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AST Guidelines for Environmental Practices in the Operating Room

Introduction

The following Guidelines for Best Practices were researched and authored by the AST Education and Professional Standards Committee, and are AST approved.

AST developed the guidelines to support healthcare delivery organizations (HDO) reinforce best practices in environmental practices as related to the role and duties of the Certified Surgical Technologist (CST®), the credential conferred by the National Board of Surgical Technology and Surgical Assisting (NBSTSA). The purpose of the guidelines is to provide information OR supervisors, risk management, and surgical team members can use in the development and implementation of policies and procedures for environmental practices in the surgery department. The guidelines are presented with the understanding that it is the responsibility of the HDO to develop, approve, and establish policies and procedures for the surgery department regarding environmental practices according to established HDO protocols.

Rationale

The following are Guidelines for Best Practices related to *environmental* or *sustainability practices* in the surgery department, often referred to as “*going green*”. U.S. HDOs continue to be responsible for the disposal of over four billion pounds of waste annually making the healthcare industry the second largest contributor to waste behind the food industry.^{16, 17} Surgery departments are the leader in medical supply usage; they are estimated to be responsible for approximately 33% of a hospital’s supply costs.³² OR and labor and delivery waste account for approximately 30% - 70% of a HDOs waste.^{10, 14, 20} The volume of waste in the OR is primarily due to the volume of disposable or “single-use” products. The reasons for the use of disposable items revolves around issues of sterility, infection control, ease of use, and most importantly the push by manufacturers who discovered a method of continuous revenue.²⁵ The following are the principal categories of waste typically generated by HDOs:^{23, 34}

- Solid waste: General trash that is non-regulated medical waste.
- Liquid waste: Liquid waste in the OR is comprised of blood and body fluids that are typically collected in disposable suction canisters. One study found that suction canisters make-up 25% of regulated medical waste at HDO’s and a second study estimated that up to 40% of surgical waste consisted of suction canister disposal.^{6,}

- **Pharmaceutical waste:** The regulatory oversight of pharmaceutical waste has increased and therefore, it is important for HDOs to manage the proper disposal methods of this waste. Additionally, some states have established strict guidelines for pharmaceutical disposal including Florida, Minnesota, Washington, and Washington, D.C.
- **Anesthesia waste:** Anesthesia waste significantly contributes to the waste stream. A study conducted by Western Hospital in Australia discovered that the anesthesia waste stream contributed to 25% of the total OR waste and that 60% of the anesthesia waste is recyclable.^{14, 19}
- **Regulated-medical waste (RMW):** Also referred to as “*other potentially infectious material (OPIM)*”, this is the biohazardous waste that must be red-bagged; it is regulated by states, but is also addressed by OSHA’s Bloodborne Pathogens Standard.
- **Universal waste:** The Environmental Protection Agency (EPA) established the Universal Waste Rule; under this rule specific hazardous waste items, such as batteries and bulbs, are not as strictly regulated and do not have to be included in the HDOs total hazardous waste poundage to encourage recycling of these waste materials.
- **Recyclables:** Waste that can be converted into reusable material that includes cardboard, glass, medical plastics, metal and paper.

The “challenge in the health care setting is how to creatively find ways to support sustainability amidst handling large amounts of hazardous or infectious medical waste while ensuring patient safety” as well as the safety of those that handle the waste such as environmental service personnel.¹⁶

However, many HDOs across the nation including academic medical centers (AMC), which make up approximately 22% of U.S. HDOs, are adopting green practices to stem the tide of waste. For example, approximately 23% of U.S. HDOs are reprocessing medical equipment, referred to as single-use devices (SUDs), to decrease the annual tonnage of RMW that is generated.^{17, 39} This also translates into important cost savings that can be quickly realized when purchasing reprocessed SUDs as compared to new devices; reprocessed devices cost between 40-60% less than the original device.²⁴ The Hospital Corporation of America (HCA) has 163 hospitals; in 2010, HCA saved \$17.6 million by reprocessing SUDs and prevented 298 tons of waste being placed in landfills.³² This provides HDOs the ability to reinvest the savings toward improving patient care, as well as help lower the cost of healthcare and significantly reduce the volume of RMW.³⁷ This should also catch the attention of AMC’s that provide over 40% of charity care in the U.S. in which the net savings can help to cover the costs associated with providing unpaid healthcare services.¹⁷

The introductory numbers and information is provided to place an additional urgency upon the importance of the following Guidelines and their adoption by HDOs. OR personnel must continue their duty of care to the patient by providing efficient, safe services that help to lower healthcare costs as well as reaffirm their commitment to society as a whole in reducing RMW.

