



Waste Education Series

Hospital Waste Reduction Checklist

There are a number of steps in establishing a successful hospital pollution prevention program. A pollution prevention *program* involves developing and implementing a continuous strategy to address all waste generated by a facility and procedures for prioritizing and systematically reducing these wastes. A pollution prevention *plan* is a written guide used to chart the progress of the program.

These steps include:

1. Obtain support from top management.
2. Getting the program started by beginning to incorporate the process within the hospital, developing a written pollution prevention plan, and training employees in pollution prevention.
3. Reviewing and describing in detail the processes within the hospital to determine the sources of waste generation and to define a baseline inventory to be used to set goals and evaluate progress.
4. Identifying potential pollution prevention opportunities for the facility.
5. Determining cost of current waste generation and establishing a system of proportional waste management charges for those departments that generate waste.
6. Selecting the best pollution prevention options for the hospital and implementation these choices.
7. Evaluating the pollution prevention program on a hospital-wide basis as well as evaluating specific pollution prevention projects.
8. Maintaining and sustaining the pollution prevention program for continued growth and continued benefits to the hospital. Re-evaluating the program as economic situations change and/or process equipment requires upgrading.

Instructions: Utilize this checklist as a means of establishing and monitoring your hospital waste reduction program. Not all categories will apply to each medical facility and your situation may be unique.

MEDICAL WASTE ADMINISTRATION		
Category	Type of Problem	Waste Reduction Activities
Personnel/ Management Structure	Need for effective waste reduction planning	Designate at least one employee with specific responsibility for developing and implementing environmental programs.
		Set up an environmental coordinating committee
		Conduct internal environmental assessments regularly.
Training	Need for on-going training	Train personnel in all departments for awareness of their roles in waste reduction.
		Environmental concerns should be featured in new employee training, annual safety training and other meetings.
		Use posters, flyers and labeling to remind employees about waste reduction.
		Use signs near sinks and drains, such as mercury solvents, etc.
		Label instruments and processes that use problem materials.
Procurement/ Receiving		Consider potential waste disposal problems when ordering materials or equipment.
		Implement centralized receiving to properly label hazardous materials and track problem substances.
		Reduce excess purchases with careful inventory control using a first-in/first-used scheme.
Contracting		Construction contractors should protect storm drains from dirt, saw-cut slurry, and spills of all kinds.
		Make sure calling system maintenance firms use only approved treatment chemicals
		Require grounds maintenance, landscaping, and cleaning firms to eliminate storm drain discharges and control runoff.

MATERIALS MANAGEMENT

Category	Type of Problem	Waste Reduction Activities
Hazardous Materials	Hazardous wastes, cleaning products, and all other chemicals.	All hazardous materials and wastes should be labeled and stored according to federal, state and local regulatory requirements.
		Segregate non-compatible materials and provide secondary containment.
		Floor drains should be eliminated in all areas where hazardous materials are handled or stored.
		Material Safety Data Sheets (MSDSs) should be readily available for all of the materials used, and accessible to all staff.
		Label containers, instruments, and processes that hold or use problem materials so that each user is aware of his or her responsibility for proper use and disposal.
		Keep bottled chemicals in secured storage, on low shelves (never over sinks) or in storage cabinet with latching doors.
		Prevent bottle breakage and spills by using trays with lips or other specialized carrying containers to transfer chemical bottles between storage areas and labs.
Solid Waste	Recyclables	Minimize use of difficult to recycle plastics and glass containers by selecting appropriate suppliers.
		Stress importance and requirements of State Recycling Law. Increase accessibility to recycling containers.
		Train new hires and existing staff on on-going basis.

MATERIALS MANAGEMENT (CONTINUED)

Category	Type of Problem	Waste Reduction Activities
	Batteries	Phase-out use of mercury containing batteries in medical equipment.
		Set up in-house recycling program for batteries.
		Use re-usable, rechargeable batteries whenever possible.
Recycling	Recyclables that are not recovered and/or are difficult to market	Establish mandatory program for banned items.
		Negotiate with several dealers for best prices.
		Provide convenient location and containers.
		Work with suppliers to take back large containers.
		Provide on-going staff training and support.
Infectious Waste	Non-infectious waste is disposed of in "red bag" trash	Make sure that the wastes meet the infectious waste standards (sharps, bulk blood and body fluids, human tissues, microbiological lab waste).
		Train staff to control infectious waste disposal through proper sorting.
		Work with hauler to understand infectious waste definitions.
	Sharps disposed of in recycling or in regular trash.	Establish convenient sharps collection stations.

