



P. W. GROSSER
CONSULTING, Inc.

Winter 2017

Special points of interest:

- **Under Ecology guidelines clinics must manage their own pharm waste**
- **Managing Anesthetic Liquid and Liquid Nitrogen Spills**

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Hospital Waste

How Do Your Clinics Manage Pharm Waste?

Many hospitals have associated community clinics, which produce varied waste streams of generally small volumes. In the past, waste from these clinics was often transported back to the main hospital for disposal, particularly expensive waste streams like biohazardous, hazardous and pharmaceutical waste. In many cases this was allowed under the U.S. Department of Transportation's *Materials of Trade* regulations.

The transport of pharmaceutical waste, whether non-hazardous (Washington State Only) or RCRA hazardous, from a clinic back to a hospital as a management step is now specifically prohibited under Ecology's *Interim Pharmaceutical Waste Policy*.

If clinics are managing their pharmaceutical waste under this policy, each clinic must manage its own pharmaceutical waste. Pharmaceutical waste can no longer be trucked to the main hospital for management.

There are, of course, several ways for any healthcare facility to manage pharmaceutical waste. A clinic could manage all its pharmaceutical waste as dangerous waste. This method can be economical if the volume of waste is fairly small; the problem is that each vial, tube, IV bag or other container must be listed on a waste manifest. The waste can be hauled away by a licensed hazardous waste vendor for either incineration or landfill burial.

Pharmaceutical waste can also be commingled as a single waste stream and managed under Ecology's *Interim Pharmaceutical Waste Policy*. If there is any RCRA federal waste (D-, U-, or . listed waste) present, then the entire waste stream must designate as hazardous waste and be incinerated at a RCRA Part B-permitted facility. If only non-hazardous pharmaceutical waste is generated, it can be incinerated at a medical or municipal incinerator at lower cost.

Finally, pharmaceutical waste can be managed under Ecology's policy but segregated at the point of generation, usually into Washington State Only non-hazardous waste and RCRA hazardous waste streams. The former can be incinerated at either a municipal or medical waste incinerator, while the latter—which is usually a small part of the pharmaceutical waste generated by a healthcare facility—must be incinerated at a RCRA Part B-permitted facility. All chemo waste, whether trace or bulk, should also be managed as RCRA hazardous waste.

Most Washington hospitals—and now clinics—manage their pharmaceutical waste in this last manner by segregating different components at the point of generation. It does require training and education of caregiver staff, as well as a contract with a hazardous waste vendor.

Required Destruction of Empty Pill Bottles? EPA Rule is Up in the Air

EPA's draft Hazardous Pharmaceutical Waste Rule, published in September 2016, contained a provision that would require healthcare facilities to destroy virtually all empty pill bottles. The presumption is that EPA and the FDA are concerned about counterfeiting—the re-use of legitimate bottles by garage pill-makers selling counterfeit drugs.

The prospect of attempting to punch holes in empty plastic pill bottles and crush glass bottles strikes fear into the hearts of safety and occupational health professionals everywhere. Besides flying glass shards or the danger of mis-hitting a punch on a round pill bottle is the exposure of staff to aerosol droplets and powder.

Presently many healthcare facilities recycle or discard empty pill bottles in the trash, which is allowed. This practice may not be allowed after 2018.

Legally, EPA could require destruction only for RCRA hazardous waste pill bottles. However, Ecology would probably extend this provision to non-hazardous, Washington State Only pharmaceutical waste if the EPA retains the provision in its final rule. Ecology is expected to publish its final

hazardous pharmaceutical waste rule in late 2018 after a review of EPA's final rule.

Although some Ecology sources believe that the EPA will retain the provision to destroy pharmaceutical containers in the final rule, sources close to EPA rule-making staff in Washington, D.C. believe that the public outcry has doomed this provision.

A compromise could also result: the EPA could require only the destruction of empty controlled substance bottles. If this is the EPA's ruling, Ecology may not extend the requirement any further for Washington.

The problem of crushing pill bottles will be a national one, so it is likely that—if the provision becomes part of the final rule - there will be commercially available pill bottle grinders very soon. These may be countertop devices, but more likely will be free-standing machines of some considerable size, bulk and cost. Crushing glass and plastic bottles will require heavy-duty motors and grinding augers.

EPA is expected to release its final rule late in the first quarter of 2018.

When does Lactated Ringer's Designate as Dangerous Waste?

Lactated Ringer's (LR), or Hartmann's Solution, is commonly used to replace fluids and electrolytes in patients with low blood volume or low blood pressure during surgery or labor. It has a similar osmolarity to body fluids and is an isotonic solution, meaning that it maintains the electrolyte balance inside and outside blood vessels. Usually it has a common formula:

Sodium chloride 6 g/L, sodium lactate 3.1 g/L, potassium chloride 0.3 g/L, and calcium chloride 0.2 g/L. It's pH is usually between 6.0 and 7.5. It may contain 5% dextrose and be labeled D5LR.