Evidence-based Research and Key Terms

The research of articles, letters, nonrandomized trials, randomized prospective studies is conducted using the Cochrane Database of Systematic Reviews and MEDLINE®, the U.S. National Library of Medicine® database of indexed citations and abstracts to medical and healthcare journal articles.

The key terms used for the research of the Guidelines include: diethylhexylphthalate; environmental practices; general waste; going green; infectious waste; other potentially infectious material (OPIM); sustainability practices. Key terms used in the guidelines are italicized and included in the glossary.

Guideline I

HDOs, manufacturers, governments, non-governmental organizations, and the private sector should adopt the World Health Organizations core principles for management of healthcare waste.

1. The adoption of safe and sustainable practices of managing RMW is a responsibility of all who are involved in the finance and support of providing healthcare to the public.⁴³ This includes manufacturers that should consider waste management practices as related to the development and sales of their products and services.⁴³ The following are excerpts from the WHO recommendations; however, all organizations, businesses, and institutions should become familiar with the document in its entirety in order to adopt the recommendations.
 - A. Non-governmental organizations should include the promotion of sound healthcare waste management in their advocacy.
 - B. The private sector should take responsibility for the sound management of healthcare waste associated with the products and services they provide, including the design of products and packaging.
 - C. All concerned institutions and organizations should promote sound healthcare waste management; develop innovative solutions to reduce the volume and toxicity of the waste they produce and associated with their products; ensure that global health strategies and programs take into account healthcare waste management.

Guideline II

The HDO should organize a Green or Sustainability Leadership Committee (SLC) that is responsible for overseeing the green efforts of the HDO.^{14, 15}

1. The committee should have representatives from the following departments and/or professions: physician(s); surgical technology; environmental services; infection control; laboratory (and its subdivisions such as the blood bank and pathology); materials management; purchasing; radiology; pharmacy; nursing; safety.^{14, 15, 30, 38}
2. HDOs may want to consider forming subcommittees that would be responsible for reporting to the SLC.
 - A. The subcommittees may be based upon departments such as Surgery Department, Central Sterile Supply Department, Environmental Services Department, Radiology Department, and so forth; the supervisors/directors

from departments responsible for implementing sustainability programs at the department level and ensuring their operation on a day-to-day basis.³

- B. Another option is subcommittees based upon the sustainability effort such as energy, purchasing, RMW, and water, or building systems such as HVAC, plumbing, electrical and waste.
3. The first important steps the SLC should take is assessing what types of waste the HDO produces, the volume of each type of waste that is produced, the cost of the disposal of each type of waste, and who is responsible for tracking and managing the waste stream. Appendix A provides a simple assessment checklist; however, it is recommended that surgery departments also utilize the Practice Greenhealth *Greening the Operating Room™ Checklist*.^{15, 34}
 - A. The HDO may find that multiple people are responsible for tracking and managing specific types of waste, and do not coordinate their efforts that leads to unnecessary duplication of those efforts.
 - B. Only by identifying the types, amounts, and costs for waste removal, and generating historical reports can the HDO move onto the next step of setting goals and tracking the sustainability efforts of the HDO.
 - (1) The baseline assessment of costs should include fuel surcharges, container rental fees, sharps management fees, and any other separate fees related to waste management.³⁰
4. The second step of the process is goal setting that takes into consideration the employee, financial, and technical support, as well as time resources of the HDO.³¹ The goals can be quantitative or qualitative, but they must be measurable and reportable to HDO administration in order to assess the “green” progress of the HDO. For example, the industry standard for RMW disposal rates is 15% or less; the HDO may set a goal of reducing RMW to less than 20% within one year and 15% or less in 18 months.^{22, 30, 31}
 - A. The following are recommended goals as related to the surgery department that can be communicated by the SLC to the surgery department subcommittee who is the operational team that executes the achievement of the goals.³
 - (1) Develop an effective recycling program in the surgery department within 12 months; the goal should be to achieve a recycling rate of 15%.³³
 - (2) Promote conservation of water, particularly at the scrub sinks (see Standard IX for additional information).
 - (3) Reduce the amount of RMW to less than 20% within one year.³³
 - (4) Promote energy conservation through the use of energy-efficient light bulbs (see Standard IX for additional information).
 - (5) Reduce hazardous chemical use by 5% within one year.
 - (6) Increase use of recycled products by 10% within one year.³³
 - (7) Increase use of reprocessed SUDs by 10% within one year (see Standard of Practice VI for additional information).
 - (8) Implement the use of reusable sharps containers in every OR within 12 months (see Standard of Practice X for additional information).³³