HOUSEKEEPING		
Category	Type of Problem	Waste Reduction Activities
Phenolic Disinfectants	Phenolic compounds are toxic and may bioaccumulate in the environment.	Eliminate use of phenolic disinfectant wherever possible. Consider substituting quaternary amine disinfectants.
		If phenols are used, keep concentrations to the minimum recommended by the manufacturer. Use pumps or auto-feed systems that supply the appropriate dose when preparing a solution; prepare only the amount to be used.
		Store both types of concentrated disinfectants in secondary containment to avoid spills.
		Never discharge concentrated disinfectant solution to the sanitary sewer.
Infectious Waste	Cost of infectious waste disposal is high. Wastewater produced by incinerator scrubbers can contain significant amounts of metals.	<p>Minimize the amount of infectious waste generated throughout the hospital or medical facility by:</p> <ul style="list-style-type: none"> *Educating all employees about the nature of appropriate red bag waste and the cost of its disposal. *Encouraging the segregation of non-infectious waste, such as batteries, X-ray film, electronics, thermometers, hazardous waste and packaging.

FACILITIES		
Category	Type of Problem	Waste Reduction Activities
Plumbing	Mercury from inappropriate spill cleanup practices and broken equipment often finds its way to sewer lines and sumps, where it settles at low points such as sumps and traps.	Whenever sewer lines, traps, or sumps are moved or cleaned, caution should be taken to avoid spilling the contents in case mercury is present. Non-water contents must be handled as hazardous waste unless proven otherwise.

FACILITIES (CONTINUED)

Category	Type of Problem	Waste Reduction Activities
Laundry		Make sure no hazardous materials enter the laundry (e.g. thermometers, rags used to clean up hazardous materials spills).
		Reduce water use by recycling gray water and using water-efficient equipment such as tunnel washers and other automated systems.
		If wastewater discharges from laundry facilities contains significant amounts of metals as well as organics, several “pretreatment” options (used by laundries in other settings) are available, including: <ul style="list-style-type: none"> * Equalization * Coagulation/flocculation * Dissolved air flotation * Micro/ultra filtration * Clarification * Oil/water separation
		Store laundry chemicals properly in secondary containment, with incompatible substances separated from each other.
Water Purification Systems	Treatment systems using ion exchange resins and/or reverse osmosis (RO). Deionized (DI) water is used to make up laboratory reagents and to prepare dialysis solutions.	Chemicals used for cleaning and disinfection of deionized water and reverse osmosis systems should be stored properly in secondary containment, with acids and bases separated, on secured shelving and away from sinks.
		Disinfection of reverse osmosis and deionized water should be accomplished without the use of formaldehyde. Sodium hypochlorite, bromine, and peracetic acid disinfectants are appropriate substitutes.
Recirculating Hot Water Systems	Corrosion of copper and lead in plumbing caused by recirculation hot water systems.	Additional corrosion prevention measures may be necessary, such as reduced or intermittent chlorination, lowered or intermittent high temperatures, protective magnesium anodes, alternate piping materials, slower recirculating rates, pH adjustment, and chemical controls such as addition of sodium bicarbonate.
	Disinfection in order to combat infectious agents.	Disinfection systems that use electrolysis to introduce copper and silver ions into the water should be avoided because of the added metals loading to wastewater.

FACILITIES (CONTINUED)

Category	Type of Problem	Waste Reduction Activities
Vacuum Pumps		Water seals should not be used since they can entrain solvents in the seal wastewater. Mechanical pumps without water seals are preferable for water pollution prevention.
		Water aspirators should be replaced with non-water systems.
		Cold traps on vacuum lines can be used to capture volatile chemicals; however, they are rarely adequate for keeping all solvents out of pump seal water and pump oil.
		Do not use single-pass cooling water for vacuum pumps.
		Single-pass pumps should be replaced or retrofitted to recirculating cooling water systems.
Dehumidifiers and Air Conditioners	Condensate from dehumidifiers and air conditioners may be contaminated with small amounts of dirt, corroded metals and oil.	All such condensate flows should be reused when possible (in cooling towers, for example)
		If necessary, condensate drain lines should be repumped to facilitate recycling of the condensate or discharge of the condensate to the sanitary sewer.
		New drainage lines must be pumped to the sanitary sewer, never to the storm drain system.
Water Softening	Common water softeners add considerable salt loading (dissolved solids) to wastewater.	Medical facilities should soften water only where absolutely necessary, such as for hemodialysis.

