when reusable canisters wear out. Other less expensive fluid management systems empty directly to the sanitary sewer but utilize disposable canisters that are able to be placed in regular trash after a rinse with an enzymatic cleaner. These systems still confer dramatic waste reduction benefits but don't ameliorate the basic canister purchase and disposal costs. They also do not have the ability to accurately measure fluid loss—a key benefit to anesthesiology staff concerned about patient safety.

How then does a facility make the business case for investment in fluid management systems in the OR and operationalize this technology? There are several finite steps an organization can follow to set up and implement a fluid management system in the OR.

Step 1. Assess Current Practice

Fluid management systems do typically require an upfront financial investment, despite having typical financial payback periods ranging from just 1 to 3 years and immediate workplace safety improvement. (Note: payback periods don't factor in a host of intangibles such as efficiency gains and exposure reductions, for example.) However, most companies have responded to the capital cuts in healthcare by offering a lease option that converts the capital costs into payments over the life of the equipment, therefore eliminating the upfront capital investment. Therefore it is important to be able to demonstrate to leadership the volumes of waste that would be diverted, any improvements in staff safety and health, and averted disposal costs that are a result of fluid management systems. There are several steps you can take to calculate that baseline:

- **Determine volume of suction canisters used by OR over set period of time.** Determining the volume of suction canisters currently being used and disposed of is the first critical element in data gathering. Check with materials management or the OR Director and find out how many suction canisters the OR orders monthly or annually—ranging from small graduated canisters up to the bulk “omni-jug” style containers. This should provide you with an estimate of how many containers are being disposed of during the same time period, unless you are holding significant inventory.
- **Determine estimated price per suction canister.** Ask materials management staff for estimated price per suction canister or if they have a total costs for all suction canister purchases in the OR over a set period, that works as well.
- **Determine what method your OR is currently utilizing for suction canister disposal.** The three most typical responses will be (1) manual pour to sanitary sewer, (2) use of a solidifier and dispose to RMW, or (3) use of disinfectant solidifier and dispose to either RMW or solid waste, depending on regulations.
- **Determine weight of container (either full containing solidifier or empty after pour).** Get an estimated weight for a full suction canister. There are several ways to do this. If the OR is typically using 3-liter containers, you can estimate a weight between 6-8 pounds per full canister based on manufacturer estimates. Or you can actually have Environmental Services (EVS) weigh a full container to get a more accurate estimate. For most accurate results, check how full OR staff usually let a suction canister get before disposing of it—it may be less than full, and this should be adjusted in your estimate.

- **Determine price the organization is paying for disposal of RMW per pound or ton.** Check in with the Environmental Services Director. The Director should have an accurate cost per pound or ton of RMW disposal fees if the organization uses a commercial hauler. This can get a bit more complicated if the hospital is treating their own RMW onsite. But EVS should be able to assist in coming up with an average cost for disposal as RMW.
- **Determine price of solidifying agent per canister.** Again—check with either materials management or with Environmental Services. It may also make sense to inquire with circulating nurses about effectiveness of the solidifying agent. Many hospitals find that their staff members are pouring more than one package of solidifying agent into each container because they don't feel one package is effective enough. This could significantly increase the cost per procedure.
- **Multiply number of canisters used by OR x weight of container (in lbs) x price of RMW per pound x cost for individual solidifier (if applicable) to get total disposal costs.**
- **Multiply number of canisters used by OR x estimated price per canister to get total supply costs.**
- **Add those two figures for total current costs for fluid management in the OR.**
- **Add in any employee health costs related to fluid management if available.** Check in with Infection Prevention or Employee Health to identify any exposures incurred from the existing system for managing fluid waste.

Note: If using a solidifier that contains a disinfectant and your state allows you to dispose of fluid canisters utilizing a solidifier+disinfectant as regular trash, use the cost for SOLID WASTE in the equations above rather than RMW costs. If your facility is doing this, consideration should be given to the perceived risk and potential negative press associated with this material in the regular waste stream

Step 2: Evaluate Your Hospital's Needs Relative to Fluid Management

Before selecting a fluid management system for cost evaluation, there is a need to determine what kind of a system would work best with the current OR set up. This involves looking at several factors. How much floor space is available in the OR—is space always at a premium? Check with engineering—how complicated would it be to plumb in the fluid management system? How old is the hospital plumbing system? Adding new equipment to a faltering plumbing system may not be an ideal solution. Poor suction and drainage may persist. The answer to these questions may point toward either a hard-plumbed version or a portable version. Does “suction power” matter to the surgeon

or staff? If so, this may also determine which type of system the organization decides upon. Wall-mounted units use existing medical vacuums, meaning fluid waste will be drained to the sanitary sewer but suction will not improve. Cart-based systems often have onboard vacuum pumps and can significantly improve suction. Does the hospital perform a lot of orthopedic surgeries? Which fluid management system has the capacity needed to handle complicated orthopedic surgeries? How many ORs does the department have? This is relevant in that if one has multiple surgeries happening simultaneously, the OR may need multiple pieces of equipment to manage suction. While it may not be a one-for-one count of equipment to ORs, more equipment means a greater capital investment. The organization also may want to consider whether it is looking for a solution for just the OR or a facility-wide solution. Different kinds of equipment lend themselves to the OR—where they may be measuring fluid loss more accurately and have the need for larger capacity as compared to patient floors you have small volumes of liquid but a large number of canisters. Some companies offer solutions that meet both needs and in other cases, hospitals have even chosen to use two different models—one for the OR and a different system for patient care areas. As the hospital begins to look at the different models available on the market, keep the answers to these questions in mind.

Step 3. Invite Vendors to Provide a Demonstration

Many suppliers are willing to come onsite and demonstrate their product, as well as provide some basic level of cost-benefit analysis. Pull together a small group—the OR manager, a few key nurses and perhaps even one of the “doubters” (these folks may not want to hear stories about new equipment benefits but seeing it with their own eyes may turn them into believers). While the project team will already have done its homework on some of the basic waste baseline data for suction canisters, vendors often have sophisticated tools and calculators to help run the numbers and estimate the payback period. Ask about the useful life of the equipment. Is this a three year investment, a 5-year or a 10-year? Be sure that the hospital's finance people will want to know these answers.

Step 4. Ask About Ongoing Supply Costs

The unifying element that separates “fluid management systems” from conventional suction canister systems is that they all have some mechanism to drain fluids directly to the sanitary sewer, therefore reducing RMW volume by diverting fluids and dramatically reducing worker exposure risks to bloodborne pathogens from fluid management. Yet different fluid management systems

utilize different parts and supplies. Some systems are canister-less, some have reusable canisters and still others utilize disposable canisters. Some require a disposable manifold or lid that must be replaced for each patient, most require an enzymatic cleaning solution to ensure no build up of residue in containers, while some also require a disinfectant. Even the reusable canister systems have to replace the canisters occasionally. It is important early on to figure these disposable supply costs into future operational costs to run the equipment.

Step 5. Review Local and State Regulations and Permits

The Guidelines for Environmental Infection Control in HealthCare Facilities from the Centers for Disease Control and Prevention, issued in 2003, say sanitary sewers may be used for safe disposal of blood and suctioned fluids, provided local sewage discharge requirements are met, and the state has said this is an acceptable disposal method.¹² Ask vendors to help the organization understand local or state rules pertaining to bulk disposal of blood and body fluids to the sanitary sewer. Vendors will likely be able to walk through the process to contact local or state officials for the permitting or other regulatory oversight guidelines, if applicable. It is important to double check regardless of what vendors say. While these systems are in use all over the country and are a well accepted technology, before the hospital makes any purchase, ensure the local and state water officials have vetted and approved the practice of disposing of bulk blood and body fluids into the sanitary sewer.

Step 6. Business Case and Payback Period

Once the project team has assessed the different fluid management systems, vetted the regulatory requirements, have a sense of the auxiliary supply figures and the lifecycle of the equipment, it will have the data it needs—set against the baseline data—to make the business case to leadership. Help leadership understand the ROI through avoided RMW disposal. While the waste disposal numbers do not typically appear as line items in the OR budget (as waste management is typically billed centrally to EVS or Facility Management), the executive team needs to know there are bottom line savings somewhere in the organization. Point out the avoided supply costs for disposable canisters, tubing and/or solidifiers. Work with the vendor to establish the ROI and payback periods for the equipment and highlight any multi-equipment discounts or rebates. And don't forget to help administrators understand the potential risks and liabilities that manual pouring of suction canister waste may present from an OSHA or worker safety standpoint.

Step 7. Train Staff on How to Use Equipment

Once the purchase has been approved, the equipment will delivered and/or installed. Ensure that the team works with engineering to properly utilize drainage hook-ups and power sources. OR staff will require appropriate training on how to use the equipment appropriately for maximum waste reduction benefit. Likewise, purchasing staff will need to be informed about new ordering practices for fluid management system equipment (canisters, manifolds, tubing or the like). Hold In-Services at the beginning of each shift to demonstrate how the new equipment works. Make the nursing or anesthesia staff practice either reloading the equipment, docking the equipment or other functionality testing that demonstrates comprehension. Suction intensity may be different than previous equipment—some models have adjustable suction levels and independent vacuums, making practice and testing critical from a patient safety standpoint. Hold a more in-depth training and troubleshooting session with a volunteer from each shift to ensure each knows how to operate equipment and can continue to teach and/or correct other staff. Partner with the vendor to provide the most comprehensive and useful training to staff. Additionally, some vendors offer training for service and biomedical personnel as well. Vendor training capacity and support should be written into the sales contract where possible.

Step 8: Troubleshoot Implementation Issues

Fluid management systems are typically an easy equipment upgrade with very few issues related to implementation. There may, however, be occasional setbacks with the new equipment—trouble with docking or drainage or canister replacement. All of that is to be expected when you integrate new equipment and occasionally have training gaps. By following these steps, you've done your best to prevent these minor setbacks, but be prepared. If staff is having difficulty, take the time to retrain and capitalize on the learning opportunity. Make sure staff understand the benefits—both financially and environmentally—of the new equipment. And develop a mechanism to report concerns or problems and appropriate solutions back to all OR staff, so other staff won't encounter the same issues.