5. The next step of the SLC and surgery department subcommittee is to develop action plans that include the methods and strategies for achieving each goal.
6. Continuing education (CE) and training is a critical factor to the success of a waste management program. Establishing sustainability efforts and segregation of waste does not involve learning new technology, but is focused on changing the behavior of the surgery personnel in order to meet the goals of the HDO.³⁰
 - A. CE in-services should be developed and offered by the surgery department subcommittee for initial and on-going training purposes. Additionally, it is recommended that the subcommittee distribute training materials such as posters placed in each OR, and written documents and updates distributed via E-mail. The training can also be used to create “buy-in” by the surgery personnel in the sustainability efforts of the department.
 - A. Surgery personnel require clear, consistent information that provides them with the goals of the sustainability program; reasons for waste segregation that are backed by regulations; information on the impacts to the health and safety of the community and overall environment; HDO’s environmental leadership in the community; and financial aspects.¹⁵
 - B. Continuing education in-services allow the surgery department subcommittee to communicate the action plans to the surgical staff.
 - C. The education should be an on-going effort to reinforce the sustainability efforts of the HDO as well as introduce new green practices in the surgery department.
 - B. The following is a list of recommendations for areas of focus regarding continuing education.
 - A. New employee orientation should include training in the waste management program.³⁰
 - B. Basic information about healthcare waste and its impact on the HDO, environment, and safety.¹⁵
 - C. Basic information about the HDO’s overall waste management plan.
 - D. Each surgery department employee’s role and responsibility in participating in the waste management plan.¹⁵
 - E. Initial and annual training of all surgery personnel in waste segregation.
 - F. Updates in the progress of the surgery department’s participation in the sustainability efforts.
 - G. Updates and review of state and federal regulations (annually or when necessary).
7. The surgery department subcommittee should establish a process through which surgical staff can communicate issues and problems to the subcommittee who will then communicate the information to the SLC. This also contributes to building a positive environment of overall team participation in the green efforts.

8. The SLC should be responsible for gathering the data on the sustainability performance of the surgery department in order to make informed decisions about the waste reduction and recycling programs.
 - A. The SLC should use the waste and recycling data to measure and report on the sustainability performance to the HDO leadership and surgery department manager. The data should be used to identify improvements that can be made to the sustainability efforts and communicate the changes to the surgery department subcommittee who is responsible for initiating the improvements.
 - B. The data should also be used to identify the *environmental practices* that are working and therefore, require no changes.
 - C. The waste and recycling data should be used to gain HDO administrative approval for the support of conducting additional cost-benefit analysis of new or expanded waste reduction and recycling programs.³³
 - D. The information provided by the data should include a breakdown of the savings in cost to demonstrate to HDO administration the value of investing in sustainability practices.
 - E. The waste and recycling data should be used by the HDO to renegotiate its solid waste contracts.³³
9. The SLC should develop public relation and communication strategies.
 - A. Market the HDO's environmental/sustainability efforts to the community. The HDO's Public Relations Officer should be responsible for contacting local newspapers, radio stations, and community groups about the sustainability efforts as well as scheduling press hearings and interviews. The HDO should be a local/regional industry leader that other organizations turn to for information on how to implement sustainability efforts.
 - B. As part of the staff educational programs, communicate the successes and achievements of the program in order to emphasize that it is the work of the staff in which these achievements have been made possible. The information can be provided during in-services, posted on the HDO web site, published in the HDO monthly newsletter, and posters placed throughout the facility.
10. The SLC should be responsible for applying for grants and awards.

Guideline III

ORs should establish policies and procedures for ensuring the correct segregation of waste to reduce the volume of RMW.

