



Vermont Legislative Research Shop

Pharmaceutical Residues in the Water

The improper disposal of pharmaceutical waste products has caused several harmful effects on the environment. Studies performed on *Acinetobacter* samples revealed that bacteria exposed to increased concentrations of pharmaceutical waste are more likely to become anti biotic resistant (Guardabassi et al, 2008.). In Canada, male minnows exposed to low levels of estrogen experienced feminization and became inter sexed, producing both sperm and eggs (Kidd, 2007). Similarly, a Florida alligator population exposed to pharmaceutical waste experienced hormonal abnormalities that affected their reproductive development (Guillette *et al*, 1994). Similar effects could cause long term damage to Vermont's ecological resources; however, the Environmental Protection Agency and Food and Drug Administration have found no evidence to date of any human health concerns related to pharmaceutical waste residues (see US Food and Drug Administration and US Environmental Protection Agency in "Works Cited" below).

Waste Accumulation

Waste effluents enter water sources through several pathways. When a medication is not completely absorbed in the body, it is released by a patient in his/her waste (Christenson, 2008). It then enters the sewer system; however, modern sewer systems do not possess the technology needed to breakdown organic waste, including pharmaceutical products. Additionally, many individuals are left with excess medications either because they no longer feel they need to take them, or because their doctor prescribed a dose that was in excess of their need. In this situation, individuals have historically been instructed to flush the medications in the toilet to avoid the accidental poisoning of children or contributing to the illegal drug market. Current federal guidelines maintain that flushing is an improper disposal technique; however, the public has not been made properly aware of this change (US Office of National Drug Control Policy, 2007).

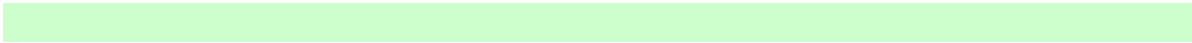
Federal Guidelines

Hospital disposal of pharmaceutical waste is controlled by strict guidelines outlined in the federal Resource Conservation and Recovery Act of 1976 (RCRA). These guidelines divide pharmaceutical waste into several classifications, based on ignitability, toxicity, corrosivity and reactivity (Smith, 2002). The P list contains the most hazardous medications, including nicotine, epinephrine, and warfarin. These medications must be taken off site to a certified hazardous waste incinerator for disposal. The U list contains less hazardous medications that can be

incinerated on site at a lower temperature before transfer to a landfill. These guidelines, although somewhat confusing, appear to be in line with current recommendations for environmental concerns. Enforcement of RCRA guidelines, however, has been a problem in recent years (Christenson, 2008).

Vermont Policy

Vermont has a handful of small collection services that allow for residents to dispose of



Source: Rubinstein, Lynn. Operating Unwanted Medication Collections

physicians to determine which patients are most likely to follow dosing instructions, and has allowed for the reevaluation of initial prescription levels. This has reduced the amount of consumer waste produced (Christenson, 2008).

Single Day Collections

Similar to continuous drop off programs, Utah and Nebraska have designated certain days for the collecting of unused, unwanted or unneeded medications. These days are publicized in the local media and drop off sites are supervised by local law enforcement officials to prevent the misuse or illegal sale of drugs. On the collection day, medications are collected at pharmacies, shipped to a hazardous waste facility and incinerated. In 2005, South Portland, Maine had a one day take back event sponsored by the North East Recycling Council. On this day, 50 gallons of medications from 52 people from 17 Maine communities, which was credited with preventing more than 55,000 pills from entering the waters and helped educate consumers about the importance for proper disposal of medical waste (Hinchey Mallory, 2007).