FACILITIES (CONTINUED)

Category	Type of Problem	Waste Reduction Activities
Limestone Sumps	Acetic wastewater from laboratory areas may need to be neutralized before discharge to the sanitary sewer. Limestone neutralization sumps are common in older construction.	The pH of wastewater from laboratory areas can be controlled in the lab with a combination of proper training and collection or neutralization of acids and bases.
		Limestone and sediments must ultimately be discharged as hazardous waste.
		If a neutralization system is necessary, an appropriate equilibrium tank or neutralization basin should be installed.
Cleaning and Maintenance Products	May contain pollutants such as metals, solvents, and tri-butyl tin.	If possible, eliminate use of the following problem products: <ul style="list-style-type: none"> *Floor waxes or wax strippers that contain zinc. *Toilet cleaning and disinfection products containing tri-butyl tin. *Carpet and upholstery cleaners that contain tri-butyl tin.
		Do not use cooling water system additives that contain copper, chromium, or tri-butyl tin.
		Paint and paint strippers contain solvents and metals that should not be disposed of into the sewer or storm drain system. Solvents and thinners used with oil-based paints should be filtered and reused.
		Limit or eliminate use of copper-based root control products.
		Maintain pools, spas, and fountains without use of copper-based algaecides.

LABORATORIES

Category	Type of Problem	Waste Reduction Activities
Chemistry Labs	Mercury, copper, chromium, cyanide	Lab managers and analysts should be aware of the available options and chose the one that produces the best results with the least amount of waste.
Hematology	Cyanide, formaldehyde, chloroform and other solvents, xylenes, mercury, copper, chromium, zinc	Use cell sorter/counting instruments with cyanide-containing cell lysing solutions.
		The manual iron-cyanide test yields a concentrated cyanide solution that should be collected, stored in secondary containment, and disposed of as hazardous waste.
Chemistry and Hematology labs	Concentrated formaldehyde solutions like Bouin's solution are hazardous wastes.	Waste from atomic absorption (AA) standards for heave metals should be collected and disposed of as hazardous waste. Procedure standards only as needed.
		Minimize use of xylenes for extractions and be sure to collect any waste. Terpene-based solvents (Hemo-D) may be substituted for xylenes used for slide cleaning in some applications.
		Collect and dispose of properly.
		Solvent recovery through distillation is economically feasible in some situations.
		Waste solvents should be collected for disposal as hazardous waste. Included are chloroform and methylene chloride, solvents used for TLC analysis. Minimize extraction sample sizes to reduce the quantity of solvents used.
		Analysis of chloride by ion-selective electrode (ISE) is preferable to the colometric method.
		All solutions from the tituametric method commonly used for the analysis of chloride in sweat are hazardous and must be collected for disposal as a hazardous waste.
	At least one albumin method used a highly concentrated chromium reagent.	Collected for disposal as a hazardous waste.
At least one total protein method uses a concentrated copper reagent.	Collected for disposal as a hazardous waste.	

LABORATORIES (CONTINUED)

Category	Type of Problem	Waste Reduction Activities
	At least one preservative for stool samples contains a concentrated copper solution.	Collected for disposal as hazardous waste.
		Substitute for glucose tests containing zinc.
Pathology/ Histology	Mercury, glutaraldehyde, formaldehyde, alcohols, xylene, other solvents.	Waste glutaraldehyde, formaldehyde, alcohols, xylenes, and other solvents should be collected and disposed of as hazardous waste.
		Store activated glutaraldehyde, formaldehyde, alcohols, xylene and other solvents for 14 to 21 days. After that time discharge.
	Zanker's solution and B5; especially problematic because they contain high levels of mercury.	Discourage the use whenever possible. Expending the additional time and care necessary to obtain excellent specimens using other (non-metallic) fixatives.
Microbiology	Reagents containing heavy metals (such as copper and silver) and solvents.	All staining supplies should be stored in secondary containment.
		Both waste and contaminated rinsate volumes can be reduced if slides are stained with a few drops of solution rather than dipping bath.
		If stains contain hazardous or metal ingredients, rinse slides and containers to a hazardous waste container.
Immuno- diagnosis	Copper sulfate solutions and mercury	Copper sulfate solutions should not be discarded or rinsed into the sewer.
		Find the alternatives to thimerisol used as a preservative in some buffer solutions; sodium azide is one example.
Gross Pathology and Necropsy	Formaldehyde solutions, glutaraldehyde, alcohols, rinses from silver staining, Zanker's solution and zinc sulfate.	All formaldehyde solutions and specimens stored in free solutions should be stored properly in secondary containment, on secured shelving, and away from sinks.
		Water solutions containing metals, including rinses from silver staining and Zanker's fixing should be collected and managed as a hazardous waste.
		Formaldehyde, glutaraldehyde, and alcohols should be stored properly and collected for proper disposal.
Equipment Containing Mercury	Mercury	Replace mercury-containing equipment with equipment that does not contain mercury.