1. A primary barrier to recycling is the failure to separate *infectious waste* from *general waste*.¹⁹ The primary goals of waste segregation should be "keep it as simple as possible" and segregate the waste at the point of generation.^{15, 30} By identifying the types and volume of waste generated in the surgery department it will assist in determining the types of containers needed, placement of the containers in convenient locations, and training needs of the surgery personnel.³⁰
 - A. Proper container sizes, placement and signage are critical to the waste segregation program succeeding.³⁰ The following recommendations assist in the success of the waste segregation program.³⁰

- (1) Containers for red bags must be covered to prevent cross-contamination in the event a bag is unknowingly compromised and to prevent solid waste carelessly tossed into the container.
 - (2) Often solid waste containers must be larger in size as compared to RMW containers and should be placed next to the RMW containers.
 - (3) Educate surgery personnel in the segregation of paper-based products. The surgery department is a significant source of cardboard packaging (e.g., glove boxes, equipment boxes, supplies such as back table packs that are delivered in manufacturer's boxes). Surgery personnel should be aware that paper and cardboard cannot be recycled if it becomes wet; therefore, the paper and cardboard must be kept separate from wet items such as saline bottles.^{14, 38}
 - (4) Use as small of a container as possible based upon the waste generation reports in order to decrease costs.
 - (5) Use containers that can be quickly opened by using a foot pedal and are wheeled for easy movement that prevents personnel injuries due to lifting heavy containers.
 - (6) All containers for solid waste, RMW, SUDs for reprocessing, and donations should be color coded. The colors should be easily distinguishable from each other and their use standardized throughout the HDO.^{14, 38}
 - (7) The biohazard label should be displayed on all RMW containers.
 - (8) Signage should be posted directly above the containers as well as on the lids of the containers. The signage should be large enough to be easily read and if necessary, use multiple languages to optimize communication. The signage should be consistent in wording, symbols, color and size.¹⁴
 - (9) Solid waste containers should be frequently emptied to prevent overfilling that could result in the improper use of the red bag container.
 - (10) All containers must be leak proof.¹⁵
2. Surgery personnel should know the five categories of medical waste that require different disposal procedures based on federal guidelines: general waste (eg, paper and unsoiled linens), infectious and pathologic (eg, tissues and body fluids), pharmaceuticals, radioactive waste and sharps.
 3. CSTs must properly segregate waste in the OR during every surgical procedure.
 - A. The CST should know the criteria for separating waste into clear bags (noninfectious waste) and red bags (infectious waste).¹⁵ Additionally, the CST should know the criteria for separating reusable textiles, such as gowns, back table and Mayo stand covers, from disposable items.
 - (1) Approximately 90% of red-bag waste is improperly placed, most likely due to not knowing and/or understanding the segregation criteria.^{16, 17} Only those items that are visibly soiled with blood or bodily fluids should be disposed of in red bags. For example, a

CST is setting up the sterile back table and Mayo stand but the case is cancelled; the disposable gown, gloves, back table cover, etc. can be thrown away in the clear bag (or donated – see Standard of Practice IV).

- (2) By following the criteria the CST can contribute to significant savings. For example, it is estimated that 40% of RMW from ORs is packaging material that should be placed in a clear bag.⁸ If the amount of packaging material placed in red bags was reduced, the volume of RMW could decrease by approximately 15%.¹⁶
- B. The Surgery Department should implement a simple system to ensure the waste is properly segregated in each OR. Most recyclable waste is generated pre-incision when items are opened and prepared before the procedure begins.^{25, 30} The following recommendations help to decrease the volume and expense of waste.
- (1) One method is to line the waste hamper with a clear bag as the OR is being set up and prior to the patient being transported into the OR, remove and close the clear bag to prevent the entrance of infectious contaminants, and replace with a red bag.^{14, 20, 38} However, the clear bag must remain in the OR until the procedure is completed.
 - (2) Second method is to line the waste hamper with a red bag and place a clear bag within the red bag; prior to the patient being brought into the OR, remove and close the clear bag, and set aside in the OR.²⁵
 - (3) The two methods described above allow the surgery team to have a red bag readily accessible for the disposal of RMW that is generated during the surgical procedure.³⁰

Guideline IV

Surgery departments should implement the use of reusable textiles and basins to lower the amount of RMW that is generated and the associated costs of purchasing and disposal of single-use items.