Step 9. Track Improvements and Recognize Success

Work with Environmental Services in advance to set up a system to track improvements in RMW reduction coming from the OR. This can be as exact as data from a waste tracking or bar-coding system that specifically identifies OR RMW volumes and fluctuations or an estimate, based on a bi-monthly audit where OR waste is pulled aside and weighed separately. EVS can be very helpful in determining how best to track or estimate waste reductions. Run the math of avoided supply costs due to the transition. Report cost reductions, waste diversion volumes and other environmental or other benefits back to leadership and OR management and keep a running tally of savings to demonstrate payback. Celebrate success! If possible, provide staff with real-world estimates of reduced environmental impact or waste reductions. I.e. avoided disposal of one day's worth of suction canisters translates to a certain number of cars off the road—or other real world examples with which they can connect. Make sure the organization's sustainability leader or green team (if applicable) knows about the success the OR is having, and includes it in any award applications or recognition opportunities.

For More Information: Go to www.GreeningTheOR.org for a list of key resources that assist you in this program area. Because this list is updated often, we keep it online, so as not to date this implementation module. Also available are case studies on fluid management efforts in the OR. Learn from your peers!

Endnotes

- 1 *Safe Options for Suction Canister Waste*. OR Manager. Vol.20. No. 4. April 2004. Accessed on March 7, 2011. Available at: <http://www.orbusmgt.com/catalog/download/ORMVol20No4SuctionWaste.pdf>
- 2 Minnesota Technical Assistance Program (MNTAP). Study on suction canisters
- 3 Barlow, RD. *Proper liquid waste disposal mines solid gold bottom line*. Healthcare Purchasing News. Accessed on March 7, 2011. Available at: http://www.hpnonline.com/inside/2004-06/liquid_waste_disposal.htm
- 4 Ibid.
- 5 *Safe Options for Suction Canister Waste*. OR Manager. Vol.20. No. 4. April 2004. Accessed on March 7, 2011. Available at: <http://www.orbusmgt.com/catalog/download/ORMVol20No4SuctionWaste.pdf>
- 6 Ibid.
- 7 Barlow, RD. *Proper liquid waste disposal mines solid gold bottom line*. Healthcare Purchasing News. Accessed on March 7, 2011. Available at: http://www.hpnonline.com/inside/2004-06/liquid_waste_disposal.htm
- 8 Glasgow, RE et al. The benefits of a dedicated minimally invasive surgery program to academic general surgery practice. *Journal of Gastrointestinal Surgery*. Vol.8, No.7. pp: 869-873. Accessed on March 5, 2011. Available at: <http://www.springerlink.com/index/2721370K415W69R5.pdf>
- 9 *Safe Options for Suction Canister Waste*. OR Manager. Vol.20. No. 4. April 2004. Accessed on March 7, 2011. Available at: <http://www.orbusmgt.com/catalog/download/ORMVol20No4SuctionWaste.pdf>
- 10 National Institute of Occupational Safety and Health, Centers for Disease Control and Prevention. *Glutaraldehyde – Occupational Hazards in Hospitals*. NIOSH Publication No. 2001-115. Accessed on March 5, 2011. Available at: <http://www.cdc.gov/niosh/docs/2001-115/#2>
- 11 Practice Greenhealth. Sustainability Benchmarking Report. 2010. Accessed on Mar 4, 2011.
- 12 *Safe Options for Suction Canister Waste*. OR Manager. Vol.20. No. 4. April 2004. Accessed on March 7, 2011. Available at: <http://www.orbusmgt.com/catalog/download/ORMVol20No4SuctionWaste.pdf>



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Metro Health Hospital, Wyoming, MI: Medical Device Reprocessing



Demographic Information:

Metro Health Hospital is a 208-bed hospital located in Wyoming, Michigan. It serves the Grand Rapids region and surrounding areas. Metro Health offers a broad range of services and specialty services at its facility.¹ Metro Health Hospital has 10 operating rooms for a total OR suite footprint of 8,890 square feet, and performed 12,740 surgeries in 2010.

Executive Summary Statement:

Metro Health has a robust sustainability program and was the first hospital in Michigan to hire a Sustainable Business Officer, in 2006. The hospital is housed in a brand new LEED Certified building that came online in 2008, and was a leader in advancing green building principles in healthcare. Metro Health is also one of a small group of hospitals nationwide inducted into Practice Greenhealth's Environmental Leadership Circle—in 2009. Metro Health had been evaluating a myriad of ways to reduce the environmental impact of its operating rooms (ORs), and reprocessing of single-use devices was seen as a vital part of that focus. Reprocessing allowed the hospital to not only reduce its waste, but also reduce its supply costs for single-use medical devices. The project team consisted of the materials management, the central processing department, OR and Metro's sustainability officer. The initial program, rolled out in 2008 utilized two vendors, one for reprocessing invasive single use devices and the other for reprocessing non-invasive single-use devices. One of the biggest complaints with staff was not knowing which single-use device item went to which vendor. The hospital switched to one vendor in 2010, hoping to increase staff compliance and savings with the new vendor, and increase the amount of material reprocessed. Metro Health realized cost savings of \$75,978 in 2008, \$84,825 in 2009, and \$75,000 in 2010 due to reprocessing of single-use medical devices.

SAVINGS FROM REPROCESSING SUDS

Includes: harmonic scalpels, orthopedic burrs, and orthopedic cannulas/trocars

- | | |
|------------------|-------------------------|
| ■ 2008: \$75,978 | ■ 2010: \$75,000 |
| ■ 2009: \$84,825 | Total: \$235,803 |

The Problem:

Large portions of the waste disposed of by the OR are comprised of disposable medical devices. The OR utilizes some of the most expensive devices across the hospital, with some studies estimating that more than 50% of the OR's budget is spent on supplies.² ORs have increased their use of single-use medical products due to concerns over infection prevention, sterility, and ease of use. It is estimated that single-use devices will grow steadily at 4.6 percent annually reaching \$59 billion dollars in 2013.³ Staff witnessed how these expensive devices were opened, used once and were also aware of the huge volumes of waste leaving the OR. If not reprocessed, many of these devices would have left the hospital as regulated medical waste, which can average \$963 per ton⁴ and have a range of negative environmental and public health impacts through the treatment and disposal process.

Strategy & Implementation:

Metro Health is committed to sustainability and has implemented a variety of efforts since 2000. Tracy Humphreys, Central Processing Department Manager and Jim Jednak, Director of Materials Management, initiated the implementation of reprocessing, and led the team with John Oudshoorn, Director of Surgical Services. The hospital began reprocessing single-use devices in 2008, focusing on sustainability and cost savings. Since then, Metro Health has saved \$235,803 dollars from reprocessing single-use devices. Some of these employees had experience with single-use device reprocessing and were able to lead Metro Health during the implementation phase.

The hospital used the knowledge of Oudshoorn and Humphreys, who collaborated and implemented a medical device reprocessing program at a facility prior to coming to Metro Health, and were the key implementation leaders. Their previous experience was vital in implementing the program at Metro Health. They used the same strategy as in the previous facility and presented to the staff on infection control procedures and the quality assurance process to emphasize the safety of medical device reprocessing. The team eased the transition by arranging for an employee from the reprocessing facility to come to the OR for one week and talk with staff and surgeons. Metro Health held an In-Service to train OR and Central Sterile staff on identifying which materials should be shipped directly for reprocessing, and which required pre-cleaning prior to shipping to the reprocessing facility.

Upfront costs were few when the program rolled out, since Metro Health employees only had to package and ship devices to the reprocessing facility, and Metro Health was not responsible for packaging or shipping fees. The only cost associated with mailing the devices was manual labor, which was minimal. The vendor actually comes onsite to the hospital and collects the devices for reprocessing. Metro trains and educates its staff on identifying which materials should be shipped for reprocessing. Metro Health realized \$75,000 savings in purchasing costs in 2010 by purchasing reprocessed devices. Metro Health estimated that 1.8 tons of waste was diverted from landfills due to reprocessing and realized a \$900 savings from avoiding RMW disposal fees in 2010. The decline in savings in 2010 from years 2008 and 2009 results from items not being reprocessed during the two-month conversion to the new vendor.

Benefits:

- Cost savings of \$235,803 from purchasing reprocessed SUDs between 2008 and 2010
- 1.84 tons of waste avoided due to reprocessing in 2010.
- Avoided \$900 in regulated medical waste disposal fees in 2010.
- Corporate goal: 40% recycle rate

	Reprocessed Devices	Rejected Devices	Customer Yield
Materials Management	2111	550	79%
Babcocks	15	11	58%
Harmonic Scalpel-5mm Coag Shears-Ethicon	1	4	20%
Harmonic Scalpel-5mm Shears	78	25	76%
Lap Instruments/Graspers/Dissectors-COLD	6	6	50%
Lap Instruments/Graspers/Forceps-HOT	2	5	29%
Orthopedic Shaver - Blade	96	125	43%
Orthopedic Shaver - Blade Smith&Nephew 7205305	202	51	81%
Orthopedic Shaver - Blade Smith&Nephew 7205306	12	0	100%
Orthopedic Shaver - Blade, Bonecutter Full Radius	103	0	100%
Orthopedic Shaver - Burr	8	13	38%
Saw Blade-Dual Cut	6	0	100%
Scissor/Grasper Tips	672	0	100%
Shaver ENT Gyrus	53	29	65%
Trocar Complete-Bladed	9	5	64%
Trocar Complete-Bladed-Auto Suture 179094F	345	43	89%
Trocar Complete-Bladed-Auto Suture 179095P	4	0	100%
Trocar Complete-Bladed-Auto Suture 179095PF	43	7	86%
Trocar Complete-Bladed-Auto Suture 179096P	37	3	93%
Trocar Complete-Bladed-Auto Suture 179096PF	1	0	100%
Trocar Complete-Non-Bladed	167	13	93%
Trocar Complete-Non-Bladed-Auto Suture 179075P	0	4	0%
Trocar Complete-Non-Bladed-Auto Suture 179775P	51	16	76%
Trocar Complete-Non-Bladed 11MM XCEL	47	15	76%
Trocar Complete-Non-Bladed 5MM XCEL	37	57	39%
Trocar Reposable Sleeve/Cannula	19	7	73%
Trocar Reposable Sleeve/Cannula-Auto Suture 179101	6	0	100%
Trocar/Cannula-Orthopedic	84	40	68%
Vessel Sealer-LS1020	4	18	18%
Vessel Sealer-LS1037	3	9	25%

Metro Health receives a report from its reprocessing vendor each month that highlights the percentage of devices accepted for reprocessing and those rejected

Challenges and Lessons Learned:

Metro Health initially faced some resistance from surgeons. The team received executive approval to implement the program and the Physician's Chief of Staff signed the approval making the use of reprocessed devices mandatory for all physicians. Engagement of the surgeons earlier in the process would likely have resulted in a smoother transition, and eliminated the need for mandates.