LABORATORIES (CONTINUED)		
Category	Type of Problem	Waste Reduction Activities
		Use some of the many available alternatives to mercury thermometers, including alcohol (red) and digital thermometers for equipment such as lab ovens and water baths.
		Make sure mercury spill cleanup kits are available in all areas where mercury-containing equipment is used.
		Make sure the individual designated by the hospital's environmental health and safety department cleans up all mercury spills. If your facility does not have such a person, instruct all employees in the proper handling and disposal (usually recycling) of mercury.

CENTRAL STERILIZATION		
Category	Type of Problem	Waste Reduction Activities
	Of the wide range of sterilizing processes used, there are certain cold sterilants (glutaraldehyde, formaldehyde, and phenols), and institutional dishwashers using caustic cleaners and ethylene oxide chambers.	Cold sterilizing solutions containing glutaraldehyde or formaldehyde should be minimized or eliminated where possible.
		Sonic sterilization may be used alone or in conjunction with solutions.
		Try using alternative liquid sterilants including, among others, formulations of peracetic acid, acetic acid and hydrogen peroxide.
		Steam sterilization (autoclaving) produces little or no chemical waste.
		Large industrial-type dishwashers may be used for sterilizations as well as cleaning.
		Use of ethylene oxide (EtO) requires air emissions control devices.
		Evaluate alternative methods including gas phase hydrogen peroxide, electron beam, gas plasma, and microwave.

HEMODIALYSIS		
Category	Type of Problem	Waste Reduction Activities
	Disinfection of dialysis equipment and the associated reverse osmosis (RO) systems used to purify dialysis water can cause water pollution problems if formaldehyde-based disinfectants are used.	A solution of peracetic acid, acetic acid and hydrogen peroxide (such as Renalin or Actril) can be substituted for formaldehyde-based disinfectants.
		RO units can be made compatible with peracetic acid disinfectants through pretreatment to remove any iron, which may react with the oxidizing solution and form holes in the membrane.
		Use of peracetic acid disinfectants with the small membrane cartridges and in the dialysis equipment itself can also reduce the volume of hazardous waste generated.
		Equipment that can be heat-disinfected may be available in the near future.
		Any dialysis unit that is still using formaldehyde for disinfection should collect all waste solutions and dispose of them as hazardous waste.

RADIOLOGY		
Category	Type of Problem	Waste Reduction Activities
	Silver (in spent processor solutions), chromium (in developer cleaners) and selenium (in some toners)	Haul off-site for recycling.
		In large facility, centralized treatment of spent fixer reduces the amount of sampling required as well as the number of systems to be maintained.
		If processors are cleaned with a chromic acid solution such as Kodak's Liquid Developer System cleaner, spent cleaning solutions and rinse water must also be disposed of as a hazardous waste.
		Spent photochemicals containing selenium such as Kodak Rapid Selenium Toner must be disposed of as hazardous wastes.
		Newer, well-maintained equipment generally uses less water and smaller volumes of chemicals, with reduced carry-over of silver-bearing fixer into the rinse water.
		Silver can be recovered effectively and economically with silver recovery units.
		Films should be recycled for silver content.