1. Reusable textiles have been improved over the years; they are technologically advanced textiles that are lab tested and required to meet strict barrier performance standards. HDOs are taking several factors under consideration when making the decision to switch to reusable textiles including feedback from surgeons and CSTs who are increasingly expressing a preference for reusable gowns due to improved thermal comfort, barrier performance and ease of donning and removing versus disposables.¹²
2. Surgery departments should complete a comparative analysis of the cost of disposables versus the cost of reusable surgical gowns, surgical textiles, and basins.²⁶
 - A. The analysis of the cost should include the following variables:
 - (1) In-house inspection and repair of reusable textiles.
 - (2) Reprocessing costs including laundering in-house or contracting with a vendor. The most important factor the HDO should take

into consideration is the environmental impact of laundering operations including water and energy efficiency and use of environmentally friendly laundry chemicals.²⁶

- (3) The initial cost of purchasing reusable textiles is typically higher than the cost of a disposable; however, the cost analysis may reveal that after the initial investment the HDO, over a period of time, realizes a cost savings with the reuse of the textiles.²⁶
 - (4) The HDO should evaluate the steps in the supply chain for the process of ordering and delivering sterile disposable products as opposed to using a single-delivery provider for reusable products. Studies have found that the ordering and delivering of sterile disposable products has multiple handling steps that contribute to an increase in cost for the HDO.²⁶
 - (5) Waste disposal costs for single-use textiles and basins.
- B. One study showed that the use of reusable textiles in the OR contributes to a considerable decrease in environmental pollution as well as costs.^{9, 32}
- (1) The study showed that reusable textiles cause less environmental pollution than disposable textiles across several spectrums of types of pollution including carcinogens, climate shift, land use, over-fertilization of waters via waste water entry, photochemical oxidation, solid waste and water consumption.⁹ The environmental pollution is a combination of the generation of RMW due to the use of disposable textiles in the OR and the manufacturing processes.⁹
 - (2) CSTs often cover the sterile disposable back table and Mayo stand covers with extra cloth towels to prevent strike-through and tears. The use of non-disposable surgical textiles that meet barrier performance standards are more resistant to strike-through and tears.
- C. It is recommended that central sterile supply departments in cooperation with surgery departments switch from the use of disposable instrument tray wraps (often referred to generically as “blue wraps”) to non-disposable wraps and/or switch to the use of as many rigid containers as possible (some instrument sets, such a microsurgical instrument sets, are not conducive to the use of rigid containers).^{7, 8}
- (1) Disposable blue wraps significantly contribute to a large portion of surgical waste.⁸ One hospital study found that blue wraps contributed up to 55% of the total volume of disposable plastic that were generated by the OR.²⁹ Blue wrap is made of the soft plastic material polypropylene or #5 plastic.²⁹
 - (2) The containers have an upfront cost that can be a significant investment for large HDO’s; however, the rigid containers can be reused continually, driving down the cost of blue wrap and the related waste disposal costs.³² Additionally, there are several other cost-benefit factors the HDO should take into consideration including purchase cost of steam and gas indicator tape, and waste

disposable costs of the tape; cost of rewrapping and sterilizing instrument sets that have torn wraps; labor costs for wrapping and rewrapping instrument sets; cost of blue wraps vs. cost of disinfecting rigid containers and replacing the filters.^{8, 29}

- (3) When a HDO switches to rigid containers in-services should be held for the central sterile processing and OR departments on how to utilize the containers; proper disinfecting; filter replacement procedures; inspection of the external latch, filters, valves and tamper-evident locks in the OR; inspection of the integrity of the filter or valve and gasket.²⁹ These items should be completed based upon manufacturer' IFU's.

It is also recommended that the department's staff complete annual training on rigid containers as well as new hires and the training is documented by the HDO.

Guideline V

Surgery departments should establish a donation program for unopened, unused items as well as certain types of opened, unused items.

1. There are many types of unused supplies generated in the surgery department that can be donated rather than be placed in the waste stream.
 - A. Accredited surgical technology programs are often on a "tight" budget in which the amount of supplies that can be purchased for students to use is limited. Local surgery departments can greatly assist by creating a donation tub in which extra supplies are placed for the Program Director to pick up on a weekly basis. For example, a surgical procedure is cancelled, but all the supplies were already opened; the surgery department could place the opened, but unused gowns, drapes, suction tubing, electrocautery, irrigation basins (if disposable), suture, back table sharps container, etc. into the donation tub.
 - B. Veterinarian clinics often accept donations, in particular suture. The outer packet has, obviously, been opened to "flip" the suture onto the back table, but as long as the inner packet is not compromised, the clinic will accept the suture.
 - C. Another important source to provide donations is medical missions and developing countries. The example of the suture provided above illustrates an avenue for providing much needed supplies to medical mission organizations as well as to HDOs in developing countries.

Guideline VI

The use of reprocessed SUDs is recommended to surgery departments to reduce the volume of RMW. Refer to the *AST Standards of Practice on Single-Use Devices* for additional details.

