U.S. ARMY PUBLIC HEALTH CENTER

TIP NO. 37-005-0521

ALTERNATIVES TO MEDICAL BLUE WRAP DISPOSAL

PURPOSE.
To provide technical information for implementing two alternatives to disposing polypropylene sterilization wrap by using reusable sterilization containers and repurposing/recycling used sterilization wrap.

REFERENCES.
See Appendix A for a list of references.

BACKGROUND.
Sterilization wrap (commonly called "blue wrap") is a single-use polypropylene (#5 plastic) material used in medical facilities during the sterilization process, and it covers and transports sterilized items prior to use. Blue wrap waste is most commonly generated in operating rooms (OR), where it is used to encase sterilized surgical instruments. It is used for its properties of strength, resistance to tearing and moisture, and ability to act as a barrier to contamination. The most common brand is KimGuard® One-Step® sterilization wrap. Blue wrap is typically disposed as solid waste following medical procedures, or may be mistakenly managed as regulated medical waste where poor segregation procedures exist.[1]

Management of used blue wrap is an issue facing medical facilities today, as they try to decrease waste generation, increase sustainable purchasing, and reduce their environmental footprint. Blue wrap makes up a significant portion of a hospital's waste stream, making up an estimated 19% of the solid waste generated from surgical services (EPA 2002), and over half the total volume of disposable plastics leaving the OR (Brannen 2011). It is estimated that a 600-bed hospital generates 42 tons/year of blue wrap (IRN 2009). Blue wrap waste can be reduced by substituting reusable sterilization containers or by diverting it from the waste stream. Diversion may include repurposing or sending used blue wrap to a plastic recycling facility to be processed into feed material for the manufacturing of new products.

CASE STUDY 1

One medical facility that performs more than 10,000 surgical procedures annually purchased over 200 reusable cases. Staff projected a 5-year savings of $84,000, based on initial results (PGH 2020). Savings were attributed to avoided disposal fees and avoided supply costs for blue wrap. Benefits noted were improved workflow and an overall reduced waste volume in the OR.

ALTERNATIVE 1. REUSABLE STERILIZATION CONTAINERS
Waste reduction strategies typically target single-use items for replacement with more durable, reusable products. Sterilization containers may be composed of anodized aluminum, stainless steel, or plastic, some with disposable filters. After the container's usable life, local programs may accept them for recycling. Because the container is reusable, it will reduce the amount of solid waste generated and reduce or eliminate the need for purchasing blue wrap. It may be the most preferred alternative in that it is considered source reduction, which is at the top of the waste management hierarchy.

[1]Rarely will used blue wrap meet the definition of infectious/regulated medical waste—only if dripping/saturated with blood or other bodily fluids.

Sterilization containers must meet the American National Standards Institute/Association for the Advancement of Medical Instrumentation (ANSI/AAMI) standard ST77:2013/(R)2018, *Containment Devices for Reusable Medical Device Sterilization*. They must also be U.S. Food and Drug Administration (FDA)-certified for the use according to section 510(k) of the Federal Food, Drug, and Cosmetic Act, and must be compatible with the hospital's sterilization equipment and storage limitations.

Costs and savings from reusable sterilization container systems will vary; hospitals can choose between many systems to replace different sizes of blue wrap at widely varying prices. The disposable filters are the main recurring cost. One hospital spent the same amount to purchase steel hard cases as was spent in 1 year on disposable blue wrap, thereby reducing blue wrap use by an estimated 70% (Allen 2011). Assuming an average price for one sheet of blue wrap is $1.56 (various manufacturers, sizes, and thicknesses) (Amazon 2021), the cost of a single reusable sterilization container should be less than $1.56*x*, where *x* is the number of times the container can be reused. Actual blue wrap costs may be lower. Purchasing personnel should substitute the actual cost of blue wrap and determine the container's advertised reuse potential in these calculations.

CASE STUDY 2

Sterilization container system advantages noted by one hospital are reduced solid waste generation, easier tracking of instruments, better protection of equipment and supplies, and reduced instrument set preparation time (Allen 2011). Sterilization container system disadvantages are higher initial cost and increased storage space requirements.

