

Reducing pharmaceutical waste from patient care settings

This fact sheet provides information on proper disposal of pharmaceutical waste as well as suggesting ways to reduce waste. For more information about reducing pharmaceutical waste visit MnTAP's pharmacy Web page at mntap.umn.edu/health/pharm.htm.

Scientists are detecting concentrations of pharmaceuticals in streams and rivers across the nation, according to the U.S. Geological Survey. This is due in part to pharmaceuticals entering the sewer system, through excretion of partially metabolized pharmaceuticals and disposal of unused or expired medications down the drain.

Little is known about the potential health effects to humans or aquatic organisms exposed to low levels of these chemicals or their mixtures. Concerns have been raised about possible hormone disruption, antibiotic resistance, and other effects. Studies are being conducted.

Disposal

Drains and toilets became a dumping ground for medications at health care facilities and in households. However, wastewater treatment plants were never designed to treat pharmaceutical waste, nor can they effectively or economically be designed now to remove these chemicals from our water. Regulations give guidance to proper disposal methods. Consult your sewer authority and your hazardous waste regulatory staff before sewerage any waste. In general:

- Unwanted medications should NOT be disposed of down drains or toilets
- Dispose of unwanted or expired medication with hazardous waste

Incineration is only legal at permitted facilities. Minnesota health care facilities, that did not have permits, have received large fines for burning pharmaceutical waste. Hospitals are reporting 10-fold increases in costs for managing pharmaceutical waste. A hospital with over 600 beds is spending about \$400,000 a year for hazardous waste disposal, which includes its pharmaceutical waste. The best management practice is to minimize the amount of unwanted, expired, or waste medication.

Epinephrine

Epinephrine is a commonly used drug. It is found on crash carts and used in many surgical applications. Waste epinephrine can contribute significantly to a facility's disposal costs.

Stock Rotation

Pharmacy technicians at Tri-County Hospital and Hennepin County Medical Center (HCMC) conduct an inventory analysis of all crash carts and stations in rooms housing epinephrine. Short-dated medications are removed and reallocated to areas of high use.

Additionally, an inventory analysis by a MnTAP intern at Tri-County Hospital in Wadena showed that the facility could reduce the stock on ambulances by six vials of epinephrine and 15 vials of lidocaine, both key hazardous wastes for the facility.

Alternate Packaging

A MnTAP intern discovered that HCMC used a fraction of the 250 epinephrine intracardiac syringes purchased in one year. The only significant difference of the intracardiac syringe from other epinephrine syringes is its 18-gauge, 3.5 inch needle. HCMC substituted a packaged 100 microgram per milliliter (mcg/ml) syringe with an 18-gauge needle affixed to the outside of the box. This allows for stock rotation to reduce hazardous waste by 13 pounds per year and dual waste by 7.5 pounds, saving \$900 a year.

Operating Room

Epinephrine is used in operating rooms to minimize bleeding from cataractectomies, orthopedic, and abdominal surgeries. To reduce epinephrine waste associated with these procedures, minimize the container size used for saline/epinephrine solutions.

One Minnesota surgery center is using a lidocaine/epinephrine mixture in a 3cc syringe as a local anesthetic in the field rather than

diluting a 500cc epinephrine/saline mixture. For shoulder procedures, tubing is capped and changed between patients, use the epinephrine/saline solution. This ensures aseptic technique while reducing the 3000cc of waste that results when new solutions are diluted for each procedure.

Purchasing/Inventory Management

Analyze the demand for pharmaceuticals with par usage reports, which computerized inventory systems can output. Determine if dosage types are redundant and can be consolidated. The MnTAP intern at Tri-County Hospital determined that 157 medications were purchased in multiple dosages and 3% of returns through reverse distribution were formularies with multiple dosages, costing \$1,450 annually.

HCMC was purchasing glucose gel in 15-gram (gm) tubes for its crash boxes, where it often went unused, and using 45-gm tubes in the Omnicells for diabetics. The facility's diabetics committee recommends 30 grams as a regular dose, ordering 45-gm packages ensures a 30% waste. The facility switched to purchasing 15-gm tubes and rotates stock from the crash boxes to reduce costs by \$345.