1. More than 60% of medical devices on the U.S. Food and Drug Administration's list of SUDs known to be reprocessed or considered for reprocessing are used in the surgical treatment of patients. This presents a considerable benefit to ORs and ambulatory surgery centers (ASC) for reducing costs associated with the disposal of RMW and purchasing of new SUDs.⁴⁰ The savings is largely realized through the buying back of reprocessed devices often at 40-60% less than the original device.^{24, 30}
 - A. The 2002 *Medical Device User Fee and Modernization Act* (MDUFMA) defines a reprocessed SUD as any "original device that has previously been used on a patient and has been subjected to additional processing and manufacturing for the purpose of an additional single use on a patient."^{16, 41} Examples of SUDs that can be reprocessed and resold include blood pressure cuffs, laparoscopic surgical trocars, pulse oximeter probes, and sequential compression devices.¹⁴
 - B. Twenty-five percent of the more than 6,000 U.S. HDOs and 2,700 ASCs report using at least one type of reprocessed SUD.³⁹
 - C. However, there have been barriers to implementing the use of reprocessed SUDs that revolve around patient safety issues including possible malfunction of reprocessed SUDs; risk of infectious diseases associated with reprocessing procedures; physicians expressing concerns as related to the use of reprocessed devices when the patient has not given consent for use of the device(s) when being treated.¹⁷
 - (1) The federal government has addressed these concerns through various routes, but most importantly the passage of the 2002 MDUFMA requires all reprocessed SUDs to be labeled that includes the name of the reprocessing business.
 - (2) Additionally, the U.S. Food and Drug Administration requires third party reproducers to meet the same standards as the original equipment manufacturer (OEM).³⁹ Third-party reproducers are required to clean, inspect, functionally test, package and sterilize SUDs as such that the device meets the same safe quality and performance functions when the device was first used.²⁴
 - (3) It is important to emphasize that OEMs frequently only test a few of the devices they manufacture, while third-party reproducers test and inspect every device.²⁴
 - (4) In January 2008, the U.S. Government Accountability Office (GAO) released the report *Reprocessed Single-Use Medical Devices: FDA Oversight Has Increased, and Available Information Does Not Indicate That Use Presents an Elevated Risk*. A key section reported that reprocessed SUDs do not present an increased health risk to patients when compared with new, unused devices.⁴² There were 434 adverse events reported to the

FDA between 2003 and 2006 that involved reprocessed SUDs, but only 65 actually did involve a reprocessed SUD, and the adverse events were comparable to events reported for new devices.⁴²

Guideline VII

Surgery departments should complete a comprehensive review of its OR kits and surgeon preference cards as part of an OR kit reformulation program.

1. Certain supplies are routinely placed in OR and anesthesia kits, such as custom back table packs and patient skin preparation kits, and thrown away because they are never used during a specific procedure or procedures.²⁷ This concept referred to as “overage” is a significant source of RMW and drives up costs.²⁷ The surgery department should review its OR kits to remove the excess supplies in order to reduce RMW and costs.²¹
 - A. The review and streamlining of the custom kits should include standardizing the number and types of each item in each kit which can result in decreased inventory, reduced cost of the kits, and reduced amount of waste that translates into lowering waste disposal fees.
 - B. The review of the custom kits should involve the surgeons, CSTs, and RNs.
2. Surgery departments should work closely with the surgeons and commercial businesses that provide the kits to eliminate the unneeded, excess items that are routinely disposed of as waste rather than being used during procedures.³²
 - A. CSTs should work with the surgeons in reviewing preference cards to identify unneeded or excess items, as well as identify items that are needed in the OR during the procedure, but should not be opened unless requested by the surgeon.
 - (1) The surgery staff should audit the surgical procedures prior to revising surgeon preference cards to identify items that are not needed, items that should be in the OR unopened, and items that were opened in excess (e.g., suture packets).³²
 - (2) The review of the preference cards should focus on reducing and standardizing the number and types of items needed for surgical procedures.
 - (3) Two recommendations the surgery department should consider is to only list those items on the preference card that are used more than 90% of the time and/or identify items used 50% or less of the time and mark on the preference card as “hold”.²

Guideline VIII

The surgery department should implement fluid management procedures to improve the handling and disposal of liquid medical wastes.