Metro Health is pleased with its performance thus far. In addition to its current SUD reprocessing, Metro Health is currently assessing whether they can reprocess selective endoscopic discectomy sleeves and whether SUD reprocessing can be expanded to the endoscopy services. These services are located in a building that is separate from Metro Health Hospital. Metro Health is committed to reducing waste in all areas of its facility and continues to look for new opportunities.



Perioperative staff at Metro Health showcase instruments collected from the OR for reprocessing.

Endnotes

- 1 "Services | Metro Health." *Expert Care. Made Easy.* | Metro Health. Web. 9 Mar. 2011. <http://www.metrohealth.net/locations/hospital/services>.
- 2 Park, KW and Dickerson, C. *Can efficient supply management in the operating room save millions?* Current Opinion in Anaesthesiology. 2009. Vol. 22. Pp:242–248. Accessed on March 21, 2011.
- 3 "Demand for Disposable Medical Supplies to Increase - Specialty Fabrics Review." *Home - Specialty Fabrics Review*. Web. 19 Mar. 2011.
- 4 Practice Greenhealth. *Sustainability Benchmarking Report*. 2010. Available at: www.practicegreenhealth.org

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University of Minnesota Medical Center, Fairview: OR Kit Reformulation



Demographic Information:

The University of Minnesota Medical Center, Fairview (UMMC), located in Minneapolis, Minnesota, is an academic medical center that offers a full spectrum of health programs and services. The hospital is licensed for nearly 2,000 beds (staffing 887), has 21 operating rooms, and performed 6,135 surgeries in 2010. Through partnership with the University of Minnesota Medical School, UMMC works to provide excellent patient care and to make advancements in the medical field. The staff at UMMC values innovation and strives to provide care for the whole person.¹

Executive Summary Statement:

Dr. Rafael Andrade, a surgeon at UMMC, has recognized the strong link between human health and the health of the environment. Aware of the fact that waste generated from healthcare facilities contributes to pollution, Dr. Andrade was very concerned when he observed that much of the waste from the operating room was unused disposable items. Through the establishment of a voluntary OR green team, Dr. Andrade has been dedicated to improving the health of the environment by working to reduce the amount of waste his procedures generate. Through the systematic reformulation of operating room kits, the team has significantly reduced the unnecessary waste produced during surgical procedures. Reformulation of the OR kits has reduced 5,332 pounds of waste annually, saved the hospital \$81,278 per year and an additional \$1,333 in avoided regulated medical waste disposal costs.

Problem:

Healthcare facilities operate 24 hours a day, 7 days a week, and 365 days a year, generating tons of waste annually. Some hospitals utilize medical waste or solid waste incinerators to treat their waste. The process of waste incineration generates a range of harmful pollutants that can impact human health.² While some waste production is inevitable, much of the waste generated by operating rooms (OR) is unnecessary. Within the tons of trash that accumulate each year there are thousands of unused disposable items.³

THE PROJECT CHAMPIONS:

- *Dr. Rafael Andrade, Thoracic Surgeon*
- *Lynn Thelen, OR Nurse*
- *Crystal Saric, Coordinator of Waste Services and Waste Reduction*
- *Catherine Zimmer, Healthcare Specialist, Minnesota Technical Assistance Program*

Packaged surgical kits containing supplies and equipment for various surgical procedures often contain items that are not used by the OR staff during the operation. Each physician has his or her own preference for which supplies and equipment to use for any given surgery. Beyond surgeon preference for certain items, premade OR kits often contain a variety of items that are not needed. Once the sterile OR kits are opened, unused items from the kits can no longer be considered sterile and are thrown away. These unused items fill waste containers in ORs, add to the cost of waste disposal, and contribute to the environmental impact of the healthcare organization.⁴

Strategy & Implementation:

To reduce the amount of unnecessary waste generated by the OR, Dr. Andrade looked for ways to reduce the use of disposable items in OR kits. The first OR kit Dr. Andrade reviewed was a kit for a port placement procedure for chemotherapy patients. UMMC surgeons perform this procedure over 200 times per year. After reviewing the kit, he reduced the necessary items in the kit from 44 to 27 items. He found that this reduction eliminated 1 pound of waste per case, and saved \$50 per case. The kit reformulation reduced both the cost of supplies and the cost of waste disposal.

In addition to reducing unnecessary items in OR kits, Dr. Andrade has also implemented waste reduction strategies such as using smaller bottles of surgical prep solution and using smaller bottles of sterile saline, which provide the necessary amount of saline for the procedure. These strategies reduce an additional pound per port placement procedure. Dr. Andrade performs around 40 port placement procedures a year. In a year, the OR kit reformulation and waste reduction strategies saved \$2,000, 80 pounds of waste, and 64 pounds of CO₂ emissions.

After realizing the significant impact of OR kit reformulation, Dr. Andrade presented the information to UMMC OR staff, which led to the start of the hospital's first green team in 2009. Dr. Andrade, Lynn Thelen, RN, Catherine Zimmer, who worked with the Minnesota Technical Assistance Program, Crystal Saric, the Coordinator for Waste Services and Waste Reduction at Fairview, and green team members systematically reviewed 38 additional OR kits and identified items that were not used such as gauze dressings, plastic basins, styrofoam trays, plastic cups, and syringes. They collaborated with the vendors of the OR kits and asked them to remove the items.

Saric says that the collaboration with vendors went very smoothly. After identifying the unnecessary items in the OR kits, the team found the representative from the vendor company who handled the OR kits, invited him to a meeting, and let him know that they didn't need certain items. Saric states that the vendor was eager to provide the hospital with what they needed and adjusted the kits accordingly. He was also able to reduce the pricing for certain packs as a result.

Andrade, Thelen, Saric, and the staff were excited to see the huge impact of OR kit reformulation. Reformulation of a thoracotomy pack reduced 606 pounds of waste per year and saved \$12,040 per year. Further review of items in 2010 reduced an additional 1,137 pounds of waste and saved an additional \$10,680 per year. In total, the OR kit reformulation produced a 5,332 pound waste reduction, saved the hospital \$81,278, and an additional \$1,333 in avoided regulated medical waste disposal costs.

EXAMPLE OF OR KIT REFORMULATION:

Neuro Minor Pack

- *Eliminated 5 items*
- *890 pounds of waste reduced per year*
- *\$3,313 saved per year⁵*

When the hospital-wide green team was formed in 2009, members specifically called out the OR as a key target area to reduce environmental impact. Overarching goals for the hospital included: energy reduction, water reduction, waste and raw materials reduction, toxic/hazardous substance reduction, sustainable facilities design, responsible purchasing, and sustainable food systems. The OR kit reformulation project met the green team's goal to reduce waste.

In the past, the supply chain or materials management reviewed the OR kits each year to decide what supplies were needed for each procedure. For this project, Andrade, Thelen, and the green team took the initiative to review the kits. They utilized input from colleagues to make decisions about revisions to the OR kits. The team calculated the savings by physically weighing each and every item on a gram scale to collect waste avoidance data. Next, they compared the cost of the old kit versus the new kit to derive the cost savings.

In addition to the OR kit reformulation, the green team had a nonprofit company called Minnesota Waste Wise come to the hospital to do an audit of hospital-wide waste. The company sorts through a day's worth of waste to evaluate what a facility is actually throwing away. The company pointed out ways that UMMC was missing out on recycling. Following the audit, the green team initiated a recycling program to improve the reduction of waste throughout the hospital.⁶



Items removed from thoracotomy pack as part of kit reformulation process.

Benefits:

- OR kit reformulation at UMMC demonstrated significant cost savings.
- Total cost savings through March 2011 on OR kits (combining University and Riverside Campus) = 10,553 pounds of waste per year and \$116,215 per year directly from OR kit reformulation.
- Reduces the negative impact that the OR has on the environment by preventing 10,553 pounds of waste from being incinerated or sent to a landfill.



Orderly Batal Abdelouahe, OR nurse Lynn Thelen and surgeon Rafael Andrade (left to right) highlighting items recycled by the OR.

Challenges and Lessons Learned:

Although the OR kit reformulation at UMMC produced major savings and greatly reduced the impact of the facility on the environment, the project was not free of frustration. It took a full year for the first pack changes to be put into use. Also, while many calls with vendors were quite productive, other calls, aimed at improving the system ("green calls"), occasionally wound up being a sales call in which vendors would try to sell the OR on a new item. Clearly stating the purpose of these calls up front helped to allay some of these concerns.

With evidence of such success with the OR kit reformulation project, UMMC has begun to look at kits in other areas of the hospital, such as the Women's Center. They have also looked at kits at the hospital's Riverside location.