RADIATION THERAPY		
Category	Type of Problem	Waste Reduction Activities
	Wastes containing lead, cadmium, and other metals, and low-level radioactive waste.	
Lead Shielding	Lead shielding to protect patients during radioactive therapy is normally either machined from lead blocks or poured in molds	All machining waste (from sawing, filing and washing operations) must be collected and disposed of as hazardous waste.
		Any wasted from washing, filing or other working of the casts should be collected and disposed of as hazardous waste.
Radioactive Waste	Radioactive waste results from the use of tracers and other radioactive diagnostic and treatment procedures.	Follow all Nuclear Regulatory Commission (NCR) regulations concerning the disposal and storage of radioactive materials and waste.

NURSING AND PATIENT CARE		
Category	Type of Problem	Waste Reduction Activities
	Disinfection supplies, medicines and other pharmaceutical products, and spills from mercury-containing equipment such as thermometers and blood pressure cuffs.	Use some of the available alternatives to mercury thermometers, such as electronic sensors, digital thermometers, and temperature strips.
		Mercury spill cleanup kits should be available in all areas where mercury-containing equipment, such as thermometers and blood pressure cuffs, is used.
		Do not send mercury thermometers home with patients.
		Blood pressure cuffs with electronic sensors are available. Replace the mercury-containing devices where appropriate.
		When possible, substitute Anderson tubes for Canter tubes. The Anderson tube contains no mercury and can be an acceptable substitute.
		Make sure the individual designated by the environmental health and safety department cleans up all mercury spills.

PHYSICIANS

Category	Type of Problem	Waste Reduction Activities
	Mercury, selenium, and zinc.	<p>Instruct staff to use the alternatives to mercury thermometers, such as digital thermometers, electronic sensors and temperature strips.</p> <hr/> <p>Until all mercury-containing equipment is eliminated from your office:</p> <ul style="list-style-type: none"> *Make sure mercury spill cleanup kits are readily available in all areas where mercury-containing equipment is used. *Clean up all mercury spills properly and completely. *Do not send mercury thermometers home with patients. *When possible, replace Canter tubes for Anderson tubes which contain no mercury and can be an acceptable substitute. <hr/> <p>Whenever possible, prescribe non-metallic shampoos and medications.</p> <hr/> <p>Evaluate drug ingredients for metals, and prescribe non-metallic alternatives when feasible.</p>

PHARMACY

Category	Type of Problem	Waste Reduction Activities
	Silver, selenium and other metals.	Pharmacists recommend over-the-counter medications, suggesting less-toxic substitutes for hazardous formulations, including dandruff shampoos and zinc ointments.
Silver Solutions and Ointments		Silver nitrate solutions with silver concentrations above 5 ppm must be collected and disposed of as hazardous waste.
Chemical Storage and Disposal		Pharmacy personnel should inventory chemical stores periodically and properly dispose of all chemicals that are no longer used, including expired medicines.
		No pollutant-containing products should be dis-carded to the sanitary sewer. Substances to be aware of include hazardous wastes and all products containing silver, cadmium, chromium, copper, cyanide, lead, mercury, nickel, selenium and zinc.
		Keep bottled chemicals in secured storage, on low shelves (never over sinks) or in storage cabinets with latching doors.
		Store acids separately from bases, and flammables separately from oxidizers.
		Make sure all chemical containers are clearly labeled.
		Provide secondary containment for all hazardous materials and waste storage.
		Prevent bottle breakage and spills by using trays with lips or other specialized carrying containers when transferring chemical bottles between storage and labs.
		Provide only minimum amounts and collect all waste.
Compounding	Pour or mix liquid chemicals within a tray or other secondary containment, so that spills will not reach a drain.	
	When compounding powders, clean up "dust" using dry cleanup methods as soon as possible, so that chemicals will not reach the sewer during routing wet cleaning operations.	

County Extension Information	SHWEC Offices	
	<p>Green Bay</p> <p>University of Wisconsin Environmental Science 317 2420 Nicolet Drive Green Bay, WI 54311 414/465-2707 Fax: 414/465-2143</p> <p>Stevens Point</p> <p>College of Natural Resources University of Wisconsin Stevens Point, WI 54481 715/346-3624 Fax: 715/346-3624</p>	<p>Milwaukee</p> <p>UWM UW-Extension SHWEC 161 W. Wisconsin Ave Suite 6000 Milwaukee, WI 53203- 2602 414/227-3175 Fax: 414/227-3165</p> <p>Madison</p> <p>610 Langdon Street Room 529 Madison, WI 53703 608/262-6250 Fax: 608/262-6250</p>