1. It is recommended that surgery departments decrease staff exposure to bloodborne pathogens and minimize RMW disposal costs by installing fluid management systems in the department.³² An article published in 2004 by *Healthcare Purchasing News* estimated that between 30% - 60% of HDO's continue to have surgical staff manually open the canisters and pour the contents down the drain.⁶ Even though the canisters have been emptied of their contents the empty plastic

canister is still considered RMW that adds the weight of the canister to the RMW disposal costs.²³

- A. Solidifiers can be added to the suction canister and disposed of in red bags; however, this can still predispose surgical and environmental personnel to splashing and spills of potentially infectious material.
- B. It is recommended that surgery departments install an automatic fluid management system (FMS) that flushes blood and body fluids directly to the sanitary sewer to increase safety for the staff, decrease the amount of RMW and offer other long-term cost-savings such as a reduction in the transportation costs of RMW.^{23, 32}
 - (1) FMS are stationary and connected directly into the sanitary sewer of the HDO or situated on a portable cart that allows for automated drainage to the sanitary sewer.²³ However, depending on the system purchased by the HDO there are three types of canisters that are recommended for use by the OR.²³
 - (a) Some FMS require the use of a reusable canister that is disinfected between uses.
 - (b) An integrated canister system is one that is completely enclosed.
 - (c) Some FMS still utilize disposable canisters that can be placed in the regular trash after disinfecting with an enzymatic cleaner. However, this system still contributes to purchasing and disposal costs, and the canisters are not calibrated in order to measure patient fluid loss.
- C. The CDC's publication *The Guidelines for Environmental Infection Control in Healthcare Facilities*, 2003, states that sanitary sewers may be used for safe disposal of blood and suctioned fluids, as long as the HDO meets local sewage discharge requirements, and the state has approved of the disposal method.
 - (1) It is recommended the HDO receives the approval by local and state water officials for the disposal of blood and body fluids into the sanitary sewer prior to purchasing a FMS.²³

Guideline IX

The surgery department should utilize water and energy conservation technologies.

- 1. Due to the surgery department being a significant source of water usage, it should be targeted for installing water conserving methods.
 - A. Low-flow fixtures should be installed in urinals, toilets and showers.
 - B. Motion-sensing devices should be used at the scrub sinks.¹⁴
 - C. Technology for reclaiming water should be installed in the department as long as the reclamation of water does not interfere with infection control, patient safety and sterilization methods.¹⁴

2. The surgery department is also a significant source of energy generation that can benefit from energy conserving methods.³²
 - A. On an overall basis, the HDO should use onsite renewable energy if available, such as wind or solar power.¹⁴ The HDO should complete a cost analysis of installing and using solar power.
 - B. The surgery department should ensure that if one or more ORs are not being used, the lights should remain off.
 - C. Some rooms, such as sterile storage or environmental storage closets, should have motion sensor lights installed.¹⁴
 - D. Light-emitting diode (LED) bulbs are now available for use in OR lighting.¹⁴

Guideline X

The surgery department should participate with all other HDO departments in environmentally preferable purchasing.

1. The Hospitals for a Healthy Environment, a collaborative effort of the U.S. Environmental Protection Agency and American Hospital Association that leads the support of environmentally preferable purchasing defines it as the “act of purchasing products/services whose environmental impacts have been considered and found to be less damaging to the environment and human health when compared to competing products/services.”¹³
 - A. Environmentally preferable purchasing has a direct environmental and public health impact in light of the studies that have shown the effects of current waste disposal practices.^{11, 36} Waste reduction is directly related to purchasing, as most of what is purchased for the HDO eventually becomes the waste that requires disposal.³³
 - B. The Purchasing Department in collaboration with the Surgery Department should support environmentally preferable purchasing by identifying and purchasing supplies from vendors who use environmentally friendly raw materials and products.¹⁶
 - C. Examples of other environmentally preferable purchasing surgery departments should support include:
 - (1) Use only unbleached recycled paper instead of chlorine-bleached white paper since the manufacturing process of the latter releases dioxins as a by-product into water supplies.¹ By using 100% recycled paper, HDOs can decrease manufacturing energy by 44%, greenhouse gas emissions by 37%, and solid waste emissions and water use by 50%.³⁵
 - (2) Identify and purchase safer, more environmentally friendly cleaning products.
 - (3) Purchase products that are free of *diethylhexylphthalate*, latex and polyvinyl chloride to decrease the incidence of allergic reactions, eye injuries, burns, and contamination of food and water supplies.^{13, 35}
 - (4) Purchase reusable sharps containers instead of disposable containers to reduce the amount of medical plastic.^{28, 30} One study

estimates that a 1,000-bed HDO could save approximately \$175,000 per year and reduce RMW by 34,000 pounds by switching to the use of reusable sharps containers.⁷

- (5) Purchase reusable rigid instrument containers.
- (6) Purchase reusables such as gowns, instrument tray wraps and basins.