Endnotes

- 1 University of Minnesota Medical Center, Fairview (UMMC). (2010). *Providing world-class care*. Retrieved February 2011, from http://www.uofmmmedicalcenter.org/fv/groups/internet/@ummc_website/documents/web_assets/c_788376.pdf
- 2 Koch, C. (2006). Do no harm. Retrieved September 1, 2010, from Google Scholar database.
- 3 Chen, I. (2010). In a world of throwaways, making a dent in medical waste. *The New York Times*. Retrieved February 2011, from <http://www.nytimes.com/2010/07/06/health/06waste.html?pagewanted=all>
- 4 Wastage of Supplies and Drugs in the Operating Room: Reduce, Reuse, Recycle, and Restrict. *Medscape*. Retrieved March 2011, from http://www.medscape.com/viewarticle/710513_2?src=emailthis
- 5 Reducing OR Pack Waste PowerPoint Presentation. (April 2010). *Greening the OR Symposium*.
- 6 University of Minnesota. (2009). *Minnesota Technical Assistance Program: Reducing waste from the operating room*. Retrieved March 2011, from <http://mntap.umn.edu/health/resources/142.html>

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The University of Maryland Medical Center: Reusable Textiles in the OR



Demographic Information:

The University of Maryland Medical Center (UMMC) is an academic medical center located in Baltimore, Maryland. The Medical Center is part of the University of Maryland Medical System, which is a private, not-for-profit healthcare network. UMMC provides a full range of health services to the Maryland and Mid-Atlantic community. The medical center is a 757-bed facility, has a staff of 7,500 employees, and has 1,135 attending physicians. The University of Maryland Medical Center has 31 Operating Rooms (OR), 500 perioperative employees, and performed 21,500 surgical procedures in 2010.¹

As one of the first teaching hospitals in the United States, UMMC highly values education, research, and innovation in healthcare. UMMC has received national recognition for patient safety and quality of care. In 2010, the Medical Center received the Trailblazer Award from Maryland Hospitals for a Healthy Environment for its pharmaceutical waste program, which protects patients, employees, and the environment from hazardous substances. UMMC has a full-time sustainability manager who helps the organization integrate a comprehensive set of sustainable healthcare practices across the enterprise.²

Executive Summary Statement:

The University of Maryland Medical Center (UMMC) has been using reusable gowns and basins in their Operating Rooms for 15 years. In 2007, the UMMC staff started a “green team” who works towards decreasing the negative impact that the facility has on the environment. Through green initiatives, the green team aims to help UMMC conserve, reduce, reuse, and recycle. The same year, in an effort to reduce waste and the cost of waste disposal, hospital administrators began to scrutinize the sustainability of the practices throughout the facility. A detailed review of the waste disposal system at the hospital led administrators to find numerous ways to greatly reduce the amount of waste the facility generates.

The sustainability initiative has helped the hospital reduce the amount of waste it generates and has helped divert waste from medical waste incineration. When waste generated by healthcare facilities is disposed of through incineration, harmful pollutants enter the community, contributing to the incidence of chronic illness.³ Through examination of the lifecycle

Leaders who support sustainable health care practices at UMMC include:

- *Vickie Stewart, MBA, Director of Business Operations*
- *Leonard Taylor, AIA, Vice President of Facilities*
- *Denise Choiniere, MS, RN, Sustainability Manager*



Perioperative staff at the University of Maryland Medical Center.

of the products and supplies used at the facility, UMMC staff found that reusable textiles decreased the waste generated in the operating room and reduced the cost of waste disposal, a win-win for the organization.

The Problem:

In 2007, UMMC performed a waste audit and found that the facility produced 10 million pounds of waste annually. They were spending \$1.35 million dollars on waste disposal. In an effort to reduce the cost of waste disposal, hospital administrators began to take a closer look at the waste system in place at the hospital. Around the same time, Victoria Stewart, the Director of Business Operations for Perioperative and Endoscopic Services at UMMC, started a green team, which aimed to improve the environmental footprint of the hospital. The green team conducted a literature review of waste in healthcare facilities and found that a large majority of a hospital's waste comes from the OR. During surgical procedures, items such as gowns, basins, towels, blue wrap,

and canisters get thrown away. With thousands of surgical procedures per year, the hospital produces millions of pounds of waste from the OR alone.

Over the last two decades, there has been a shift to the use of disposable products in healthcare facilities. Partly due to efforts to reduce exposure to Human Immunodeficiency Virus (HIV) and to prevent healthcare-associated infections (HAIs), many hospitals moved away from reusable products.⁴ Today, there are companies that provide reusable textiles, reusable products, and medical supplies to healthcare facilities and specialize in sterilizing the products to protect users from the transmission of disease. Since disposable items often cost less upfront, many healthcare facilities choose to use disposable items and are not aware of the benefits of reusable products. Stewart noted that when they took an in-depth look at the lifecycle cost of reusable textiles, they found that reusable textiles actually cost less than disposables.

Strategy & Implementation:

In 2006, a disposable textiles vendor approached UMMC to try and pitch them on a transition to disposable textiles and medical products. At the time, UMMC was purchasing reusable surgical gowns, drapes, table covers, and basins. Stewart evaluated the proposal and found that when the avoided cost of waste disposal and the cost savings from the return of discarded instruments from the reusable textile company were factored in, the reusable items cost the hospital essentially the same as disposables. However, cost savings from the return of discarded instruments provided UMMC with a significant financial benefit. The reusable products provided the quality and safety factors the organization cared about, while offering a cost differential. Newly armed with a definitive business case, UMMC made the decision to stick with reusable textiles.

UMMC staff considered other factors when evaluating reusable textiles vs. disposables, including staff satisfaction with the comfort of the gowns, as well as the quality and safety of the gowns. The OR staff had been using the reusable gowns for years and they felt confident about the level of

barrier protection and safety the gowns provided. The staff also wanted to do what was right for the environment. UMMC staff realized that the use of reusable items helped reduce the amount of waste the hospital generated and helped divert waste from medical waste incineration. In an interview, Vickie Stewart noted that “with a mission to heal, teach, and discover, UMMC could not contribute to long term chronic illness.”

UMMC collaborates with a service provider to obtain reusable textiles. UMMC uses a company called Synergy Health (formerly SRI Surgical), which provides reusable products and supplies to healthcare facilities and sterilizes and repackages the products at a local plant. The company provides UMMC with surgical gowns, drapes, stainless steel cups, basins, and bowls. The company provides custom made OR packs to UMMC that contain the supplies that physicians prefer for various procedures. Synergy Health delivers items to UMMC daily and picks up used items at the same time. Used items are returned to the plant where they are sorted, cleaned, packaged, and sterilized.⁵

UMMC purchases three different types of reusable surgical gowns. The three types of gowns offer varying levels of protection that adhere to the Association for the Advancement of Medical Instrumentation (AAMI) standards for liquid barrier performance for protective apparel and drapes.⁶ Gowns are selected based on the type and length of surgery and according to the safety guidelines established by AAMI. Each year, UMMC staff reviews the OR packs to ensure that all items in the packs are being used. If items are not being used, they work with the company to remove the unnecessary items and streamline the kits.

In 2010, UMMC avoided disposal of 138,748 pounds of waste as a result of using reusable supplies. The majority of disposable gowns and textiles would have ended up in the regulated medical waste stream. Using the average cost of RMW of \$0.28 per pound,⁷ this amounts to an approximate savings of \$38,800 annually in avoided waste disposal fees. Working with a reusable textile service provider not only reduced the cost of waste disposal, but it also provided the

Factors considered when comparing reusable textiles to disposables:

- *Cost of product*
- *Cost of disposal of product*
- *Staff satisfaction with comfort, quality, and safety*
- *Appropriate barrier protection*
- *Capture of lost instruments*

benefit of the retention of instruments that were mistakenly sent out with the reusable textiles. When hospitals use disposable textiles in the OR, many of these instruments are wrapped in disposable fabric and make their way into the medical waste stream. In UMMC’s case, their vendor is able to collect those instruments and return them to the hospital, providing an estimated savings of around \$39,000 per year.⁸

Benefits:

- Drives staff satisfaction while benefiting patients, employees, and public health.
- Decreased medical waste—diverting 138,748 lbs from medical waste incineration in 2010.
- Generates cost-savings in the form of avoided waste disposal dollars.
- Allows for the collection and return of lost medical instruments—also a hard dollar savings.

Using reusable gowns and basins:

- *138,748 pounds of waste diverted in 2010*
- *1.5 million pounds of waste diverted since 2000*
- *Estimated savings of \$38,800 in avoided waste costs in 2010⁸*
- *Estimated savings of \$722,250 in avoided waste disposal costs since 2000⁸*
- *Average of \$39,000 dollars in returned instruments per year⁹*

A PROGRAM TO ENCOURAGE STAFF:
UMMC offers the “Green on Greene Street” Program to employees. All UMMC employees who take the Green on Greene Street Pledge to go green and to support environmentally sound principles are entered into a monthly drawing to win a stainless steel water bottle

Challenges and Lessons Learned:

UMMC has been using reusable gowns and supplies for 15 years. The 2007 review only reinforced the organization's decision to stick with reusable products. In fact, having found that reusable textiles in the OR has had such a significant impact on the hospital's budget, UMMC is currently looking into converting to reusable textiles in the Labor and Delivery Unit, Interventional Radiology, the Catheterization Lab, and the Electrophysiology Lab. The hospital is also looking into changing to reusable isolation gowns. While waste reduction has been a big focus for the organization, Stewart acknowledges that these efforts need to be backed up by environmentally preferable purchasing, focusing on what kind of supplies are coming into the facility, as well as what leaves as waste. UMMC is also interested in working with their supply chain vendors to reduce packaging on the front end, which will also have an impact on the facility's environmental footprint.

Endnotes

- 1 University of Maryland Medical Center (UMMC). (2011). About the University of Maryland Medical Center. Retrieved February 2011, from http://www.umm.edu/center/fact_sheet.htm
- 2 UMMC. (2010). UMMC goes green. Retrieved March 2011, from <http://www.umm.edu/green/trailblazer10.htm>
- 3 Koch, C. (2006). Do no harm. Retrieved September 1, 2010, from Google Scholar database.
- 4 Tieszen, M.E. & Gruenberg, J.C. (1992). A quantitative, qualitative, and critical assessment of surgical waste: Surgeons venture through the trash can. *The Journal of the American Medical Association*, 267, 2765-2768.
- 5 SRI Surgical. (n.d.). Reusable surgical gowns. Retrieved March 2011, from http://www.srisurgical.com/solutions/sol_reusable_gowns.php
- 6 Association for the Advancement of Medical Instrumentation (AAMI). (2011). About AAMI. Retrieved March 2011, from <http://www.aami.org/about/>
- 7 Conrardy, J., Hillanbrand, M., & Nussbaum, G.F. (June 2010). Reducing Medical Waste. *Association of Perioperative Registered Nurses Journal (AORN)*, 6, 711-721.
- 8 Cost-savings estimated using average cost of RMW at \$0.28 per lb per Conrardy, J., Hillanbrand, M., & Nussbaum, G.F. (June 2010). Reducing Medical Waste. *Association of Perioperative Registered Nurses Journal (AORN)*, 6, 711-721.
- 9 Personal Communication, SRI Surgical. March 21, 2011.