In these formulations Lactated Ringer's does not designate as a dangerous waste. When no longer needed, it may be safely discharged to the sanitary sewer without pretreatment. It is exempt from the requirements of Ecology's Interim Pharmaceutical Waste Policy.

However, the composition of Lactated Ringer's can vary depending upon a patient's diagnosis. If a drug is added to the LR, the entire solution will likely designate as a dangerous waste. Under Washington pharmaceutical waste rules, only sugar and salt solutions do not designate as dangerous waste.



Anesthesia Gas Exposure in the PACU

Recent investigations into anesthesia gas leaks and staff exposure at a number of Portland, OR area hospitals have revealed that PACU staff may be regularly exposed to high levels of anesthesia gases.

While most anesthesia gas machines in operating suites exhibit little to no hazard to OR staff, manufacturer's recommended maintenance schedules are not always followed. Leaks were found in gaskets, valves, hoses and clamps at several hospitals. Of particular note are Nitronox and Pro-Nox machines in Labor & Delivery. Employee training, adequate room ventilation rates and poor maintenance were regular issues.

Additionally, surgery patients evidently continue to breathe out anesthesia gases for 30 to 60 minutes after their procedures. During this time staff in the PACU are often in the patient's breathing zone while monitoring their recovery. There is seldom adequate provision in the PACU for ventilating these anesthesia gases. Occupational exposure limits for nitrous oxide, Sevoflurane, Isoflurane and Desflurane were regularly exceeded in the PACU of the hospitals where testing occurred.

Empty Pharmaceutical Container Management

With the expected publication of EPA's *Hazardous Pharmaceutical Waste Rule* in April 2018, the management of your empty pharmaceutical waste containers is potentially going to become even more difficult.

Because nearly all pharmaceutical waste designates as dangerous in Washington, you have the option of managing such containers under either Ecology's *Interim Pharmaceutical Waste Policy* or the dangerous waste regulations.

The following is a distillation of a new flow chart developed by Ecology staff for the management of pharmaceutical containers.

IPWP Management

Is the container a syringe? If the plunger has been fully depressed, the container is considered solid waste. If not, the syringe is not empty and should be managed as dangerous waste under the IPWP.

Is it a unit-dose container (vial, ampoule, patch, packet, cup, blister pack, or bottle holding ≤ 1.0 L or $\leq 1,000$ pills)? If the container has an original manufacturer label, the container may have to be destroyed to prevent further use [Note: this provision

may or may not be implemented after the publication of EPA's final rule. See accompanying article on the destruction of pill bottles]. If there is no original label, it is considered solid waste. If it is not a unit-dose container (IV bag, nebulizer, tube or bottle holding > 1.0 L or $> 1,000$ pills) the container is not empty and should be managed as dangerous waste under the IPWP.

Dangerous Waste Management

Did the container hold a P-listed waste as the sole active ingredient? If yes then it is not empty and you must designate the container and contents.

Is there $< 3\%$ of the container volume remaining? If not, the container is not empty and you must designate the container. If yes, did the container hold chemotherapy drug? If yes, then manage the container as dangerous waste. If it did not contain a chemo drug, the container is empty and may be managed as solid waste.

Ecology's flow chart for the management of empty pharmaceutical waste containers is not yet publicly available, but is expected to be soon.





17629 NE 138th Street
Redmond,
Washington 98052-1226

Phone: 425-883-0405
Fax: 425-895-0067
E-mail: ajones@pwgrosser.com



Hospital Waste is published quarterly for hospital, clinical and medical laboratory waste and hazardous material managers to assist them in managing these materials.

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When Anesthetic Liquid or Liquid Nitrogen Spills ...

Anesthetic liquids such as halothane, enflurane, isoflurane or sevoflurane readily evaporate at room temperature. If an amount of liquid less than one bottle spills, the best advice is to allow it to evaporate. In an OR suite, the liquid can be suctioned up.

If a bottle or more of anesthetic liquid should spill—which is less likely these days because the bottles are plastic—then a Code Orange should be called. Use an ab-

sorbent material such as granules or a pad to absorb the liquid, then bag and label the debris. Because of the chemical nature of most anesthetic liquids (not including nitrous oxide), this waste will designate as an Extremely Hazardous Waste in Washington: WP01. Empty anesthetic liquid bottles do not designate and may be discarded in the trash or recycled.

See the Occupational Safety and Health Administration's *Anesthetic Gases: Guidelines for Workplace*

Exposures for additional information.

Liquid nitrogen also occasionally spills in patient settings. The best advice is to simply allow the liquid to evaporate, regardless of how much spilled. Note that 78% of our atmosphere is nitrogen; you won't be causing any pollution by allowing liquid nitrogen to evaporate. Further, because it is a cryogen, do not touch the spilled liquid.