Competency Statements

Competency Statements	Measurable Criteria
1. CSTs have the knowledge and skills to ensure the environmental policies of the surgery department are implemented on a daily basis in the OR.	1. Educational standards as established by the <i>Core Curriculum for Surgical Technology</i> . ⁵
2. CSTs can serve on as well as participate in the work of an HDO Sustainability Leadership Committee and/or Surgery Department sub-committee.	2. The didactic subject of cost containment and efficiency in the OR is included in a CAAHEP accredited surgical technology program.
	3. Students demonstrate knowledge of cost containment and efficiency in the lab/mock OR and during clinical rotation.
	4. CSTs work with the surgical team members in implementing the sustainability and environmental practices of the HDO.
	5. CSTs participate on the HDO's Sustainability Leadership Committee and/or Surgery Department sub-committee.
	6. CSTs complete continuing education to remain current in their knowledge of environmental and sustainability practices for the OR. ⁴

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Glossary

Diethylhexylphthalate: It is a clear substance that is liquid at room temperature. It can be transferred from the plastics that contain it.

Environmental practices: The application of the most appropriate combination of environmental control measures and strategies.

General waste: Non-hazardous waste that includes drapes, gloves, gowns, sponges, and towels that do not contain blood, body fluids or OPIM.

Going green: Making environmentally friendly decisions including “reduce, reuse, and recycle.”

Infectious waste: Medical waste that has been contaminated by a pathogenic organism and is capable of producing an infectious disease.

Other potentially infectious material (OPIM): As defined by OSHA OPIM includes the following human body fluids: semen, vaginal secretions, cerebrospinal fluid, synovial fluid, pleural fluid, pericardial fluid, peritoneal fluid, amniotic fluid, saliva in dental procedures, any body fluid that is visibly contaminated with blood, and all body fluids in situations where it is difficult or impossible to differentiate between body fluids; (2) Any unfixed tissue or organ (other than intact skin) from a human (living or dead); and (3) HIV-containing cell or tissue cultures, organ cultures, and HIV- or HBV-containing culture medium or other solutions; and blood, organs, or other tissues from experimental animals infected with HIV or HBV.

Sustainability practices: Practices implemented to protect the natural environment, human and ecological health, while driving innovation and not compromising our way of life, including renewable fuel sources, reducing carbon emissions and maintaining the delicate ecosystems of the planet.

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Appendix A

Surgery Department Assessment Checklist

Handling HDO Waste in the Surgery Department

1. How much waste is generated daily by the surgery department?
 - A. What is the total percentage of RMW?
2. What makes-up the waste (e.g., percentage of plastic; percentage of paper products; percentage of RMW)?
3. Does the department already segregate waste?
 - A. What is the level of segregation that is occurring?
 - B. Where is the department's waste stored before collection? Where are the collection points located in the department?
 - C. What type(s) of storage containers are used?
4. How are sharps handled?
5. How is liquid waste handled?
6. Are water and energy conservation methods in place?
7. Does the department recycle?
 - A. What material makes-up the recyclable items?
 - B. What percentage of waste is recycled?
8. Does the department have a donation program in place?

Management

1. Who is responsible for overseeing the sustainability efforts in the department?
 - A. Who are the key people in the department responsible for waste issues?
2. How many surgery personnel are involved in waste collection?
3. What types of worker and patient safety measures are in place?
 - A. Has the assessment revealed any health risks to patients or surgery personnel? If so, what kind of risks?
4. Does the department practice environmentally preferable purchasing?
5. Does the department conduct continuing education and training for surgery personnel?
 - A. If so, how often?
 - B. Is the training included in the orientation of new employees?
6. Does the department participate in community awareness activities of how the HDO has implemented sustainability programs?

Budget

1. How much does the management of the healthcare waste in the department cost the HDO?

2. Is the budget adequate for the management of the healthcare waste?
3. Who pays for hauling and disposal of the healthcare waste?

Healthcare Waste Regulations

1. What are the local, state, and federal healthcare waste regulations that the HDO must follow?
2. What is the cost to the HDO of implementing and following the regulations?

Adopted from *Health Care Waste Management Guidance Note* by LM Johannessen, M Kijkman, C Bartone, D Hanrahan, MG Boyer, and C Chandra; published by The International Bank for Reconstruction and Development/The World Bank; 2000.