Updated January 2013: More information on Synergy Health (formerly SRI Surgical) can be found at www.synergyhealthplc.com.

Practice Greenhealth would like to thank intern Ms. Maria Nix, RN, MSN for her great work in producing this case study.



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Inova Fairfax Hospital: Regulated Medical Waste Reduction and Minimization



Demographic Information:

Inova Fairfax Hospital is a 900-bed Trauma 1 community hospital located in Falls Church, Virginia. The hospital is part of the Inova Health System, a large integrated delivery network of 5 hospitals with 1,700 beds and 16,000 employees. Inova Fairfax has received the prestigious Magnet status for nursing excellence and was recently named one of the “50 best” hospitals in the nation for 2010 by HealthGrades. Located on the Inova Fairfax campus, the Inova Fairfax Hospital for Children offers a level 3 Neonatal Intensive Care Unit and a full range of specialized health services for infants, children, and adolescents. Inova Fairfax has received national recognition for providing excellent and innovative medical care in a wide range of health areas.¹ Inova Fairfax has 29 operating rooms and performed 19,402 inpatient and 16,362 outpatient surgeries in 2010.²

Executive Summary Statement:

Since 2007, a cultural shift has taken place at Inova Health System. Dr. Ravi Gupta, a physician at Inova Fairfax Hospital, recognized the impact that the healthcare industry has on the environment and human health. He felt concerned about the excess waste and improper disposal of waste at the hospital and encouraged Inova leadership to pay closer attention to the impact their facilities had on the environment. With Dr. Gupta's encouragement, and support from the Chief Executive Officer (CEO), leaders and staff at Inova Health System began a journey that has completely transformed the culture of Inova Health System to one of environmental consideration. A combination of efforts, such as creating a position dedicated to sustainability, starting a system-wide environmental committee, and starting “green teams”, led to the successful change of the hospital's culture. Through the implementation of practices that focus on waste minimization and proper segregation of waste, along with green practices such as Environmentally Preferable Purchasing (EPP), recycling, and Health Information Technology (HIT), Inova Health System has reduced over 1 million pounds of regulated medical waste from 2009 to 2010, saving over \$200,000, and has become a sustainable healthcare leader.

PROJECT CHAMPIONS:

- *Seema Wadhwa, Sustainability Manager*
- *OR Directors and Leaders*
- *Environmental Services*
- *Green Team*

The Problem:

Regulated medical waste (RMW) has to be treated in order to meet safety requirements established by regulatory agencies before it can go to a land-fill.³ Various waste treatment technologies, such as chemical treatment or incineration, can have significant negative impacts on the environment and human health by contributing to pollution. The disposal of RMW not only has the potential to produce harmful effects on the environment and human health, but it also costs 6-10 times more than the disposal of regular solid waste.⁴ While proper treatment of RMW is necessary to ensure safe waste disposal, many non-infectious items such as computer paper, cardboard boxes, clean medical supplies, packaging, and even unused supplies end up in RMW containers.⁵

In 2007, Dr. Ravi Gupta noticed that there were many ways that Inova Fairfax could cut down the amount of waste generated at the facility. At the time, the hospital had not yet begun a recycling program. Many recyclable items were ending up in both solid waste and regulated medical waste streams—driving up the cost of waste disposal. Administrators at Inova Health System knew that they needed to focus on appropriate waste segregation and that the organization had lots of opportunity to remove non-infectious items from the infectious waste stream. Inova Fairfax staff was unaware of how improper segregation of waste impacted the hospital's budget, the environment, and public health.

Strategy & Implementation:

When leaders at Inova Health System became aware that they needed to begin to focus on reducing the organization's environmental footprint and decrease the amount of waste the

facility generated, they realized that this would require a culture change at the organization. In order to change the culture of the entire health-care system, they needed to create a position specifically dedicated to environmental sustainability. The organization brought Seema Wadhwa on board as a consultant in 2008 to lead the transformation to a sustainable organization.

Setting the foundation for the sustainability initiatives at Inova Fairfax, in 2007, Dr. Gupta and Randy Kelley, the CEO of Inova's Loudoun Hospital, started a system-wide environmental committee. The environmental committee members, including Cindy Kilgore, the Assistant Vice President of Materials Management, were dedicated to raising awareness of healthcare-related environmental issues and facilitating efforts to "go green". In addition to the environmental committee, Inova has green teams at each hospital who help engage employees in sustainable healthcare practices. As part of the waste reduction and minimization efforts, Inova Fairfax implemented a recycling program in the OR and educated staff about proper waste disposal and segregation. Seema noted that the implementation of the single-stream recycling program was key to employee engagement.

One of Seema's early targets was the Operating Room (OR). She chose the OR as a starting place for several reasons, including the fact that, conveniently, all of the waste from the OR goes to one place, the OR is a manageable size, and research demonstrates that a large percent of a hospital's overall waste comes from the OR.⁶ Seema began by holding an In-Service for the OR staff to raise awareness about the impact of OR waste on the environment.

The implementation of sustainable practices in the Inova Fairfax OR began with a survey of the OR environment. Seema talked to staff to understand how logistics worked in the OR. She spent time in the OR to survey practices and procedures, to decide where recycling containers could be placed, and to analyze how the recycling program would work.

Next, Inova Fairfax conducted a detailed audit of Regulated Medical Waste (RMW) coming out of the OR. During the waste audit, the contents of the RMW bags were analyzed. Seema found that the RMW bags contained, predominantly, packaging material. When they weighed the waste coming from the OR, they found that the OR produced over 900 lbs of RMW daily. Inova Fairfax had learned from Practice Greenhealth (PGH) that 15% RMW was the industry best practice for RMW as a percent of total waste. Seema knew that the OR's RMW percentage was higher than it needed to be.

After analyzing the waste coming from the OR, Seema began an education campaign for staff. Seema held an In-Service to educate the OR staff about how their waste disposal practices impacted the hospital's budget, the environment, and human health. The In-Service pointed out to staff why they should care about the waste they generated. Referencing research that demonstrates a direct link between healthcare practices and chronic illness in humans, the short training enlightened the OR staff about the impact their practices had on human health. The In-Service included a review of the facility's waste disposal policy, which describes where staff should put each type of waste: RMW (red bag waste) and regular solid waste. The training pointed out that non-infectious items were ending up in RMW containers. The In-Service enlightened staff about the cost savings that recycling offers. Lastly, it included a call to action and a reminder that the OR staff are the last line of defense for the segregation of waste.

Auditing waste from the OR prior to implementing waste minimization and segregation practices:

- 907 lbs of RMW from the OR daily.
- The cost of RMW from OR was \$85,000 annually.⁷

Auditing waste from the OR after implementing waste minimization and segregation practices:

- 738 lbs of RMW from the OR daily.
- 170 lbs per day drop in 6 months.
- Cost savings of over \$15,000

Three to six months after the In-Service, Seema followed up with the OR staff and re-analyzed the waste coming from the OR. She found that there was a 19% reduction of RMW. The education of staff helped decrease the amount of packaging in RMW containers and decreased improper disposal of items in RMW containers. The recycling program had helped divert non-infectious waste from RMW. Additionally, the OR staff had begun to collect clean, unused supplies for donations to charity.

Benefits:

- Reduction of red bag waste by 19%
- Decreased over 1 million pounds of RMW across the system from 2009-2010



During a waste audit of the OR, Inova Green Team members highlight items unnecessarily placed in the red bag.



Many of the items identified in red bag waste during the waste audit were packaging.



ORs at Inova Fairfax are now equipped with containers for solid waste (clear), linen (blue), regulated medical waste (red) and recycling (green).

IMPROVING THE ACCOUNTABILITY OF OR STAFF:

As a way to improve the proper segregation of waste, the Green Team members from the OR (using proper personal protective equipment) pulled out recyclable items from the regular solid waste containers to show the staff what items could have been recycled.

A PROGRAM TO ENCOURAGE STAFF:

*To improve waste minimization and segregation efforts, Inova started **The Oscar Award Program**. Designed to encourage staff to properly segregate waste, the program involved weighing carts of Regulated Medical Waste from each department of the hospital. The staff that had been the most compliant with waste segregation won the Oscar Award—a stuffed Oscar the Grouch.*



Challenges and Lessons Learned:

Creating and sustaining change at Inova Fairfax required communication, auditing, monitoring, process improvement, and education. Changing the overall culture of the organization was key to the successful implementation of sustainable practices. Seema noted that challenges of the waste minimization and segregation project included the consideration of all waste disposal regulations and ensuring that hospital policies were updated and clarified to outline the new practices.

Endnotes

- 1 Inova Health System. (2011). *Inova Fairfax Hospital*. Retrieved March 2011, from <http://www.inova.org/patient-and-visitor-information/facilities/inova-fairfax-hospital/index.jsp>
- 2 Best Hospitals-Inova Fairfax Hospital. (2011). US News and World Report. Retrieved on March 20, 2011 at: <http://health.usnews.com/best-hospitals/inova-fairfax-hospital-6340490>
- 3 EPA. (2011). *Waste Disposal*. Retrieved March 2011, from http://www.epa.gov/region7/waste/solidwaste/waste_disposal.htm#medical_waste
- 4 Hospitals for a Healthy Environment. (2003). *Regulated medical waste reduction: 10 steps to implementing a regulated medical waste reduction plan*. Retrieved March 2011, from <http://www.h2e-online.org/docs/h2e10steprmw20103.pdf>
- 5 Wastage of Supplies and Drugs in the Operating Room: Reduce, Reuse, Recycle, and Restrict. *Medscape*. Retrieved March 2011, from http://www.medscape.com/viewarticle/710513_2?src=emailthis
- 6 Conrardy, J., Hillanbrand, M., & Nussbaum, G.F. (June 2010). Reducing Medical Waste. *Association of Perioperative Registered Nurses Journal (AORN)*, 6, 711-721.
- 7 Wadhwa, S. (2011). Regulated Medical Waste Segregation in the OR. Greening the OR PowerPoint presentation.

Practice Greenhealth would like to thank intern Ms. Maria Nix, RN, MSN for her great work in producing this case study.