Most hospitals use computerized inventory management systems; however, some facilities are not tapping into the potential of the systems for managing their pharmaceutical inventories. The systems generally can track historical use and wastes, compile reorder lists, determine the amount of each formulary to be stocked, and label formularies.

Reverse Distribution

Health care facilities should sort their own pharmaceuticals set aside for reverse distribution because under hazardous waste rules, health care facilities need to know what they are disposing of. Tri-County found that the cost for sorting its own waste was the same as having its waste hauler do it.

As environmental regulators scrutinize health care hazardous waste more, reverse distributors are accepting fewer products for return as they require disposal as hazardous waste. Also,

if pharmaceuticals returned through reverse distribution are not credited, regulators may view them as hazardous waste.

The American Society for Health System Pharmacies states that the national average for pharmaceutical returns is 2%. Benchmarking themselves against this figure, HCMC (4%) and Tri-County (9%) were motivated to reduce their returns. Doing so has saved Tri-County over \$30,000 and HCMC over \$70,000 annually.

Top 10 Returns

In the summer of 2006, MnTAP interns reviewed the reverse distribution logs of HCMC and Tri-County Hospital to determine the formularies that comprised the largest number of returns. These lists may provide insight into inventory management improvement opportunities at other facilities.

| | HCMC | Tri-County Hospital |
|----|-----------------------|---------------------|
| 1 | Crash box epinephrine | Combivent |
| 2 | Epinephrine | Humalog |
| 3 | Glucagen | Lantus |
| 4 | Glucose gel | Morphine sulfate |
| 5 | Nitrostat | Novolog |
| 6 | Hydralazine | Pneumovax |
| 7 | Lidocaine | Synthroid |
| 8 | Amiodarone | Cetacaine |
| 9 | Adenosine | Ketamine |
| 10 | Naloxone | Nubain |

Stock Rotation

The two facilities identified crash boxes, crash carts and ambulances as locations with the greatest potential for products to expire and become waste. Rather than letting products expire on floor, both facilities developed plans to bring back high use items two to three months prior to expiration for redistribution through the pharmacy.

Sample Waste

Samples left by pharmaceutical representatives are often short dated or sometimes have expired. During one two-month time frame, HCMC accumulated 35 pounds of expired sample waste, costing it \$520 in disposal and sorting fees.

Because many samples were not being logged, HCMC moved its sample log from the pharmacy to the Purchasing Department to make it more accessible to visiting pharmaceutical representatives. A new policy was developed making Purchasing responsible for logging samples and only allowing samples with one year or longer for expiration.

Some health care facilities allow short dated samples to be used at homeless shelters. Facilities should be careful with this practice and not use it as a means to dump waste. They need to have a clearly defined disposal plan for outdates.

Investigational Drug Waste

Many hospitals conduct educational research. Investigational drugs left over from clinical trials may require disposal as hazardous waste. Accept only the amount of drug that will be used during the trial to minimize the volume that must be disposed of as hazardous waste.

IV Bags

When a hospital patient's care changes, their prepared IV bags may become waste. PVC-free IV bags weigh one-third less than those made of PVC bags. Reducing the weight of the waste reduces management costs. At one health care facility, switching to PVC-free IV bags was estimated to save \$165 per drum.

References

Pharmaceuticals, Hormones, and Other Organic Wastewater Contaminants in U.S. Streams fact sheet <<http://toxics.usgs.gov/pubs/FS-027-02/>>.

Discussion Paper on Pharmaceutical Disposal to Sewer Systems, Emerging Contaminants Workgroup of the Santa Clara Basin Watershed Management Initiative, February 2005 <http://www.baywise.info/images/WMI_Pharm_White_Paper_FinalMarch05.pdf>.

For More Information

Our information resources are available online at <mntap.umn.edu>. For personal assistance call MnTAP at 612.624.1300 or 800.247.0015