Mail back Program

In 2004, Maine House Representative Bromley, of South Portland, Maine proposed House bill L.D. 1826 entitled "An Act to Ensure the Proper Disposal of Expired Pharmaceuticals". This bill created the Unused Pharmaceutical Disposal Program to allow residents to mail unused or expired medications to the Maine Drug Enforcement Agency. The bill ~~Enforcement Act~~ Enforcement Act

Works Cited

- Burlington Police Department. "Prescription Drug Repository Program." Press release. 6 Oct. 2008. Accessed 29 Jan. 2009
http://www.bpdvt.org/Informational%20Resources/Prescription%20Drug%20Repository%20Program_Press%20Release%20&%20Flyer.pdf>
- Cauchi, Richard. "State Prescription Return, Reuse and Recycling Laws" National Conference of State Legislatures 12/1/2008. Accessed 10 February 2009
http://www.ncsl.org/programs/health/Rx_Reuse.htm
- Christensen, Teirney. "Fish on Morphine: Protecting Wisconsin's Natural Resources Through a Comprehensive Plan for Proper Disposal of Pharmaceuticals." *Wisconsin Law Review* 2008 (2008): 142-62.
- Environmental Protection Agency, US. "Frequently Asked Questions" *Pharmaceuticals and Personal Care Products*. Accessed 10 Feb. 2009 <http://epa.gov/ppcp/faq.html>
- Food and Drug Administration, US. "How to Dispose of Unused Medications." 23 June 2008. Accessed 10 Feb. 2009
http://www.fda.gov/consumer/updates/drug_disposal062308.html
- Guardabassi, Luca, Andreas Peterson, John E. Olsen, and Anders Dalsgaard. "Antibiotic Resistance in *Acinetobacter* spp. Isolated from Sewers Receiving Waste Effluents from a Hospital and a Pharmaceutical Plant." *Applied and Environmental Microbiology* 64 (1998): 3499-502.
- Guillette, Louis J., Timothy S. Gross, Greg R. Masson, John M. Matter, and H. F. Percival. "Developmental Abnormalities of the Gonad and Abnormal Sex Hormone Concentrations in Juvenile Alligators from Contaminated and Control Lakes in Florida." *Environmental Health Perspectives* 102 (1994). Accessed 10 Feb. 2009
http://www.ehponline.org/members/1994/102_8/guillette_full.html
- Hinchey Mallory, Elizabeth and Susan Boehme. "Unwanted Medicine Take back Programs" *Disposal of Unwanted Medications: A Resource for Action in Your Community*. Illinois Indiana Sea Grant Program. June 20, 2007. Accessed 10 February 2009
<http://www.iisgcp.org/unwantedmeds/>
- Kidd, Karen A. "Collapse of a fish population after exposure to a synthetic estrogen." *Proceedings of the National Academy of Sciences of the United States of America* 104 (2007): 8897-901. Accessed 10 Feb. 2009
<http://www.pnas.org/content/104/21/8897.full>

Maine State Legislature. L.D. 1826 An Act to Encourage the Proper Disposal of Expired Pharmaceuticals. Sponsored by Senator Lynn Bromley. Introduced 1/8/2004. Accessed 10 February 2009

<http://janus.state.me.us/legis/LawMakerWeb/externalsiteframe.asp?ID=280012218&LD=1826&Type=1&SessionID=5>

Northwest Product Stewardship Council. "Pharmaceuticals and Product Stewardship: Other U.S. Programs" Updated 1/23/2009. Accessed 10 February 2009

<http://www.productstewardship.net/productsPharmaceuticalsOtherUS.html>

Office of National Drug Control Policy. February 2007. "Proper Disposal of Prescription Drugs". Accessed 10 February 2009

http://www.whitehousedrugpolicy.gov/publications/pdf/prescrip_disposal.pdf

Pines, Eydie and Charlotte Smith. "Managing Pharmaceutical Waste" Hospitals for a Healthy Environment April 15, 2006. Accessed 10 February 2009

<http://www.h2eonline.org/docs/h2epharmablueprint41506.pdf>

Rubinstein, Lynn (2006, September). Operating Unwanted Medication Collections A Legal and Safe Approach. Accessed January 29, 2009