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Spectrum Health: Medical Plastics Recycling in the OR



Demographic:

Spectrum Health, a not-for-profit health system located in Grand Rapids, Michigan, has the largest multi-specialty physician group in West Michigan. Spectrum Health includes nine hospitals and more than 170 service sites. In 2010, Spectrum Health was recognized as a Top 10 Health System by Thomson Reuters.¹ Spectrum Grand Rapids, consisting of Blodgett Hospital, Butterworth Hospital, Helen DeVos Children's Hospital, and ambulatory care sites, has a total of 1,065 licensed beds, and 29 operating rooms totaling 18,875 square feet. The organization conducted 4,764 surgical procedures in 2010.

Executive Summary Statement:

Three years ago, Spectrum Health hired a sustainability coordinator, Josh Miller, as part of its efforts to become a more sustainable organization. One of the first areas the system wanted to address was recycling. Spectrum Health's goal was to reduce its overall waste stream by 30% by 2010 focusing on regulated medical waste reduction and recycling efforts at the Butterworth and Blodgett Hospitals.² The system was already recycling and wanted to build on its recycling program. The operating room (OR) was a large-scale generator of waste and generated significant volumes of plastic—none of which were being recycled at the time. Medical plastics had not traditionally been collected for recycling. The system—under Miller's leadership—reached out to its recycling hauler and explored the potential to recycle a variety of different clean medical plastics being generated in the OR. Spectrum Health was able to work with its vendor to implement a rigorous recycling program within the operating rooms of the health system that saved the organization money while reducing waste and environmental impact.

The Problem:

Generating between 20 percent and 33 percent of total waste in a hospital, the OR is one of the largest contributors of general and regulated medical waste.³ ORs have increased their use of single-use medical products due to concerns over infection prevention, sterility, and ease of use. It is estimated that single-use devices will grow steadily at 4.6 percent annually reaching \$59 billion dollars in 2013.⁴ Each one of these products comes



OR Staff and Josh Miller (center) roll out the medical plastics recycling program in the OR.

Spectrum's focus on waste reduction across the organization has yielded dramatic results:

- 15% reduction in solid waste between 2007 and 2010
- 40% increase in recycled materials between 2007 and 2010
- 32% reduction in regulated medical waste between 2007 and 2010
- 8% reduction of total waste between 2007 and 2010

wrapped in packaging that must also be disposed of. Blue wrap alone is estimated to comprise 19 percent of surgical waste.⁵ It is made of polypropylene and is used to protect and cover sterilized instrument trays in the OR. Blue wrap is not reusable since the material cannot sustain sterilization, and recycling of this plastic has traditionally been difficult. Spectrum Health began a single-stream recycling program in 2009 in the system's Butterworth Hospital and Blodgett Hospital facilities. Spectrum Health's recycling program was able to grow considerably, once the system was no longer required to separate recyclables.

Single stream recycling was vital in the OR for a number of reasons. The OR had limited space and single stream recycling would reduce the number of recycling containers since all recyclables could now be placed into one container. Training staff to recycle would be easier as well. Miller knows of a hospital outside of Spectrum Health System that increased its recycling rate to 55% upon implementing single stream recycling. Miller is confident that Blodgett and Butterworth Hospitals can also achieve this rate from their current recycling rates of 31% and 19%, respectively.

Strategy & Implementation:

Gail Greco-Bieri, Support Staff Educator and Supervisor in the OR, reached out to Spectrum Health's new sustainability coordinator in 2007 with an idea to reduce styrofoam usage. Once the two met, they collaborated and brainstormed to determine opportunities to reduce the waste generated by the ORs. In evaluating the make-up of waste being disposed of by the OR, together they realized that much of the waste was clean plastics generated during procedure set up, which was not only clean but overwhelmingly plastic. Miller was in the midst of working with Spectrum's recycling hauler to evaluate whether the system could move to single-stream recycling. As part of this dialogue, he reached out to the hauler and asked whether he would be willing to review the plastics being generated by the OR and determine if any were recyclable. Spectrum Health's vendor is very progressive and often presents new recycling opportunities to the organization and welcomed the opportunity to work with the system to address this issue.

Miller and Greco-Bieri worked with the OR staff at Spectrum Health's Butterworth Hospital—the organization's largest hospital—to collect clean plastic waste from several surgical set ups. These items were then shared with the hauler, who was able to correctly identify the types of plastics and determine whether there was an available recycling market for each. Miller and Greco-Bieri were thrilled to learn that many of the clean disposable plastics in the OR were recyclable, including polypropylene blue wrap, plastic casing, hard plastic from devices, paper lined with plastic, plastic from surgical gowns, outer casings of syringes, soft plastics from glove wrappers, rigid saline bottles, wash basins, and surgical preparation kits.

Butterworth & Blodgett Waste Stream 2007-2010

Component					
Year	Solid Waste	Recycle	RMW	Hazardous	Total Waste (tons)
2007	72.25%	15.04%	9.59%	0.12%	4,068
2008	74.47%	18.88%	6.47%	0.18%	3,988
2009	74.68%	19.39%	5.77%	0.16%	3,724
2010	69.92%	22.87%	7.08%	0.13%	3,743

While there are typically some hauling fees for managing recyclables, there is often a rebate on materials as well, which can result in a break-even or sometimes a small cost-savings. One also has to consider that any waste diverted into recycling is no longer going into either the regulated medical waste stream (RMW) or the solid waste stream, which also can help the organization realize avoided disposal costs. In Spectrum's case, it already had a strong regulated medical waste (RMW) segregation in place, which meant much of this waste was being diverted from solid waste rather than RMW. In a typical organization where the ORs have not yet focused on comprehensive RMW segregation, waste avoidance savings can be markedly higher as these plastics are mostly being diverted from RMW rather than solid waste.

Spectrum's hauler confirmed that he had a market for the majority of medical plastics being generated in the OR and that he could begin collection immediately. As part of the new program, the hauler was also able to recycle the blue sterile wrap—often a difficult recyclable—and was willing to accept the material with the indicator tape still attached. Often the indicator tape can be considered a contaminant—especially if it contains lead. Spectrum's vendor then separates the blue wrap and sells it, where it is then melted and used in the manufacture of skids and soda bottles.

Miller and Greco-Bieri reached out to the organization's Environmental Services Director to determine proper collection receptacles in the OR and a collection schedule. The program started at Blodgett and Butterworth, and then expanded to the system. They placed 32-gallon recycling containers in each operating room and in other areas like the intake area and the post-anesthesia care unit. The supply core area was implemented with the 23-gallon, Slim-Jim® container. They purchased green bags that stood out from other waste streams to collect recyclables—tying in with the organization's green recycling bins. EVS staff picks the waste up every hour. As a result of the surge in recycling, EVS was picking up two bags, instead of one, which challenged their labor capacity.

The sustainability team emphasized that the process for recycling needed to be easy to maximize staff participation and support. Staff needed to know how to divert plastics and which plastics to divert through various channels. The Green Team created posters with visuals to avoid any confusion. They held In-Services with staff and sit-downs with nurse managers. The sustainability coordinator makes a yearly OR-specific sustainability presentation discussing new opportunities to engage the OR staff. The responsibility of recycling is placed with staff members and not patients. Furthermore, Spectrum staff members undergo training where they learn the connection between negative environmental impact and public health, as a way to tie employees to the work.



OR team at Spectrum sorts clean medical plastics to be diverted for recycling.

Challenges and Lessons Learned:

Spectrum emphasized that education prior to rolling out a new program is key. Staff members are more willing to support the effort when they have knowledge of the reasons behind the process changes. The health system also indicated that the implementation plan is more likely to succeed if a system is in place that is easy and simple for people to follow. The Environmental Services staff faced challenges due to a lack of full-time employees to pick up the additional bags generated by the surge in recycling. The recycling program continued to grow but available labor did not. While the department is still challenged from a labor standpoint, it has been able to stretch and make the new initiative work for the organization. The success of the medical plastics recycling initiative has also built momentum within the OR, and is driving nurses to recognize new opportunities for sustainable practices within the operating room.

Benefits:

- 42,000 pounds of blue wrap diverted to recycling in 2010
- Also recycling plastic casing, hard plastic from devices, paper lined with plastic, plastic from surgical gowns, outer casings of syringes, soft plastics from glove wrappers, rigid saline bottles, wash basins, and surgical preparation kits
- 100 bags per day diverted from OR
- Recycling cost half as much as general waste
- Increases staff satisfaction relative to reducing environmental impact of the OR

Endnotes

- 1 "Who We Are Grand Rapids, Michigan (MI) - Spectrum Health." *Spectrum Health Systems | Grand Rapids, Michigan (MI) Hospitals*. Web. 8 Mar. 2011. <http://www.spectrum-health.org/body.cfm?id=1563>.
- 2 "AccessKent | Public Works." *AccessKent | Official Website of Kent County, Michigan*. Web. 19 Mar. 2011. http://www.accesskent.com/YourGovernment/PublicWorks/dpw_success_stories.htm.
- 3 Roy K. Esaki, MD and Alex Macario, MD. "Wastage of Supplies and Drugs in the Operating Room." *Medscape Anesthesiology*. Accessed on April 20, 2010 at: <http://www.medscape.com/viewarticle/710513>
- 4 "Demand for Disposable Medical Supplies to Increase - Specialty Fabrics Review." *Home - Specialty Fabrics Review*. Web. 19 Mar. 2011.
- 5 Laustsen, G. *Greening in Healthcare*. Nursing Management. November 2010. Vol. 41, Issue 11. Pp: 26–31. Accessed on March 11, 2011.

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MetroWest Medical Center, Natick & Framingham, MA: Rigid Sterilization Containers for Surgical Instrumentation



Demographic Information:

MetroWest Medical Center is a 269-bed regional health care system including two hospitals, and an outpatient diagnostic imaging and rehabilitation center. MPMC is the largest health care system between Worcester and Boston, Massachusetts. MPMC offers training programs that are affiliated with leading medical schools and teaching hospitals in Boston.¹ MetroWest has 16 operating rooms taking up 17,956 square feet, and performed 10,565 surgical procedures in 2010.