ALTERNATIVE 2. REPURPOSING OR RECYCLING BLUE WRAP

A second alternative to address blue wrap waste is to divert the waste once it has been generated—through repurposing or recycling. Repurposing is defined as keeping a product's original form, but using it in for a different purpose. In the case of blue wrap, some companies have found ways to make new products, such as tote bags used for patient belongings or as promotional items. Some blue wrap suppliers include programs for repurposing or recycling the material after use, and will link customers with partners and provide staff training at no charge (see Case Study 3).

CASE STUDY 3

Blue wrap supplier Halyard Health® assists medical facilities in managing both clean and used OR surgical wrap through a recycling program called Blue Renew. Through this program, more than 400 U.S. hospitals divert over 4 million pounds of blue wrap from landfills annually. Free services include onsite consulting, staff training, and performance tracking (HealthTrust 2021).

Medical facility supply chain managers or green team members should check with the blue wrap supplier to determine whether these services exist and are feasible.

Recycling blue wrap for plastic feedstock reduces waste from blue wrap disposal as well as the pollution associated with manufacturing virgin plastic feedstock. To be recycled, blue wrap must not be contaminated with infectious or other regulated medical waste, hazardous materials, or other plastic waste. It should be collected in dedicated containers that are easily cleaned (or disposable), do not interfere with clinical/surgical operations, and are not too bulky or too heavy to be moved safely. For

example, one Army hospital that collected blue wrap in the OR used the following process. After instrument trays were opened, clean blue wrap was placed in designated blue bags and taken to a collection point in the Sterile Processing Department. Installation recycling personnel collected the bags and then baled the material at the recycling center to prepare for sale.

Recycling and repurposing advantages are waste reduction, decrease in waste disposal costs, achievement of waste diversion goals, and contribution to manufacturing feedstock. Disadvantages may include the need for separate collection containers in the OR, and extra storage space in the hospital for a bulky waste previously discarded as solid waste. In addition, it will be necessary to provide education for staff to ensure proper segregation.

Challenges to blue wrap recycling include the need to change existing waste management procedures that may be performed by contractors (including environmental services or contracted waste management companies).

Hospital staff should work with the host installation and/or contact the waste collection contractor to determine whether there is a charge for additional pickups or to amend an existing contract to include the collection of blue wrap. It is not recommended that a medical facility undertake sorting, baling, transporting, and developing agreements for the sale/purchase of used blue wrap to a vendor or Materials Recovery Facility. The labor, time, equipment, fuel, capital investment, and other resources needed would not likely produce a return on investment, due to poor recycling markets and China's 2018 decision to stop accepting plastic recyclables from the U.S. and other countries. In addition, tenant facilities on an installation are not permitted to operate separate recycling programs if the installation runs a Qualified Recycling Program (QRP) (DA 2008).

Recycling blue wrap may be cost effective if the hospital (or installation) is billed for solid waste based on actual weight and can benefit from cost avoidance of waste disposal. Savings are harder to obtain if solid waste collection/disposal services are billed based on container number and capacity, unless an entire container can be eliminated or downsized. The ability to receive recycling revenues for blue wrap is based on a number of factors, including whether or not the host installation has a recycling program that will accept the blue wrap and can receive funds from its sale. The installation's QRP will usually not allow funds from recycling sales to be returned directly to each generating activity; those funds must first be used to cover program recycling costs.

RECOMMENDATIONS.

Source reduction is the first step in the pollution prevention hierarchy. Determine whether reducing the use and generation of blue wrap (by purchasing reusable sterilization containers) is a viable option. In calculating costs, use the price per sheet of blue wrap that the hospital is currently paying.

Coordinate with your host installation environmental office, your supplier of blue wrap, and/or the solid waste contractor to identify and partner with those willing to take used blue wrap for repurposing and/or recycling.

Seek commitment from upper management, environmental services, and the sustainability manager to pursue alternatives to blue wrap disposal. Ultimately the OR/clinical staff will

implement the program, so any procedures should be vetted through them. Recruit a dedicated champion for the effort.

Consider partnerships wherever possible. Examples are coordinating with hospital supply companies to transport the collected blue wrap in their supply trucks (that would otherwise leave the hospital empty), and connecting with other hospitals in the area to increase the amount of blue wrap offered to recyclers.

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Appendix A

References

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U.S. Code. 2011. "Federal Food, Drug, and Cosmetic Act," Title 21, Chapter 9.