Executive Summary Statement:

MetroWest has been slowly growing its sustainability program over the past several years as a result of several passionate employees. In 2010, MetroWest's parent company, Vanguard Health Systems, created a sustainability role for the system. Dr. Amy Collins, a physician at MetroWest and chair of MetroWest's sustainability committee, was named to the role.

MetroWest became interested in the concept of reusable sterilization containers is when the Manager of SPD (Sterile Processing Department) decided to decrease the use of disposable blue wrap as a cost saving measure. After MetroWest's Resource Coordinator returned from the Greening the OR Symposium in April of 2010, the SPD Manager, the Resource Coordinator, and Dr. Collins worked together to implement the containers as a cost savings and green initiative.

After framing the benefits for leadership, \$75,000 dollars in capital was allocated for the purchase of reusable hard cases. 211 containers were purchased with the allocated dollar amount. Projections for savings from the program included a 5-year savings of \$84,000 and a 10-year savings of \$233,000.

The Problem:

Blue sterile wrap is a major contributor to waste generated in Surgical Services and is estimated to comprise 19% of surgical waste.² This wrap product, as indicated by its name, is clean and sterile when it enters the OR. It is typically removed and disposed of during the case set-up and in hospitals where good regulated medical waste (RMW) segregation programs don't yet exist—makes its way into the regulated medical waste stream. RMW is an extremely costly waste

THE PROJECT IS BEING LED BY:

- a supervisor at each campus,
- the organization's sustainability leader,
- the Sterile Processing Department Manager; and
- the Resource Coordinator for Surgical Services.

stream—estimated to cost between 6-10 times more than solid waste to manage.³ MetroWest began looking for opportunities to reduce its environmental footprint in the OR, and as a high volume material and significant supply cost, blue wrap was a natural target. An alternative to sterilization of instruments in blue wrap is the use of rigid reusable containers for sterilization. Instruments are then stored in these hard cases until they are needed for surgery. The containers are then reused for sterilization and storage of the instruments for the next case. After learning about reusable hard cases, the hospitals then had to convince administrators to allocate the capital to purchase the hard cases. The green team leadership and Dr. Collins were able to work with administration to allocate \$75,000 in capital to purchase a set of 211 reusable hard cases.

Strategy & Implementation:

211 cases were purchased in May of 2010 for \$75,000 and another \$66,000 has been allotted for the upcoming fiscal year. As a result of purchasing the hard cases, the operating room has been able to significantly reduce its purchase of blue sterile wrap and the volume of waste it generates. MetroWest Medical Center was able to save an estimated \$29,843, in avoided blue wrap purchase and avoided waste disposal fees, and reduce its waste stream by 5,606 lbs of disposable blue wrap in 2010 as a result of transitioning 66% of its surgical instrumentation to reusable rigid containers in the OR. This represents close to a 40% payback on the containers in just 12 months. Today, almost 66% of surgical procedures at MetroWest utilize reusable hard cases.

Where blue wrap is still required, the organization came up with an innovative solution and partnered with a company to use the collected blue wrap for the manufacture of patient bags. MetroWest worked with BolderPath to manufacture items for patient use made from recycled blue wrap. After producing one batch of the small tote bags, MetroWest did not consider the endeavor profitable. However, the organization still collects the wrap and is looking at other options.

The Sterile Processing Department (SPD) worked with Surgical Services to determine appropriate placement for the reusable hard cases, as they can take up more space than blue-wrapped supplies. They met with the vendor to size the containers and prioritize what kits would go into containers. Once the containers arrived, the SPD staff transitioned the wrapped kits into the containers and sterilized as a complete unit. When the case cart is packed, the hard case is added to the cart. In the OR, instruments are unpacked for procedure set up. The cases go back to Sterile Processing after the case, where instruments are cleaned and repacked and the case re-sterilized for repeat use.

At the same time as the transition, the organization was also working on a Lean project to improve the flow of supplies to the OR. The timing of the two projects was synergistic and hard cases were soon organized in the sterile supply area. The program did not start as a Lean initiative but was incorporated into Lean success. The staff was also able to create sets with the hard cases instead of having single wrapped items, decreasing turnover time in SPD. MetroWest also recognized less missing instruments by having a container to which they needed to return items. MetroWest has a good relationship with its vendor for the rigid cases, contributing to its successful efforts. MetroWest was able to approach its supplier about the program, share its budget, and the vendor was able to recommend an appropriate solution. The containers were purchased all at once. The Lean specialists at MetroWest supported the use of reusable containers since MetroWest realized a better workflow, increased utilization, and realized more efficiency. MetroWest focused on implementing the containers at one campus first, but purchased all the reusable containers for both campuses at once.

Benefits:

- Increased workflow and utilization
- Created new patient products from blue wrap
- Good working relationship with vendors
- Reduced waste volume in the OR
- Cost-savings from avoided waste disposal fees and avoided supply costs for blue sterile wrap

Challenges and Lessons Learned:

The transition to reusable surgical containers has been successful in the OR at MetroWest. Key factors to consider in implementation are container storage and educating staff on the new process. The organization did explore expansion of the program to the emergency department (ED), but experienced significant challenges. Implementing containers in the ED would result in higher costs because the blue wrap serves a dual purpose. In the ED, the blue wrap becomes a drape over the table during procedures. Eliminating the wrap would create an additional cost for the drape and add steps to the current procedure. While the organization is still looking at ways to use these containers in the ED, it has not yet been able to address this challenge.

Endnotes

- 1 "About Us: Metro West Medical Center." *Metro West Medical Center*. Web. 9 Mar. 2011. <http://www.mwmc.com/about-mwmc.aspx>.
- 2 Laustsen, G. *Greening in Healthcare*. Nursing Management. November 2010. Vol. 41, Issue 11. Pp: 26–31. Accessed on March 11, 2011.
- 3 Hospitals for a Healthy Environment. (2004). *Regulated medical waste reduction: 10 steps to implementing a regulated medical waste reduction plan*. Retrieved March 2011, from <http://www.h2e-online.org/docs/h2e10stepmw20103.pdf>

Practice Greenhealth would like to thank intern Ms. Anuja Deo, MBA Candidate in Healthcare Management at George Washington University for her great work in producing this case study.



SPD staff at MetroWest highlight the rigid sterilization containers used in the OR and Sterile Processing.



The new reusable containers meet all of the hospitals' sterilization needs while significantly reducing its use of blue wrap.



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North Suburban Medical Center: Fluid Management in the OR



Demographic Information:

North Suburban Medical Center (NSMC) is a 157-bed, acute-care hospital in Thornton, Colorado. As a cornerstone facility in the HCA-HealthONE® system, the largest provider of health-care services in the nation, North Suburban employees are committed to providing outstanding, high-quality patient care to the growing population of families living in north Denver. The hospital currently has 6 operating rooms and is undergoing a surgical services expansion.

Executive Summary Statement:

NSMC staff works to carry out the mission of the hospital by searching for ways to grow and improve their facility. This includes ensuring a safe workplace for staff while also reducing the environmental impact of the organization. NSMC staff had recently struggled with the safe management of fluid waste in the Operating Room (OR). The OR staff had experienced problems with the previous fluid management system and wanted to find a safer way to manage fluid waste in the OR. Dedicated to ensuring the safety of patients and employees, NSMC recently purchased the Stryker Neptune Fluid Management System for the hospital's 6 ORs. The new system has not only addressed the safety concerns of the organization, but it has also reduced waste, while meeting all of the needs of the OR doctors, nurses, and anesthesiologists.

The Problem:

During a surgical procedure, OR staff suction blood, body fluid, and other fluid waste from the patient using a suction device. Hospitals use various systems for managing this fluid waste. Fluid management systems such as wall suction canisters and closed system suction devices collect surgical fluid waste in the OR. At NSMC, the OR staff ran into various problems with the previous fluid management system in which wall suction canisters were used. The wall suction canisters were only available in a limited variety of sizes. During a surgical procedure, the suction canisters would occasionally fill up, forcing the OR staff to empty the canisters, risking exposure to potentially infectious fluid waste. Additionally, the wall suction canisters had poor suction strength, and did not allow anesthesiologists the chance to accurately measure the fluid loss from the patient.

THE TEAM INVOLVED IN THE DECISION MAKING PROCESS:

- Phil Jaklich, Director of Surgical Services
- OR nurses
- Anesthesiologists
- OR physicians

Phil Jaklich, Director of Surgical Services at NSMC, along with the orthopedic service line nurses, doctors, the urology department, and anesthesiologists wanted a safer and more precise way to manage and measure fluid waste in the OR.

In addition to the need for a safer and more precise way to manage fluid waste in the OR, NSMC management wanted to find ways to reduce the amount of waste the hospital generated. With the previous fluid management system in the OR, an isolizer—which solidifies fluid waste, was added to the contents of the suction canister, adding to the cost of waste disposal. The solidified waste was then disposed of as Regulated Medical Waste (RMW). NSMC treats their RMW in an onsite autoclave and then sends treated waste to the landfill.

Strategy & Implementation:

In an effort to reduce the amount of Regulated Medical Waste the facility generated, NSMC started a recycling program and in 2009, initiated the new fluid management system in the OR. In 2010, NSMC purchased three of the Stryker Neptune Fluid Management Systems. The equipment is a closed fluid waste management system. The system is comprised of a mobile device that collects surgical fluid waste without operator assistance, precisely measures the fluid, and then safely and properly disposes of the fluid to the sanitary sewer through a docking mechanism. The closed system protects OR staff and patients from exposure to bloodborne pathogens from fluid waste.¹



Perioperative staff at North Suburban—modeling the new equipment.

The system uses an integrated canister that never has to be replaced. Compared to disposable suction canisters that need to be replaced for each surgery, the integrated canisters save the hospital on the cost of supplies. The Neptune system cleans itself after the system is emptied. A combination of water and enzymatic cleaner are rinsed through the canisters, thoroughly cleaning the system in 3-5 minutes.² The system uses a disposable manifold that is replaced after each patient. This is the only waste that enters the RMW waste stream related to fluid management. Each manifold weighs just 53g—it would take 77 of the disposable manifolds to compare to the weight of just one full 3-liter disposable suction canister.³ The Neptune 2 also has a built-in smoke evacuator—an additional equipment benefit.

In order to meet NSMC goals for fluid management to increase safety of OR staff, precisely measure surgical fluid waste, and to decrease Regulated Medical Waste, NSMC began to survey various types of closed fluid management systems. OR doctors, nurses, the OR Director, and

anesthesiologists wanted a fluid management system with stronger suctioning capability, a system that could precisely measure fluid waste, and a system that was mobile. After review of several systems, the OR Director, Phil Jaklich purchased three of the Neptune Fluid Management Systems. The system was selected because it had all of the features that met the agreed upon goals of the team involved in the decision making process.

After NSMC purchased the systems, a team from Stryker came to NSMC to work with the hospital's engineering department to properly install the plumbing for the system. Stryker had the new wastewater line approved by the city and provided all of the materials necessary for installation. A representative from Stryker also held an In-Service to educate and train the OR staff on how to use the new system. Likewise, the Stryker representative trained the anesthesiologists on how to read the measurement of the fluid waste. The educator for the OR and the OR Charge Nurse are also responsible for helping to train new staff on how to use the Neptune system.

The Neptune system is only emptied when it is full, which helps speed turnover time of the OR in between surgeries. The dock for the system is located in the soiled utility room and connects to the wastewater line. All OR staff participating in docking the system. At the end of each day, and anesthesia technologists follow up to make sure that the system has been docked.

Benefits:

- The new system offers more volume capacity for surgical waste than suction wall canisters.
- The system precisely measures fluid waste increasing the safety of the patient.
- The system has a smoke evacuator and smoke detector.
- The system is self-cleaning and decreases the risk of staff exposure to bloodborne pathogens.
- The system reduces RMW related to fluid waste.

SINCE STARTING TO USE THE NW FLUID MANAGEMENT SYSTEM, NSMC HAS HAD:

- *zero staff exposure to fluid waste from splashing*
- *zero slips from fluid spills*
- *zero electrical hazards from fluid spills*



The new fluid management systems stand ready for use.

Challenges and Lessons Learned:

The implementation has been fairly smooth with no significant challenges arising. The pay-back period for the new system was 4 years. However, Phil Jaklich noted that the benefits of the Neptune system, including staff satisfaction, staff safety, and reduced spills were immediate. NSMC uses the three Neptune systems in all 6 ORs. They plan to purchase two more Neptune systems in 2011.

Endnotes

- 1 Stryker. (2010). *Stryker Neptune 2*. Retrieved March 2011, from <http://www.stryker.com/en-us/products/OREquipmentConnectivity/GeneralMultiSpecialtyEquipment/WasteManagement/Neptune2/index.htm>
- 2 Stryker. (2007). *Neptune 2 Ultra Brochure*. Retrieved March 2011, from www.stryker.com
- 3 Personal Communication, Nate Miersma, Portfolio Manager, Stryker Corporation. March 2011.

Practice Greenhealth would like to thank intern Ms. Maria Nix, RN, MSN for her great work in producing this case study.



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Providence St. Peter Hospital, Olympia, WA: Energy Efficiency in the OR— HVAC Setback Program



Demographic Information:

Providence St. Peter Hospital is a 340-bed, not-for-profit hospital. The campus consists of 157 acres with 835,323 square feet hospital, 53,000 square feet medical office building, and 12,000 square feet visitor hotel.¹ The facility offers comprehensive medical, surgical, and behavioral health services. Located in southwest Washington, the hospital serves a growing population in the five-county area. Providence St. Peter has 11 ORs and performed 8,300 surgeries in 2010.

Executive Summary Statement:

Providence St. Peter Hospital is part of Providence Health System, a 29-hospital integrated delivery network spanning 5-states in the Pacific Northwest. Providence Health System has been focusing for several years on how to rein in its energy use across the system. The system has benchmarked through Energy Star, and has a corporate director of sustainability who works with the individual facilities to set energy efficiency targets and goals. Providence St. Peter Hospital (SPH) identified the operating room (OR)—with its requirements for 15 air changes per hour, as a potential candidate for energy savings. SPH set out to reduce energy in the OR through an HVAC setback program. The hospital added two new ORs in addition to its existing nine. The new ORs can be controlled individually and have been the catalyst for multiple projects relating to energy efficiency. The project helped Providence St. Peter Hospital save energy while focusing on the thermal comfort of the clinical staff. The project payback was less than 1 year.

The Problem:

It is estimated that 30.1% of all health care outlays are related to surgical expenditures such as supplies and equipment.² The OR is also incredibly energy intensive. It has the highest air change requirements of any area within the hospital and uses high level filters to reduce particulates—both of which drive electricity and natural gas costs through the HVAC system. The OR also uses a variety of energy intensive equipment including medical gas vacuum pumps, diagnostic and monitoring equipment, and surgical lighting. Despite the fact that most ORs are often empty between the late evening and early morning hours, hospitals often keep the air changes the same no matter if they are occupied or unoccupied.



The operating room is one of the most energy-intensive departments in the hospital, requiring 15 air changes per hour for existing ORs built before 2010..

HVAC OCCUPANCY SENSOR LIGHTS

Estimated annual savings:

- 25,000 kWh or \$2,000
- 2,460 therms or \$2,091
- Project cost to implement was \$3,300

Thus, return on investment is less than 1 year

Nine of the eleven ORs at SPH were not able to utilize the occupancy sensor technology; the rooms were either all on or all off due to antiquated HVAC controls. The addition of two more ORs that could be controlled individually offered an opportunity to decrease SPH's energy use and increase its Energy Star rating. SPH maximized energy efficiency in the operating room through installation of HVAC setback programming.

Strategy & Implementation:

SPH recognized that in order to maximize energy savings across the OR department, the best scenario is to have individual control of each OR room. Originally, the hospital created an OR night setback system for the original nine ORs. The system consisted of a mushroom button at the main desk of the nine original ORs. The staff was required to hit the button in the middle of the night when the OR went down for the night—typically between the hours of 12AM and 5AM for SPH. The HVAC system would then reduce its output from fifteen air changes to six air changes per hour during that time frame, resulting in a 60% setback. The system was rejected after five months due to concern that staff would not remember to turn the system on before surgeries, risking patient safety. In order to implement additional energy efficiency measures in the OR, the sustainability team had to assure the surgical staff that they would not have to push the mushroom button or add any extra steps to their routine.

The staff instead decided to move forward with installing occupancy sensors for the two new ORs that were tied into the HVAC system. If no motion is detected for 60 minutes, the HVAC system goes into unoccupied mode and moves down to 6 air changes per hour.

SPH's Sustainability Coordinator, Keith Edgerton applied for grants from Puget Sound Energy to fund the individual controls package to dial back the HVAC system in the OR. Puget Sound Energy did award the hospital funding for its project and supplied \$55,000 for the front-end investment for the total HVAC efficiency project: \$22,494 for the HVAC fan and \$32,506 for the night setback controls. The \$3,300 occupancy sensor cost, including labor and equipment, was an out-of-pocket cost for SPH.

Three operating engineers were responsible for implementing the new sensors. They added two ceiling mounted infrared occupancy sensors to each of the two new ORs. Each sensor operated independently so that only one sensor must detect motion to turn on. The occupancy sensitivity was set at the high setting and a delay of three minutes was set before the HVAC system started

up when the occupancy sensor detected motion in the room. The delay ensured there was human activity in the room. Sensors were mounted kitty corner to each other and had uninterrupted visual access to each entrance. The staff installing the sensors verified that none of the ceiling-mounted equipment obstructed the views of the doors to affect the sensors. If the sensor did not detect any activity for 60 minutes, the HVAC system goes into unoccupied mode. As a safety feature, a red flashing light was installed outside each OR. The red light flashes to signal that the HVAC system is not on.

The new system did manage to achieve the 60% setback in the two newly wired ORs. Reducing air by 60% in the two ORs when the OR is unoccupied 47% of the time results in a 25,000 kWh energy savings and \$2,000 dollar cost savings, and an additional 2,460 therm energy savings and \$2,091 cost savings. SPH pays \$0.08 dollars per kWh of electricity and \$0.85 dollars per therm of natural gas..

Benefits:

- 25,000 kWh or \$2,000
- 2,460 therms or \$2,091
- Occupancy sensors and high efficiency fan would save \$4,992 (62,400 kWh) annually if all 11 ORs functioned the same way
- OR's energy usage is 1% of SPH's total energy usage

Challenges and Lessons Learned:

SPH spent years trying to increase efficiency in its ORs through a variety of methods. The new occupancy sensors tied into the HVAC system were a success and Providence is interested in implementing this technology in other hospitals across the system. There are 10 Providence hospitals in Washington and Montana that participate on the Sustainability Board and all plan to or have already adopted the practice of individually digitally controlling the HVAC for their ORs. The occupancy sensors are also being used in the catheterization laboratories. Ultimately, the hospital wants to tie



Perioperative staff looking at new occupancy sensors for HVAC setback programming.



Keith Edgerton, Sustainability Coordinator for St. Peter Hospital and Providence Southwest Washington Service Area

the HVAC system to the evacuation pump (EVAC) system by adding a variable frequency drive (VFD) to make the system work. Surgeons need to turn the EVAC system on to perform surgery. Linking the systems together would trigger the EVAC to turn down when not in use. Since the EVAC uses a lot of energy, linking the systems would result in a cost savings as well.

St. Peter Hospital attributes much of its success with the new technology to knowing the system would work before implementing it. The staff recognizes the importance of having surgical staff trust them that nothing will go wrong after the new system is implemented. In the future, SPH may also consider a shorter wait period before dialing down the HVAC, as 60 minutes can be excessive and a lesser duration might still ensure safety while also decreasing additional energy use.

Endnotes

- 1 "Providence St. Peter Hospital." *Providence Health & Services*. Web. 8 Mar. 2011. <http://www2.providence.org/southwest-washington/facilities/providence-st-peter-hospital/Pages/default.aspx>.
- 2 Kranich, D. and Byrd, J. "How to Increase Efficiency in the Operating Room." *Surgical Clinics of North America*. Volume 76, Issue 1, Pages 161-173, 1 February 1996. Accessed on 4Mar 2011. Available at: [http://www.surgical.theclinics.com/article/S0039-6109\(05\)70429-1/abstract](http://www.surgical.theclinics.com/article/S0039-6109(05)70429-1/abstract)"\ "bib13

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